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Preface

SIMATIC NET

S7-CPs for Industrial Ethernet CP 343-1 ERPC

Manual

Manual Part B

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

indicates that death or severe personal injury will result if proper precautions are not taken.

WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

CAUTION

without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

NOTICE

indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

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

Qualified Personnel

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

Proper use of Siemens products

Note the following:

WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be adhered to. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of the Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

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

Preface

Product names

This document contains information on the following product:

CP 343-1 ERPC Order number 6GK7 343-1FX00-0XE0 Hardware product version 1 Firmware version V1.0

for SIMATIC S7-300.

In this document, the term "CP" is used instead of the full product name.



- 1 C-PLUG (rear of device)
- 2 Order number
- 3 X = placeholder for hardware product version

CP 343-1 ERPC

Address label: Unique MAC address preset for the CP

The CP ships with a MAC address preset in the factory for the Ethernet interface. The MAC address is printed on the housing behind the hinged front panel.

Cooperation partner for ERPC functions

Cooperation partner for ERPC functions is:

ILS Technology LLC 5300 Broken Sound Blvd. Suite 150 Boca Raton, FL, USA, 33487 Phone: +1-561-982-9898 x 124 Fax: +1-561-982-8638 E-mail: devicewise@ilstechnology.com Preface

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Properties / services

1.1 Application

Automation system

The CP 343-1 ERPC communications processor is designed for operation in a SIMATIC S7-300 automation system. It allows connection of the S7-300 to Industrial Ethernet.

Ethernet interface

To allow connection to Ethernet, the CP also has an interface complying with the gigabit standard IEEE 802.3ab. The Ethernet interface supports autocrossing, autonegotiation and autosensing.

ERPC functions

The ERPC functions allow communication by the CP 343-1 ERPC via LAN to an ERP subscriber, for example, an ERP system or an MES. The ERPC application that runs on the CP 343-1 ERPC handles the communication between the S7 station at the automation level and ERP system at the enterprise management level.

You will find the requirements for this communication in section Procedure for using the ERPC functions (Page 40).

1.2 Communication services

1.2 Communication services

Supported communication services

The CP supports the following communication services:

- S7 communication and PG/OP communication with the following functions:
 - PG functions (including routing)
 - Operator control and monitoring functions (HMI) Multiplexing PG/OP connections
 - Client and server for data exchange via communication blocks on S7 connections configured at both ends
 - Communication blocks: FB12, FB13, FB14, FB15, FB8, FB9, FC62 (see also STEP 7 online help or the manual "System Software for S7-300/400 System and Standard Functions")
 - Server for data exchange on S7 connections configured at one end only without communication blocks on the S7300 / C7300 station
- Open communication services with the following functions:
 - SEND/RECEIVE interface over ISO-on-TCP, TCP and UDP connections

In UDP broadcast, only sending of frames is supported, not receipt.

UDP frame buffering on the CP can be disabled during configuration. When necessary, this allows you to achieve a shorter reaction time between the arrival of a UDP frame and its evaluation on the CPU.

Multicast over UDP connection

The multicast mode is made possible by selecting a suitable IP address when configuring connections.

- FETCH/WRITE services (server; corresponding to S5 protocol) via TCP connections The addressing mode can be configured for FETCH/WRITE access as the S7 or S5 addressing mode.
- LOCK/UNLOCK with FETCH/WRITE services
- Connection diagnostics from the user program
- ERPC communication

In conjunction with the software components of our cooperation partners ILS Technology LLC, the CP supports ERPC communication. Frames are exchanged between the S7 station and ERP subscribers using TCP/IP. The following methods are available for data transfer:

Write/read jobs

Data is read cyclically or spontaneously from the S7-CPU and sent to the ERP subscribers or written to the CPU by the ERP subscribers.

 Event-oriented transmission, configured as a logical trigger and fires by the user program on the CPU

When certain events occur, data is read from the CPU and sent to the ERP subscriber.

Apart from software blocks for the logical trigger, no resources are required on the CPU for ERPC communication.

1.3 Other services

Other services

- Time-of-day synchronization over Industrial Ethernet using the following configurable modes:
 - SIMATIC mode

The CP receives MMS time messages and synchronizes its local time and the time of the CPU.

(accuracy approx. +/- 0.5 seconds)

You can choose whether or not the time of day is forwarded. The forwarding direction can also be selected (station \rightarrow LAN or LAN \rightarrow station).

or

- NTP mode (NTP: Network Time Protocol)

The CP sends time-of-day queries at regular intervals to an NTP server and synchronizes its local time of day and the time of the CPU (accuracy approx. +/- 0.5 seconds).

Addressing using a factory-set MAC address

The CP can be reached via the default MAC address to allow an IP address to be assigned.

• SNMP agent

The CP supports data queries over SNMP in version V1. It delivers the content of certain MIB objects according to the MIB II standard and LLDP MIB.

• Time of day for the diagnostic buffer

If a time master exists (using the NTP or SIMATIC mode), the time for CPinternal diagnostic buffer is synchronized over the backplane bus or LAN.

Module access protection

To protect the module from accidental or unauthorized access, protection can be configured at various levels.

• IP access protection (IP-ACL)

Communication via the CP of the local S7 station can be restricted to partners with specific IP addresses.

• IP configuration

For the Ethernet interface, you can configure how and with which method the CP is assigned the IP address, the subnet mask and the address of a gateway.

As an alternative to STEP 7, the CP can be assigned the connection configuration via a block interface in the user program (FB55: IP_CONFIG) (does not apply to S7 connections).

• Web diagnostics

With the aid of Web diagnostics, you can read out the diagnostic data from a station connected via the CP to a PG/PC with an Internet browser.

This makes it possible, for example, to read the diagnostic buffers of the intelligent modules in the rack.

If you do not require this function, you can disable it in the STEP 7 configuration and disable the port (properties dialog of the CP > "IP Access Protection" tab).

Requirements for use

2.1 Operation in controller device families

SIMATIC families

The CP can be operated in the following device families:

- S7-300 stations with the CPU types
 - Standard
 - Compact
 - Modular

The following table shows the devices with which the CP can be operated with this range of functions.

NOTICE

The table lists the CPUs and devices approved at the time of printing this manual. S7300 CPUs approved later and not listed in the table also support the range of functions described here.

CPU	Order number
CPU 312	6ES7 312-1AD10-0AB0
	6ES7 312-1AE13-0AB0
CPU 312C	6ES7 312-5BD01-0AB0
	6ES7 312-5BE01-0AB0
	6ES7 312-5BE03-0AB0
CPU 313C-2 DP	6ES7 313-6CE01-0AB0
	6ES7 313-6CF03-0AB0
CPU 313C-2 PtP	6ES7 313-6BE01-0AB0
	6ES7 313-6BF03-0AB0
CPU 314	6ES7 314-1AF11-0AB0
	6ES7 314-1AG13-0AB0
CPU 314C-2 DP	6ES7 314-6CF02-0AB0
	6ES7 314-6CG03-0AB0
CPU 314C-2 PtP	6ES7 314-6BF02-0AB0
	6ES7 314-6BG03-0AB0
CPU 315-2 DP	6ES7 315-2AG10-0AB0
CPU 315-2 PN/DP	6ES7 315-2EG10-0AB0
	6ES7 315-2EH13-0AB0

Table 2-1 Use of the CP with S7300

2.2 Configuration

CPU	Order number
CPU 315F-2 DP	6ES7 315-6FF01-0AB0
CPU 315F-2 PN/DP	6ES7 315-2FH10-0AB0
	6ES7 315-2FH13-0AB0
CPU 315T-2 DP	6ES7 315-6TG10-0AB0
CPU 317-2 DP	6ES7 317-2AJ10-0AB0
CPU 317-2 PN/DP	6ES7 317-2EJ10-0AB0
	6ES7 317-2EK13-0AB0
CPU 317F-2 DP	6ES7 317-6FF00-0AB0
	6ES7 317-6FF03-0AB0
CPU 317F-2 PN/DP	6ES7 317-2FJ10-0AB0
	6ES7 317-2FK13-0AB0
CPU 317T-2 DP	6ES7 317-6TJ10-0AB0
CPU 318-2	6ES7 318-2AJ00-0AB0
CPU 319-3 PN/DP	6ES7 318-3EL00-0AB0

2.2 Configuration

STEP 7 version required

The following version of STEP 7 is required:

STEP 7 version	Functions of the CP
STEP 7 V5.4	Required for configuration in STEP 7 (hardware catalog of
+ Service Pack 5	HW Config) and the ERPC functions
+ Hotfix 5	
+ Hardware Support Package HSP 1032	

Installation of the Hardware Support Package HSP 1032

You will find the HSP on the Internet at the following address:

ID 23183356 (http://support.automation.siemens.com/WW/view/en/23183356)

Install the HSP in STEP 7 / HW Config in the "Options" menu with the "Install Hardware Updates" menu command. You will find further information in the STEP 7 online help (under "HSP" or "Hardware update").

After installing the HSP, close STEP 7. After restarting STEP 7, the CP is in the catalog of HW Config.

Downloading the STEP 7 configuration data

You can download the configuration data to the CP via the MPI interface of the CPU and the backplane bus or directly over LAN/Industrial Ethernet. For more detailed information, refer to section Downloading ERPC configuration data (Page 52).

2.3 Programming

Programming - FCs / FBs

For some communications services, there are pre-programmed blocks (FCs/FBs) available as the interface in your STEP 7 user program.

Refer to the documentation of the FCs / FBs in the online help of STEP 7 or in the manual /6/.

NOTICE

Current block versions

We recommend that you always use the latest block versions for all module types.

You will find information on the latest block version and links to download the current blocks in our Customer Support area on the Internet:

Link to the blocks: (http://support.automation.siemens.com/WW/news/en/8797900)

If you are using older block types, this recommendation only applies if you also have the latest firmware version.

CAUTION

Block call

The communication blocks for S7300 (SIMATIC NET block libraries for S7300 in STEP 7) must not be called in more than one priority class! If, for example, you call a communication block in OB1 and in OB35, block execution could be interrupted by the higherpriority OB.

If you call blocks in more than one OB, you must write your program so that a communication block that is currently executing cannot be interrupted by another communication block (for example by disabling/enabling SFC interrupts).

Requirements for use

2.3 Programming

Installation and commissioning

3.1 Important notes on using the device

Safety notices on the use of the device

The following safety notices must be adhered to when setting up and operating the device and during all work relating to it such as installation, connecting up, replacing devices or opening the device.

General notices

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.

Opening the device

DO NOT OPEN WHEN ENERGIZED.

General notices on use in hazardous areas

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.

3.2 Procedure for installation and commissioning

Replacing components

EXPLOSION HAZARD

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

General notices on use in hazardous areas according to ATEX

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.

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.

Protection against transient voltage surges

Provisions shall be made to prevent the rated voltage from being exceeded by transient voltage surges of more than 40%. This criterion is fulfilled, if supplies are derived from SELV (Safety Extra-Low Voltage) only.

3.2 Procedure for installation and commissioning

Installation and commissioning

Note

The module must be installed so that its upper and lower ventilation slits are not covered, allowing adequate ventilation.

During operation, keep the hinged front panel closed.

3.2 Procedure for installation and commissioning

Step	Execution	Meaning / explanation
1	Install the CP on the S7 standard rail. Establish the connection via the enclosed bus connector to the backplane bus.	Slots 4 to 11 are permitted for the CP in racks 0 to 3 (connected by IM 360/361). Proceed as described in the sections dealing with setup and wiring, explained in detail in /10/.
	Note The CP cannot be used in an extension rack the communication bus is not connected to the exte	at is connected via the IM 365! Reason: The required ension rack via the IM 365.
2	Connect the CP to the power supply.	Follow the steps as described in detail in /10/ when wiring between the power supply and the CPU.
	 Notes The CPU, CP and IM (if one exists) must be Only wire up the S7300 / C7300 with the point 	e connected to the same power supply. wer switched off!
3	Connect the CP to Industrial Ethernet.	Connector behind the hinged front panel An Ethernet cable can also be inserted and removed with the power supply on.
4	Optional: connect the ERP subscribers to the same Industrial Ethernet network.	This step is only necessary if you want to use ERPC functions.
5	Optional: Download the ERPC firmware to the CP.	This step is only necessary if you want to use ERPC functions. Read the relevant documentation of our cooperation partners ILS Technology LLC.
6	The remaining steps in commissioning involve downloading the STEP 7 configuration data.	 To download the STEP 7 configuration, you can connect the PG as follows: via MPI via Industrial Ethernet Addressing the first time (IP address assignment / node initialization) Downloading the defined configuration For further details, refer to the general Part A of this manual. The PG/PC requires a LAN attachment, for example via a CP 1613 and must have the necessary software (for example the S71613 package or SOFTNET IE). The TCP/IP protocol must be installed. The protocol used must then be applied to the S70NLINE access point.

Installation and commissioning

3.2 Procedure for installation and commissioning

Step	Execution	Meaning / explanation
7	Optional: complete the ILS Workbench configuration and download this to the CP.	This step is only necessary if you want to use ERPC functions. Read the relevant documentation of our cooperation partners ILS Technology LLC.
8	Use the diagnostic functions during commissioning and to analyze problems.	 The following options are available: The LED displays on the CP Hardware diagnostics and troubleshooting with STEP 7 Communication diagnostics with STEP 7 / NCM Diagnostics Static information using HW Config Web diagnostics If applicable, evaluation of the alarm block FB54 in the user program Queries via SNMP



Figure 3-1 CP connectors with the front panel open

- 1 MAC address
- 2 Firmware version
- 3 LAN connector P1 (RJ-45 jack)
- 4 Chassis ground slider (see below for description)
- **5** Connecting the power supply

Ground/chassis ground concept

NOTICE

Please note the instructions regarding the grounding and chassis ground concept in the SIMATIC S7 installation guides; see "SIMATIC S7 Programmable Controller S7300 - Installation and Hardware: Installation Manual" /10/.

Behind the hinged panel on the left of the device, you will see a slider with which you can connect or disconnect the chassis ground of the 24 V power supply with reference ground.

3.3 C-PLUG (configuration plug)

- Chassis ground slider pushed in: Chassis ground and reference ground connected (note: you can feel the slider lock into position).
- Chassis ground slider pulled out: No connection between chassis and reference ground.

When shipped: Slider pushed in

Use a screwdriver to set the slider.

Configuration

To set up the CP for communication services, read the instructions in section Configuration (Page 14).

3.3 C-PLUG (configuration plug)

Exchangeable C-PLUG

The CP has a receptacle for a configuration plug (known as a C-PLUG) that is supplied as standard with the device. This can store up to 32 MB of data in nonvolatile memory.

Area of application

The C-PLUG is an exchangeable medium for storing configuration and project engineering data of the CP. This means that configuration data remains available if the CP is replaced. It is possible to replace the module without a PG.

How memory is divided up and the data contained in the various areas is explained in section Memory organization (Page 35).

NOTICE

Startup without C-PLUG

The full CP functions are available only when a C-PLUG is inserted.

If the C-PLUG is missing, the CP starts up but only diagnostic functions are available.

Recommendations for data storage

We recommend that you store the configuration data on the CPU, refer to the option "Save configuration data on the CPU" in section Module replacement (Page 23).

If the STEP 7 configuration data is extensive, storage of the configuration data on the CP (on the C-PLUG) is recommended in the following situations:

- The configuration memory on the CPU is inadequate.
- The delays due to the extent of the configuration data when starting up the module are unacceptable.

3.3 C-PLUG (configuration plug)

The ERPC firmware is stored in the internal file system of the CP and not on the C-PLUG or on the CPU. See also section Memory organization (Page 35).

Principle

The power is supplied by the CP. If there is a power down, the C-PLUG retains all data permanently.

Flash components are used in the C-PLUG in which the number of write operations is limited. This must be taken into account when using blocks in the user program that write data to the C-PLUG (for example FB55 with changing IP parameters). Refer to the information in section Characteristics of the C-PLUG (Page 34).

Inserting in the C-PLUG slot

The slot for the C-PLUG is on the rear panel of the device.

The C-PLUG is inserted in the receptacle.

NOTICE

The C-PLUG must be inserted or removed only when the power is off!



Fitting the C-PLUG (left) and removing it from the CP with a screwdriver (right)

How the C-PLUG works when the CP starts up (module replacement situation)

If the C-PLUG has not yet been written to (as shipped), when the STEP 7 configuration is downloaded to the CP, all the configuration data of the CP is saved automatically on it. This does not include the ERPC firmware, the ILS Workbench configuration and the ILS license file.

If the S7 station had previously been operational and the CP configuration data is stored on the CPU (option "Save configuration data on the CPU"), an unwritten C-PLUG adopts all the STEP 7 configuration data from the CPU when the CP starts up. This does not include the ERPC firmware and the ILS Workbench configuration.

If the C-PLUG is inserted, the basic device automatically uses the configuration data of the C-PLUG. This assumes that the data was written by a compatible device type.

If a fault occurs, the basic device can then be replaced much faster and more simply. If a device needs to be replaced, the C-PLUG is simply taken from the failed component and inserted in the replacement device. As soon as it starts up, the replacement automatically has the same device configuration as the failed device.

Formatting a C-PLUG and storing configuration data

Use only C-PLUGs that are formatted for the CP 343-1 ERPC. C-PLUGs that have already been used and formatted in other device types must first be formatted for the CP 343-1 ERPC device type.

You do this with STEP 7 / NCM Diagnostics. For more detailed information, refer to the online help in the topic "General Diagnostics Functions - C-PLUG Diagnostics Object".

After formatting, all data areas are deleted on the C-PLUG. After formatting the C-PLUG of the ERPC CP, only the ERPC Workbench configuration (assuming it had already been loaded) and the ILS license file remain.

STEP 7 configuration data is adopted on a formatted C-PLUG as explained below when it is inserted in the CP and the CP is inserted in the rack:

- After cycling power, the previous configuration data is adopted from the CPU assuming this option was configured, see above (section "Recommendations for data storage").
- By downloading from the PG/PC, the configuration data from the STEP 7 project of the connected PC/PG is adopted.

Removing the C-PLUG

It is only necessary to remove the C-PLUG if a fault occurs on the basic device.

NOTICE

The C-PLUG must be removed only when the power is off!

Diagnostics

Inserting a C-PLUG containing the configuration of an incompatible device type, accidentally removing the C-PLUG or general malfunctions of a C-PLUG are signaled by the diagnostic mechanisms of the host device (SFLED red).

3.4 Module replacement

General procedure

The configuration data for the CP is stored either on the CPU or on the C-PLUG of the CP. This means that the module can be replaced with a module of the same type (identical order number) without needing a PG in the station.

3.4 Module replacement

Storage of the STEP 7 configuration data on the CPU can be selected in the properties dialog of the CP in the "Options" tab in "Module replacement without PG". We recommend that you store the configuration data on the CPU if the configuration memory of the CPU allows.

To use ERPC communication, you must first load the ERPC firmware on the CP before commissioning a new CP.

Replacing the CP with an S7 Ethernet CP without ERPC functionality is not possible.

Module replacement: Special feature when using the ERPC functions

If you use the ERPC functions on the CP, you will first need to load the ERPC firmware on the new CP before you replace the module. See also section Downloading the ERPC firmware (Page 69).

NOTICE

Module replacement if a fault occurs

If the ERP subscriber cannot be reached, note the following:

- The buffered frames are not stored on the C-PLUG.
- Buffered but not yet transferred data is lost when you replace the module.

Module replacement: Special feature of IP address assignment from a DHCP server

During configuration in the properties dialog, you can specify the IP configuration for the CP. One option here is that the CP obtains the IP address from a DHCP server.

NOTICE

When replacing a module, please remember that the factory set MAC address of the new module differs from that of the previous module. When the factoryset MAC address of the new module is sent to the DHCP server, this will return either a different or possibly even no IP address.

Ideally, you should therefore configure IP as follows:

Always configure a client ID if you want to obtain the same IP address from the DHCP server after replacing the module.

3.5 Controlling the operating mode

Changing RUN > STOP

You have the option of changing the mode of the CP between RUN and STOP using the STEP 7 / NCM S7 configuration software (PLC > Accessible Nodes).

Procedure

• Changing from STOP to RUN:

The CP reads the configured and/or downloaded data into the work memory and then changes to the RUN mode.

• Changing from RUN to STOP:

The CP changes to STOP. Established connections (TCP or UDP connections) are terminated (transitional phase with LED display "STOPPING").

The reaction is as follows in STOP:

- The communications connections mentioned above are terminated.
- Configuration and diagnostics of the CP is possible (system connections for configuration, diagnostics, and PG channel routing are retained).
- HTTP access is possible.
- The time of day is not forwarded.

Module access protection

The configurable module access protection has the following effects on the change of mode:

- Module access protection: Not disabled
 - The functions can be executed.
- Module access protection: Status dependent
 With this setting, it is only possible to access the CP when the CPU is in STOP mode.

Installation and commissioning

3.5 Controlling the operating mode

LED displays

LEDs on the front panel

On the front panel, you will see the following LEDs for displaying the operational and communication status.



Figure 4-1 LEDs on the front panel

The LEDs have the following meaning:

- APPL_STATE: Status of the ERPC function
- SF: Group error
- BF: Bus fault on Ethernet interface
- LINK: Link status of the Ethernet interface
- RX/TX: Acyclic data traffic, for example SEND/RECEIVE
- RUN: RUN mode
- STOP: STOP mode

Unlabeled LED placeholders have no meaning.

LEDs for displaying the mode

The different combinations of the LEDs on the front panel indicate the status:

SF(red)	BF (red)	RUN (green)	STOP (yellow)	CP operating mode
	-	0		 Starting up after power "ON" or Stopped (STOP) with errors For example no valid C-PLUG detected In this state, the CPU or intelligent modules in the rack remain accessible using PG functions.
0	0	, Ċ	0	Starting up (STOP → RUN)
0	0	\bigcirc	0	Running (RUN)
0	0		÷Ö.	Stopping (RUN \rightarrow STOP)
0	0	0	•	Stopped (STOP) In STOP mode, configuring and performing diagnostics on the CP remain possible.
-	•	-	-	 Interface networked but no LAN cable inserted or Duplicate IP address detected
	0		0	RUN with external error
· \	· .	۰ Ö ۰	÷ Ò -	Module fault / system error

Table 4-1 LED display schemes

Legend - meaning of the symbols:

Symbol		0	🔶 🔅 🔶	-
Status	ON (steady light)	OFF	Flashing	Any

Firmware download - LED display patterns

The LED display patterns when downloading the firmware are described in section How to load new firmware (Page 69).

LEDs for displaying the CP communication status

In addition to the LEDs that signal the CP state, the following LEDs provide information about the status of the CP interface to Industrial Ethernet.

LED	Display	Meaning
LINK (green)	0	Port has no connection to Industrial Ethernet
		Existing connection to Industrial Ethernet
RX/TX (green)	÷	The CP is sending/receiving over Industrial Ethernet.

For the meaning of the LED symbols, refer to the legend to the table above

Module identification (Ethernet interface)

Using the SIMATIC Manager, you can search for and identify the module initially by browsing the connected network with the menu "PLC" > "Edit Ethernet Node". If you select the found node in the "Browse Network" dialog, and then click "Flash", the "LINK" flashes.

LED "APPL_STATE" for displaying the ERPC functions

The "APPL_STATE" LED is a 3-color LED and can indicate the status of the ERPC application. The meaning of the LED states can be configured in the ILS Workbench.

To make the display consistent with the other LEDs of the CP, we recommend that you assign the colors to the "APPL_STATE" so that they have the following general meaning:

- Green: OK
- Yellow: Warning
- Red: Error

LED displays

Performance data / operation

5.1 Transmission and reaction times

Measured values on the Internet

Note

Measured values of transmission and reaction times over Ethernet, PROFIBUS and PROFINET networks for a series of configurations can be found on the Internet at the following address:

Link to the performance data: (http://support.automation.siemens.com/WW/view/en/25209605)

5.2 Number of possible connections over Ethernet

Number of connections

Characteristic	Explanation / values
Permitted number of simultaneous connections in total over Industrial Ethernet	16 (TCP/UDP)8 with ERP subscribers

Maximum load

As a maximum, you can operate the following connections over Ethernet:

• 16 TCP or UDP connections,

of these, up to:

- 8 Send/Receive connections
- 8 S7 connections

Also:

- 8 connections with ERP subscribers
- 1 TCP connection for Web diagnostics

5.3 S7 communication characteristics

5.3 S7 communication characteristics

Number of connections

Characteristic	Explanation / values	
Number of connections for S7 communication on Industrial Ethernet	 8 S7 connections configured at one or both ends Also: 2 PG/OP connections 1 diagnostics connection The number depends on the CPU type being used. Please refer to /10/ for the values for your CPU. 	
LAN interface - data field length generated by CP per protocol data unitsendingreceiving	 240 bytes / PDU 240 bytes / PDU 	

Execution times of the FBs for S7 connections

To calculate the CPU cycle times (OB1) with S7 connections, the execution time for the function blocks (FBs PUT, GET, USEND, URCV, BSEND, BRCV) required for processing on the S7-300 / C7-300 CPU is the decisive factor.

	Execution time on the CPU per block call					
Block type	PUT	GET	USEND	URCV	BSEND	BRCV
Data length	<=160 bytes			<=16 KB		
CPU 314C-2 DP (6ES7 314-6CF00-0AB0)	<4.9 ms	<4.6 ms	<4.4 ms	<4.8 ms	<4.7 ms	<4.9 ms
CPU 317-2 PN/DP (6ES7 317-2EJ10-0AB0)	<1.1 ms	<1.4 ms	<1.3 ms	<1.5 ms	<1.4 ms	<1.9 ms

5.4 Characteristics of the SEND/RECEIVE interface

Number of connections

The SEND/RECEIVE interface provides access for communication over TCP and UDP connections.

The following characteristics are important:

5.4 Characteristics of the SEND/RECEIVE interface

Characteristic	Explanation / values
Number of TCP connections + UDP connections in total	 Maximum 8 Notes: All UDP connections are also possible in multicast mode. Free UDP connections are supported by the CP.
Max. data length for blocks AG_SEND (V4.0 and higher) and AG_RECV (V4.0 and higher)	 AG_SEND and AG_RECV allow the transfer of data fields of a length: 1 to 8192 bytes for TCP 1 to 2048 bytes for UDP
Restrictions for UDP	
Transfer is not confirmed	The transmission of UDP frames is unconfirmed, in other words the loss of messages is not detected or displayed by the send block (AG_SEND).
No reception of UDP broadcast	To avoid communication overload resulting from a high broadcast load, the CP does not permit reception of UDP broadcast.
UDP frame buffering	Size of the frame buffer with buffering enabled: 2 KB Note:
	are discarded.

Execution times of the FCs AG_SEND / AG_RECV

To calculate the CPU cycle times (OB1) with SEND/RECEIVE connections, the execution time for the FCs (AG_SEND, AG_RECV) required for processing on the S7-300 / C7-300 CPU is the decisive factor.

Component	Explanation / values	
Execution time on the CPU 315-2 DP (6ES7 315-2EG10-0AB0)	per AG_SEND block call:<1 ms at <= 240 bytes	per AG_RECV block call: • <1 ms at <= 240 bytes
Execution time on the CPU 317-2 PN/DP (6ES7 317-2EJ10-0AB0)	per AG_SEND block call:<0.8 ms at <= 240 bytes	per AG_RECV block call:<0.8 ms at <= 240 bytes

5.5 Characteristics of the ERPC functions

5.5 Characteristics of the ERPC functions

Number of connections to ERP subscribers

Characteristic	Explanation / values
Number of ERP subscribers	max. 8

Logical trigger

Characteristic	Explanation / values		
Number of logical triggers per CP	max. 8		
Data per logical trigger	max. 8 KB (user data + header information)		

ERPC symbols

Characteristic	Explanation / values		
Number of configurable symbols	max. 2 000 symbols per CPU		
	max. 255 ERPC symbols per logical trigger		

Data throughput

Characteristic	Explanation / values
Throughput between S7 station and ERP subscribers	max. 2 000 bytes / second

5.6 Characteristics of the C-PLUG

The flash area allows a limited number of write cycles.

• Number of write cycles: approx. 100 000

Recommendation: You should therefore avoid writing data cyclically.

5.7 Memory organization

Memory distribution

The data areas of the CP are organized as follows:

Fixed data	MAC address set in factory	IP address and IP parameters LAN settings
C-PLUG	Retentive parameters	SNMP variables (modifiable)
Internal file system (cannot be used for other purposes)	Flash file system (cannot be used for other purposes) STEP 7 configuration data ¹⁾ ERPC firmware ILS Workbench configuration	The ILS Workbench configuration (backup copy) ILS license file
CPU data	Retentive parameters of the CP STEP 7 configuration data ¹⁾	Data that is stored on the S7-300 CPU if the option "Store configuration data on the CPU" was selected.

Legend:

1) The configuration data is stored either on the CPU or on the CP. This option can be selected in the Properties dialog of the CP ("Options" tab, "Module replacement without PG").

5.7 Memory organization

Note

Recommendation for data storage

If you use the CP in a complex plant configuration, the configuration data can become extensive. In such cases, the time for the transfer of the configuration data from the CPU to the CP may take several minutes.

In such cases, you should weigh up the pros and cons of storing the data on the CP.

Meaning of the memory areas

On the CP 343-1 ERPC, the file system is divided into the following areas:

Fixed data

The MAC address is stored permanently in the this part of internal memory.

C-PLUG

The C-PLUG is nonvolatile memory. It consists of the following areas:

Retentive area

The retentive area includes the storage of the IP parameters, LAN settings and the modifiable SNMP variables safe from power outages.

If you reset memory, the data is retained.

If you reset to the factory settings, this area is erased.

Flash area - internal file system

The flash file system is used to store the ILS license file and backup copy of the ILS Workbench configuration so that they are safe from power outages.

If you reset memory, the data is retained.

If you reset to the factory settings, this area is erased.

Flash area - STEP 7 configuration data

The STEP 7 configuration data is located here (alternatively: storage of the configuration data on the CPU).

If you reset memory or reset to factory settings, this area is erased.

NOTICE

Number of write cycles

The C-PLUG uses flash components and only allows a limited number of write cycles (approximately 100 000). You should therefore avoid continuous cyclic writing of data (for example changing IP parameters with FB55) to the C-PLUG.

• Internal file system

This area of the internal memory is divided into two partitions containing the following data:

- The ERPC firmware
- The ILS Workbench configuration

The data is stored so that it safe against power outages. This area cannot be used for other purposes.

If you reset memory, the data is retained.

If you reset to the factory settings, this area is erased.

Characteristics of the memory areas

Characteristic		Explanation / values		
M	emory areas			
•	C-PLUG: Retentive area (nonvolatile)	•	2 KB	
•	C-PLUG: Flash areas (nonvolatile)	•	32 MB	
•	Internal memory	•	128 MB	

Performance data / operation

5.7 Memory organization
ERPC functions

Content of this section

This section deals with the ERPC functions of the CP and the necessary actions to be taken with the Siemens tools.

The functions of the ERPC software and the ILS Workbench are not described in this document. Read the relevant documentation of our cooperation partners ILS Technology LLC.

6.1 Overview

6.1.1 The ERPC functions

Data exchange with ERP subscribers

The ERPC functions of the CP 343 1 ERPC allow the data exchange via LAN between the SIMATIC S7 automation station and ERP subscribers at the enterprise management level. An ERP subscriber can, for example, be an ERP system or an MES.

WARNING

Changing process data during write access

If you write data from an ERP subscriber to the CPU, access to process data is possible. If you change the values of process variables with write this access, the values can be changed directly in the process.

Changing process data can trigger unexpected reactions in the process that can lead to serious injury to persons or damage to equipment. With this in mind, a degree of caution is necessary.

- Restrict the access rights for the following systems and their configuration computer:
 - The ERP subscribers that communicate with the CP 343 1 ERPC (configured by the ILS Workbench)

In the ILS Workbench configuration, make sure that you take into account the rights for read and write access to the ERPC symbols from the STEP 7 configuration!

- The automatization station in which the CP 343-1 ERPC is located (configuration with STEP 7)
- Install a physical emergency stop circuit for the machine or process.

With the ERPC functions of the CP, this allows the interfacing of the process level (automation) with a higher-level ERP system.

6.1 Overview

With the aid of the ERPC functions, an ERP subscriber can read data from the CPU of the connected S7 station and write data to the CPU of the CPU of the S7 station.

6.1.2 Procedure for using the ERPC functions

Overview

The CP ships with Siemens firmware loaded. This means that all basic functions with the exception of the ERPC functions are supported.

To use the ERPC functions, follow the basic procedure outlined below:

1. Loading ERPC firmware on the CP 343-1 ERPC

Before you start to configure the ERPC functions with STEP 7, you must first download the ERPC firmware to the CP, see section Downloading the ERPC firmware (Page 69).

2. Downloading the ILS license file to the CP

Contact the cooperation partners ILS Technology LLC for detailed information.

3. Specifying the relevant data for ERPC communication

Before configuring the ERPC software in the ILS Workbench and configuring the CP with STEP 7, the two configuration engineers of these two systems should come to an agreement on the relevant data. Consistent configuration at both ends is necessary for data exchange between the ERP subscribers and the SIMATIC S7.

- 4. Configuration of the CP in STEP 7
 - Configuration of the symbol table for the CPU
 - Configuration of the ERPC symbols
 - Preparation of the function block FB56 for the logical trigger
 - Preparation and configuration of the configuration data block for the logical trigger
- 5. Downloading the STEP 7 configuration to the CP

See section Downloading ERPC configuration data (Page 52)

6. Configuration of the ILS Workbench

The basic functions for ERPC communication such as the selection of the relevant data, the assignment of the logical triggers or networking of the subscribers are specified in the ILS Workbench.

With the exception of the configuration steps in the ILS Workbench, these steps are described below. Read the relevant documentation of our cooperation partners ILS Technology LLC for information on configuring the ILS Workbench.

ERPC functions

6.2 ERPC services and communication

6.2 ERPC services and communication

6.2.1 Communication between S7 station and ERP subscriber

Methods of data transfer

Two methods are available for data transfer:

• Read and write jobs

These are spontaneous or cyclic read and write jobs to the S7 station.

- Cyclic read/write jobs are configured in the Workbench and downloaded to the CP via the ILS-Workbench configuration.
- Spontaneous read/write jobs are initiated by the Workbench.
- Event-oriented data transmission with the logical trigger

The event-oriented transmission of data from the process is started with help of a "logical trigger" on the S7-CPU. When the logical trigger is fired, the values of the configured data areas are transferred from the CPU to the ERPC application on the CP for forwarding to the ERP subscriber.

The logical trigger can also be configured so that data is requested from the ERP subscriber and is then written to the CPU using a standard write job (see " Read and write jobs").

The frame buffer

If an ERP subscriber is unreachable, the frames intended for it are stored temporarily in a frame buffer of the CP (store-and-forward mode).

If the ERP subscriber is unreachable, the requested frames are buffered on the CP until the subscriber can be reached or the frame buffer overflows.

If the ERP subscriber is still unreachable after the maximum memory capacity had been used up, data is lost.

6.2 ERPC services and communication

6.2.2 System overview

System overview

The following figure shows an ERP subscriber at the enterprise management level connected via a LAN to the CP 343-1 ERPC in a SIMATIC S7 station.



Figure 6-1 ERP subscriber and S7 station connected via Industrial Ethernet

Only the CPU and CP 343 1 ERPC are shown as modules in the S7 station since these are the relevant modules for the ERPC functions. The most important software components for ERPC communication are shown in the S7 station:

- The ERPC application that handles communication between the automation and the enterprise management level runs on the CP. This is downloaded to the CP as the ERPC firmware and ILS Workbench configuration.
- In the CP, you can also see the Siemens CP firmware and CP services that, among other things, handle the ERPC communication between CP firmware and CPU.

 In the CPU, apart from the logical trigger, you can also see the variables that define the readable/writable data areas in the form of configurable ERPC symbols. No resources are required on the CPU for read and write jobs from the application.

The "ILS Workbench" for configuring the ERPC application and "STEP 7" for configuring the SIMATIC station are shown among the configuration tools.

6.2.3 Reading and writing data

Types of read/write jobs

To allow the ERPC application to read or write data, the following options are available:

- Reading from the CPU
 - Cyclic reading from the CPU

Following a read job, data is read cyclically from the CPU by the CP and sent to the ERP subscriber.

- Spontaneous reading from the CPU

Following a single read job from the ERP application, data is read once from the CPU by the CP and sent to the ERP subscriber.

- Writing to the CPU
 - Spontaneous writing to the CPU

The data from the ERP subscriber is written to the CPU once a following a write job.

If data is requested from a logical trigger by the ERP subscriber, this is written to the CPU using a write job.

Sequence of read and write jobs

If it is problem free, a read/write job from the ERP application is executed in the following steps:

1. The ERPC application initiates a cyclic read/write job.

For test purposes, the ERPC application on the CP can also accept a spontaneous read/write job from the ILS Workbench.

2. The CP starts the read/write service with which the values are written to the CPU or read from the CPU and sent to the CP.

Depending on the size of the data, one or more read/write jobs are sent. With a read task for which more than one read job is necessary, the CP waits until the last read job is completed.

- 3. Once the read jobs have been completed and the data of the read task is complete, the ERPC application sends the requested data frame to the ERP subscriber.
- 4. If the ERP subscriber is unreachable, the data frame is stored on the CP.

If an error occurs, and error identified is returned and a diagnostic message is entered in the diagnostic buffer of the CP.

6.2 ERPC services and communication

Supplied information

When a read/write job has executed, the following information is returned to the ERP subscriber by the CP:

- A data record (with read jobs)
- An acknowledgment

The CP replies to every requested read or write job with an acknowledgement that confirms correct execution of the job or contains an error message. If an error occurs, and error identified is returned and a diagnostic message is entered in the diagnostic buffer of the CP.

6.2.4 The logical trigger

What is the logical trigger?

The event-oriented transfer of data from the process to the ERP subscriber is initiated using triggers. The 'logical trigger' is supported by the ERPC software.

The logical trigger is a reaction to an event on the S7 controller. The reaction is the reading out of certain data from the S7-CPU.

Data can only be read from the CPU as a result of the logical trigger. If data needs to be written to the CPU by a logical trigger, this can be configured in the ILS Workbench as the follow-on reaction to the trigger data that was read.

The logical trigger is created in the ILS Workbench. The link to the process data is created during configuration and programming of the S7 controller:

- The function of the logical trigger on the S7 controller is implemented by the software block FB56.
- The data areas to read out and written to on the CPU are defined using the ERPC symbols that are specified in the configuration of the CP.
- The condition that decides when the function can be called, on other words, when the data can be read out, is set in the user program.

When the S7 station is operational, the ERPC application waits for the logical trigger to be fired by the user program of the CPU. When the logical trigger is fired, FB56 reads the relevant values from the CPU and transfers them in a data block to the CP firmware. The CP firmware transfers the data to the ERPC application which puts together a data frame and sends it to the ERP subscriber.

Supplied information

When a logical trigger has executed, the following information is returned to the ERP subscriber by the CP:

A data record

• An acknowledgment

On successful completion of a logical trigger, an acknowledgment is transferred that either confirms the correct execution of the job or contains an error message. If an error occurs, and error identified is returned and a diagnostic message is entered in the diagnostic buffer of the CP. The type of acknowledgment can be specified in the FB56 function block (see below).

A time stamp

When it transfers data to the ERPC application, the CP also sends a time stamp that contains the time at which the frame was transferred to the ERPC application.

The ERP subscriber can evaluate the time stamp, in other words, the time difference between job and response.

Implementation of the logical trigger on the SIMATIC CPU as a function block

The logical trigger is implemented on the CPU by the function block FB56 "LOG_TRIG". FB56 has the following tasks:

- Event-related reading of the CPU data according to the ILS Workbench configuration
- Data transfer to the CP
- Processing of the organizational data (acknowledgment identifier and status codes).

FB56 is called in the user program (OB1) at the point at which the call of the logical trigger is required for the transfer.

You will find a detailed description of FB56 in /6/.

Other blocks

Further blocks are required for the FB56 call:

- An automatically generated instance DB
- A data block "CONF_DB"

This configuration DB contains the configuration data of the logical trigger. You make the configuration DB available in STEP 7.

If you want to call more than one logical trigger at the same time, you will also need to make more than one configuration DB available (see below).

The numbers of FB56 and the instance DB can be changed.

Configuring several logical triggers

You can also configure several logical triggers that are called by FB56. Each logical trigger is configured in a separate configuration DB. If this is necessary, you will need to make several configuration DBs available that can be called with the FB56 call in the user program. The called trigger and the configuration DB are controlled by the block parameters "ID" and "CONF_DB" of FB56.

6.2 ERPC services and communication

Assignment of the logical triggers

The assignment of the logical triggers to the following relevant data on the S7 station is made in the ILS Workbench:

- Logical trigger Data areas of the CPU (ERPC symbols)
- Logical trigger configuration DB

To complete the ILS Workbench configuration, you will need to connect the CP on which you have loaded the STEP 7 configuration data to the host of the ILS Workbench via Ethernet.

The ILS Workbench then reads the configured ERPC symbols and the characteristic data of the configured configuration DB from the CP.

Following this, you can make the assignment of the logical triggers to the ERPC symbols and the configuration DBs in the ILS Workbench.

6.2.5 ERPC communication between CP and CPU

Addressing the CPU data areas

The CPU data areas used for ERPC communication can be either data blocks (DBs) or bit memory areas. They are addressed either directly or via symbols. As normal in STEP 7, symbolic addressing is defined in the symbol table of the CPU. The advantage of symbols is that as well as having an address and size information, they also have a meaningful name that might, for example, indicate the technical function in the process. Address changes due to modifications to the program are also easy to update by downloading the symbol table or the ERPC symbols to the S7 station.

On the CP 343-1 ERPC, the symbols used for ERPC communication are known as "ERPC symbols". These need to be transferred to the CP firmware to ensure consistency with the ILS Workbench configuration. Once the required symbols have been defined in the symbol table of the CPU, they are specified and configured as ERPC symbols in the properties dialog of the CP in STEP 7.

NOTICE

Special case "DB with structure"

A data block with structures (array with complex S7 data types) cannot be addressed using symbols. This type of CPU data area needs to be addressed directly.

Job size and data consistency

Note

Data can originate from different read jobs.

With read jobs of the ERPC application larger than 210 bytes, data is returned from the S7-CPU that originates from more than one read job by the CP.

With one read/write job, up to 210 bytes of payload data can be transferred between CPU and CP.

If a job from the ERPC application is larger than 210 bytes, the data area requested by the ERPC application is segmented into more than one read job of up to a maximum size of 210 bytes and these are sent one after the other to the CPU. The data read in the read jobs is buffered on the CP until the job from the ERPC application is completed and this is then transferred to the ERPC application as one unit.

The same maximum size of 210 bytes also applies to write jobs.

6.3 Configuration

6.3.1 Overview of ERPC configuration

WARNING

Consistency of the configuration in STEP 7 and in the ILS Workbench

The ERPC functions are configured in two separate systems: STEP 7 and ILS Workbench.

The STEP 7 configuration returns the address references for the ERPC functions. An inconsistency between the two configuration means that incorrect CPU data areas will be read, that links may lead to incorrect results and that data from the ERPC application may be written to incorrect address ranges.

If you make modifications to the STEP 7 configuration (for example, the symbol table, ERPC symbols or CPU data areas), make sure that you inform the ILS Workbench configuration engineer so that the modifications can be taken into account before you download the changes to the S7 station. A lack of coordination between the configuration engineers of the two systems can lead to unpredictable reactions in the process.

ERPC configuration in the ILS Workbench

The read/write jobs and the logical triggers are created and configured in the ILS Workbench. Read the relevant documentation of our cooperation partners ILS Technology LLC.

ERPC configuration in STEP 7

Apart from the ILS Workbench configuration, the following configuration steps are necessary in STEP 7 for ERPC communication.

In all cases, for read/write jobs and the logical trigger:

6.3 Configuration

- Configuration of the CPU data areas used for ERPC
 - Creation of the symbol table for the CPU
 - Specification of the ERPC symbols in the properties dialog of the CP

Further configuration of the read/write jobs in STEP 7 is not necessary.

Additionally for the logical trigger:

- Preparation and configuration of the required software blocks
 - Creation of FB56 "LogTrig" and programming of the block call in the user program
 - Creating and configuring the configuration data block "CONF_DB"

Completing configuration of the ILS Workbench

Once you have downloaded the STEP 7 configuration to the CP, you will need to complete the ILS Workbench configuration, see section "Assignment of the logical triggers" in section The logical trigger (Page 44).

Relevance of the CPU data areas used for ERPC

The data areas of the S7 CPU from which data is read or to which data is written is specified in the ILS Workbench configuration. These data areas are specified in STEP 7 by the ERPC symbols. The ERPC symbols are a subset of the CPU symbols selected for the ERPC application. These ERPC symbols are used in the ILS Workbench configuration.

An ERPC symbol is configured with its name, address, type, length and read/write permissions. The read/write services of the CP use the address, type and length information of the ERPC symbols.

The ERPC symbols used in the ILS Workbench are transferred to the CP when the ILS Workbench configuration is downloaded. The ERPC application handles the ERPC communication using the ERPC symbols.

You should therefore make sure that the data areas used for ERPC communication are consistent in the ILS Workbench and in STEP 7.

Note

Data types in the ILS Workbench and in SIMATIC S7

Remember that different data types can be used in the ILS Workbench and on the SIMATIC S7 controller.

You will find a description of the S7 data types in the STEP 7 online help. The following are relevant:

- "Elementary data types"
- "Complex data types"
 For the complex S7 data types "Array" and "UDT", only elementary data types are supported for ERPC communication.

6.3.2 Basic configuration in STEP 7

Hardware configuration

You configure the hardware of the CP as usual in STEP 7 / HW Config. You will find the CP 343-1 ERPC in the module catalog of HW Config in the following folder:

SIMATIC $300 \rightarrow CP-300 \rightarrow$ Industrial Ethernet $\rightarrow CP$ 343-1 ERPC \rightarrow 6GK7 343-1FX00-0XE0 Insert the CP in the rack in slot no. 4 or higher.

Configuring the CP properties

The functions of the CP are configured in STEP 7 / HW Config in the properties dialog of the CP.

You will find detailed information on the general configuration of the CP in /1/.

6.3.3 Configuration of the symbol table and the ERPC symbols

Creating and configuring the symbol table

Create a simple table in the blocks folder of the CPU of the relevant station in your STEP 7 project. There, you configure the data areas / variables you require for the logical trigger or for other purposes as symbols.

You will find information on the symbol table in the STEP 7 online help and in /8/.

Configuring the ERPC symbols

Follow the steps outlined below to configure ERPC symbols:

- 1. Open the S7 station in HW Config.
- 2. Open the properties dialog by double-clicking on the CP.
- 3. Open the "ERPC Symbols" tab.

If you have not yet selected any symbols for ERPC, the table is empty. If you have already selected symbols for ERPC, they will be displayed here.

6.3 Configuration

operties - CP 343-:	1 ERPC - (R0/55)				×
General	Addresses	Options	Time-of-Day	Synchronization	
IP Access Prote	ction User	s ERF	PC Symbols	Diagnostics	Í
Info Symbol ERPC_Syn ERPC_Syn	nbol_02.D8_VAR(0/2) nbol_01(0/2)	Rights Read and write Read only	Comment	Add Edit Delete load symbols	
Rights: Number of symbols:	☐ Read only 2		.► Can	sel Helo	

Figure 6-2 Properties dialog of the CP, "ERPC Symbols" tab

Waiting time when opening the properties dialog

When you open the properties dialog, a check is performed to determine whether any changes have been made (see below), this means that it may take longer than normal to open the properties dialog.

Functions in the "ERPC Symbols" tab

In this tab, you configure the ERPC symbols required for the ERPC communication.

You will find details of the information shown and the possible actions you can take in the "ERPC Symbols" tab in the STEP 7 online help.

Information displayed

The list shows the ERPC symbols stored in the current STEP 7 project. The columns of the symbol list display the following information:

Info

Additional information from the check of changes made

• Symbol

Names of the ERPC symbols

Rights

The rights configured for ERPC communication (reading from the CPU, writing to the CPU)

Comment

Comment on the ERPC symbols specifically for ERPC communication

Below the list, you can see the total number of symbols used for ERPC.

Possible actions

You can perform the following actions with the buttons:

You can add or delete symbols

In the next dialog "Select symbols for the ERPC Application", select the symbols from the CPU symbol table you want to use for ERPC communication.

• Assigning access rights and comments for symbols

In the next dialog, "Edit Symbol Attributes", assign the access rights of the ERPC communication to the selected ERPC symbols. You can also assign an optional comment here.

Note

Rights in the ILS Workbench configuration

In the ILS Workbench configuration, make sure that you take into account the rights for read or read and write access to the ERPC symbols from the STEP 7 configuration!

Downloading symbols

You can download ERPC symbols to the connected S7 station during ongoing operation. The CPU does not change to STOP. The module access protection must be configured here as "Not locked".

If you select the "Read only" option below the list, you can assign the "read only from the CPU data area" right to the selected ERPC symbols.

Check for changes

When you open the properties dialog, the symbols selected for the ERPC application are compared with the those in the symbol table of the assigned CPU in the STEP 7 project (offline symbol table).

Note

There is no comparison of ERPC symbols you may have downloaded previously from the STEP 7 project to the station.

The relevant information on differences between the ERPC symbols and those of the symbol table of the CPU are displayed in the "Info" column.

6.4 Downloading ERPC configuration data

Saving the changes in the configuration

Note

Changes made to the configuration of the ERPC symbols are saved permanently only after closing the properties dialog with "OK" and saving the STEP 7 project.

The next steps

This completes the STEP 7 configuration for cyclic and spontaneous reading and writing of data for ERPC communication. The configuration data still needs to be downloaded to the CP (see below).

To be able to use the logical trigger, you still need to set up and configure the blocks described below before downloading the configuration data.

6.3.4 Configuration of FB56

Availability of FB56 and the configuration data block "CONF_DB"

To be able use the logical trigger, you require a function block FB56 "LogTrig" in STEP 7. You will find FB56 in STEP 7 in the block library "SIMATIC_NET_CP". You will need to program the FB56 call in the user program of the CPU.

You will also need to create a data block (DB) in STEP 7 for the configuration data of the logical trigger and specify this in the call parameters of FB56. FB56 accesses CONF_DB. CONF_DB has no further significance for the user program.

You will find detailed information on FB56 and its call and on CONF_DB in the block help of STEP 7 and in /6/.

6.4 Downloading ERPC configuration data

Downloading the STEP 7 configuration

Downloading the STEP 7 configuration is not dependent on the configuration of the module access protection of the CP.

You will find information on module access protection and downloading the STEP 7 configuration in /1/.

Downloading the ILS Workbench configuration

Read the relevant documentation of our cooperation partners ILS Technology LLC for information on downloading the ILS Workbench configuration.

Note

Downloading the ILS Workbench configuration to the CP

Downloading the ILS Workbench configuration is dependent on the configuration of the module access protection of the CP:

- Module access protection = "not locked"
- It is possible to download the ILS-Workbench configuration during ongoing productive operation on the CP. The S7 station continues to run.
- Module access protection = "status-dependent" Before downloading the ILS Workbench configuration, the CPU must be set to STOP. The configuration cannot be downloaded in RUN.

6.5 Diagnostics of the ERPC functions

Diagnostics of the ERPC functions of the CP

The following diagnostic options relate to the ERPC functions of the CP 343-1 ERPC.

The diagnostic tools of the ILS Workbench are not taken into account here. Read the relevant documentation of our cooperation partners ILS Technology LLC.

NCM S7 Diagnostics

In the "ERPC Trigger" diagnostics object in the navigation area of NCM S7 Diagnostics, you will find information on the status of the ERPC triggers.

Start module diagnostics in STEP 7 in the "Diagnostics" tab of the properties dialog of the CP or in the menu "Start" > "SIMATIC" > "STEP 7" > "NCM S7" with the "Diagnostics" menu command.

For detailed information on the ERPC-specific diagnostic objects, refer to the online help of NCM S7 diagnostics.

Diagnostic buffer of the CP

The CP outputs messages relating to ERPC functionality in the diagnostic buffer.

ERPC functions

6.5 Diagnostics of the ERPC functions

The CP as Web server

Web diagnostics

The CP provides you with the function of a Web server for access using a Web browser. The CP provides HTML pages for Web diagnostics.

With the following address, you have access to Web diagnostics:

http://<IP address of the CP>/diag

Diagnostic buffer entries are output in English on the diagnostic pages. This is not influenced by the language selected for display of the Web pages.

For detailed information on Web diagnostics, refer to the general Part A of this manual /1/.

Please note the following special features when using Web diagnostics:

Note

Priority of the communications types

The data exchange for productive communication (S7 connections + SEND/RECEIVE connections) always has a higher priority than data exchange with the Web browser. This can lead to delays when accessing the HTML pages in the Web browser.

Disabling the Web server function

As default, the CP is enabled for communication via HTTP. If you do not want to use the CP for IP communication with HTTP, you will need to deactivate port 80 of the CP in the STEP 7 configuration:

Select the option "Activate Web server" under "IP access protection" in the properties dialog of the CP.

Port 80 is enabled as default.

Web browser

To access the HTML pages on the CP, you require a Web browser. The following Web browsers are suitable for communication with the CP (other browsers also possible):

- Internet Explorer (recommended version: as of 6.0)
- Opera (recommended version: as of 9.2)
- Firefox (recommended version: as of 2.0)

You will find these Web browsers, information and addons on the Internet.

The CP as Web server

Further notes on operation

8.1 Clear/reset and reset

Available functions

If the CP was configured with module protection, the following two functions are available only when the CPU is in STOP mode.

With the CP, there are two functions available for deleting the stored data:

Clear / reset

Following this memory reset, the CP retains the preset MAC address and the retentive parameters. The CP is therefore immediately ready for downloads using the IP address.

The retentive parameters include:

- IP address, subnet mask and, if applicable, router address
- LAN settings
- SNMP variables (modifiable)
- ERPC firmware

The ILS Workbench configuration and the ILS license file in the flash file system are also retained.

The CPU in the S7 station does not recognize that the CP memory was reset. The CP therefore changes to the "stopped with error" state (see section LED displays (Page 27)). The configuration data must then be reloaded.

if the configuration data is stored on the CPU, you can start a download by cycling power.

• Resetting to factory settings

After resetting to factory settings, the CP retains only the factoryset MAC address (as shipped).

On the C-PLUG the retentive parameters and the data in the file system (flash area) are deleted.

The data in the internal file system is deleted.

8.2 Network settings with Fast Ethernet / gigabit Ethernet

If you store the STEP 7 configuration data on the CPU, please read the note below.

Note

Using the functions described here to clear or reset the memory, you do not modify the STEP 7 configuration data on the CPU.

If you subsequently upload the STEP 7 configuration data from the CPU to a PG you will always obtain the STEP 7 configuration data that was previously on the CP (with parameters, connections, IP address).

You will find a graphic overview the memory areas in the section Memory organization (Page 35).

How to use the function

The "memory reset" and "reset to factory defaults" functions can be triggered in STEP 7.

- Clear / reset
 - In STEP7 / /HW Config in the "PLC" menu with "Clear / Reset"

or

- In STEP 7 / NCM Diagnostics in the "Operating Mode" menu with "Clear / Reset Module"
- Resetting to factory settings
 - In STEP 7 / SIMATIC Manager in the "PLC" menu with "Edit Ethernet Node" > "Browse" > select the CP > confirm with "OK" > go to "Reset to factory settings" with the "Reset" menu command

or

 In STEP 7 / NCM Diagnostics in the "Operating Mode" menu with "Reset to Factory Settings"

8.2 Network settings with Fast Ethernet / gigabit Ethernet

8.2.1 Fast Ethernet

Configuring the network settings

The configuration of the network settings "Transmission medium / duplex" is made for the interface in the properties dialog of the port of the interface in the "Options" tab.

The configuration of the network settings "Transmission medium / duplex" is made in the properties dialog of the CP in the "Port Parameters" tab.

8.2 Network settings with Fast Ethernet / gigabit Ethernet

Automatic setting or individual network settings

As default, the CP is set to automatic detection (autosensing/autonegotiation/autocrossing). In normal situations, the default setting ensures troublefree communication. You should only change these in exceptional situations.

NOTICE

If you create a manual configuration for the CP, the automatic negotiation of the network settings (autonegotiation) is no longer effective. In this case, if the communication partner of the CP works with autonegotiation, this can lead to disruptions in communication.

Only use manual configuration when the communication partner works with the same manually set configuration.

Autocrossing mechanism

The automatic setting also includes an "autocrossing" mechanism. With autocrossing, you can connect network components and end devices using either crossover or straight-through cables.

STEP7 / NCM Diagnostics and Web diagnostics display the network setting

Diagnostics of the port settings for the CP described here is possible using the entries in the diagnostic buffer, with Web diagnostics, with SNMP, NCM Diagnostics and the LED displays.

You will find information on the currently used network settings in STEP 7 as follows:

- In NCM Diagnostics under the diagnostic object "Industrial Ethernet" in the "Network Attachment" group box;
- Select the module in HW Config > "PLC" menu > "Module Information"
- In WEB diagnostics

Diagnostic data of the Ethernet interface is available only with Web diagnostics, SNMP and NCM Diagnostics.

Further notes:

Autocrossing

If you disable automatic detection, the autocrossing is also disabled. Which cable you can use depends on the integration of the CP (network component or end device).

10/100 Mbps network components without "autonegotiation"

If you use 10/100 Mbps network components that do not support "autonegotiation", you may have to set the mode manually during CP configuration using STEP7 / HW Config (in the properties dialog of the CP). As default, the CP is configured for automatic detection.

Forcing a specific network setting instead of "Autonegotiation"

If your application requires a fixed network setting instead of "Autonegotiation", both partner devices must have the same setting.

8.2 Network settings with Fast Ethernet / gigabit Ethernet

• No reaction to Autonegotiation query with manual configuration

Remember that if you configure the CP manually, it will not react to an autonegotiation query! As a result, a connected partner will not be able to make the required network setting and communication will not be established.

Example:

If the CP is set to "100 Mbps - full duplex", a CP connected as partner will set "100 Mbps - half duplex". Reason: Due to the fixed setting, no autonegotiation response is possible; the connected partner recognizes the 100 Mbps with autosensing but nevertheless remains in half duplex.

Recommendation: Change "individual network settings" only over MPI

If you modify the LAN settings in the properties dialog of the CP in the "Port Parameters" tab, these changes will be adopted by the CP and activated when the configuration data is downloaded to the CP. In some situations, the device may then no longer be obtainable over Ethernet.

We therefore recommend that you download configuration data to the S7 station over an MPI connection if you change this setting.

If you download the configuration data over the LAN interface then, depending on the selected setting, it is possible that the current download will not be completed due to the changes to the configuration taking immediate effect and an inconsistent configuration is reported.

Example:

The download is started initially with the setting TP/ITP at 10 Mbps half duplex. If the "Individual network setting" is now changed to 100 Mbps full duplex, the download cannot be completed.

8.2.2 Gigabit Ethernet

Transmission speed 1 Gbps

If you want to use transmission speed 1 Gbps, leave the interface set to "Automatic settings".

The connection partner must also be configured with the automatic setting (autonegotiation). If the connection partner does not support gigabit Ethernet, the data will be transferred at the next lower speed (100 or 10 Mbps).

8.3 Influence of MPI on connections via Industrial Ethernet

Adding/removing MPI nodes

If a station on the MPI bus is added or removed, for example because a service PG has been connected or disconnected, it is possible that active communication connections on the communications bus are aborted. This has the following effects on the communication connections on Industrial Ethernet:

• All S7 connections are temporarily aborted.

Exceptions: This does not apply when using CPUs with a separate communication bus, for example:

- CPU 315-2 PN/DP, CPU 315F-2 PN/DP
- CPU 317-2 PN/DP, CPU 317-2 DP, CPU 317T-2 DP, CPU 317F-2 DP, CPU 317F-2 PN/DP
- CPU 318-2, CPU 318-2 DP
- CPU 319-3 PN/DP
- The connections on which a job with a data length > 240 bytes is being processed on the communication bus are aborted temporarily.
- FETCH/WRITE connections are temporarily aborted.

On the FC interface in the user program, the condition codes made up of the DONE, ERROR and STATUS parameters must be evaluated in FC11 / FC12.

8.4 IP configuration

8.4.1 Configured S7 connections cannot be operated if the IP address is assigned over DHCP

NOTICE

If you obtain the IP address over DHCP, any S7 connections you may have configured will not work.

Reason: The configured IP address is replaced by the address obtained over DHCP during operation.

8.5 Setting the CPU time of day by the CP

8.4.2 Detection of double IP addressing in the network

Response of the CP to double addressing in the network

To save you timeconsuming troubleshooting in the network, the CP detects double addressing in the network.

The reaction of the CP when double addressing is detected varies as follows:

• CP during startup

When the CP starts up (after power down or after the initial addressing), the CP queries its own IP address on the network. If a response is sent in reply, the CP does not start up! The error is indicated by an LED ("STOP with internal error" is displayed) and an entry is made in the internal diagnostic buffer.

The CP remains in STOP mode.

When you eliminate the cause by removing the device with the same IP address or changing its address, you must then restart the CP.

• CP in RUN mode

In RUN, the CP also sends this query at intervals of one minute to detect double IP addresses.

If a double IP address is detected, the CP also reports this via the LEDs (BUSF LED) and generates an entry in the diagnostic buffer.

The CP remains in RUN mode.

8.4.3 Obtain IP address vie DHCP: CP STOP on expiry of the lease

Response of the CP to expiry of the lease

If you have configured "Obtain IP address from a DHCP server", when the CP starts up, it is assigned a valid IP address by the DHCP server for a restricted time (period of the lease).

NOTICE

When the lease expires the reaction of the CP is as follows:

The CP changes to STOP and loses the previously assigned IP address if the DHCP server does not extend it before expiry of the lease. All communication connections are terminated.

8.5 Setting the CPU time of day by the CP

Update interval

The CP updates the time of day of the CPU at intervals of 1 minute.

If the CP receives time-of-day frames at intervals of 1 second, the CP still only synchronizes the time on the CPU once every minute. This means that the time value on the CPU jumps less often.

8.6 Time-of-day synchronization

General rules

The CP supports the two modes explained below for time-of-day synchronization:

- SIMATIC mode
- NTP mode (NTP: Network Time Protocol)

Note

No automatic changeover to daylight saving is defined in NTP. As a result, you may need to implement this changeover using a program application.

NOTICE

Note the following regarding time-of-day synchronization in NTP mode:

If an NTP frame is detected by the CP as "not exact" (example: NTP server is not synchronized externally), the CP does not synchronize itself and does not forward the time on the communication bus (K bus). If this problem occurs, none of the NTP servers is displayed as "NTP master" in the diagnostics; rather all NTP servers are displayed only as being accessible.

Forwarding the time-of-day message

You can configure the direction in which time-of-day messages are forwarded in STEP 7 / NCM S7 in the properties dialog of the CP as follows:

• Configuration "from station to LAN"

The CP forwards time frames from the CPU to Industrial Ethernet when the local CPU is time master (SIMATIC mode only) or when the time of day is forwarded by a different CP on the K bus.

Configuration "from LAN to station"

The CP forwards time frames from Industrial Ethernet to the CPU when one of the following components is time master:

In SIMATIC mode:

- a remote CPU 41x
- a remote CPU 31x
- a SIMATIC NET time transmitter
- a CP 1430 TF

an NTP server when using NTP mode

8.7 SNMP agent

As default, time-of-day synchronization is not activated for the CP and it does not therefore forward the time. However, the internal clock of the CP is synchronized in this case, if a time-of-day frame is received from the K bus or from Industrial Ethernet.

Synchronization using one of the two modes described here must be configured in STEP 7 in the properties dialog of the CP - "Time-of-Day Synchronization" tab.

For more detailed information on the parameters and options, refer to the online help in the properties dialog.

Coordinating forwarding of the time of day with several CPs

If there is more than one CP in a station connected to the same network, only one of these CPs is allowed to pass on time-of-day messages.

You can therefore made the following settings in the configuration:

Automatic

The CP receives the time-of-day message from the LAN or from the station and forwards it to the station or to the LAN.

If several CPUs are being operated in the station, this automatic setting can lead to collisions. To avoid this, you can specify the direction of forwarding with the following options:

- From station to LAN
- From LAN to station

8.7 SNMP agent

SNMP (Simple Network Management Protocol)

The CP supports data queries via SNMP in Version 1. It returns the contents of certain MIB objects according to the MIB II standard, LLDP MIB and Automation System MIB.

SNMP is a protocol for managing networks. To transmit data, SNMP uses the connectionless UDP protocol.

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

Where to find further information

For more detailed information on working with MIB files, refer to the documentation of the SNMP client you are using (example of an SNMP client: SNMP OPC Server from SIMATIC NET).

You will find more information on MIB on the following SIMATIC NET Internet page:

Link to MIBs: (http://support.automation.siemens.com/WW/view/en/15177711)

Supported MIB objects

The CP supports the following groups of MIB objects of the MIB II standard in compliance with RFC1213:

- System
- Interfaces
- Address Translation (AT)
- IP
- ICMP
- TCP
- UDP
- SNMP

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

- EGP
- Transmission

The CP continues to support the LLDP MIB according to IEEE 802.1AB.

Exceptions / restrictions:

 Write access is permitted only for the following MIB objects of the system group: sysContact, sysLocation and sysName;

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

• Traps are not supported by the CP.

"Interfaces" MIB group

This group returns status information about the CP interfaces. The MIB objects of the ifTable provide the status information of the interface. The Object Identifier "ifIndex" is assigned to the CP interface as follows:

ifIndex		Type of interface
when the Ethernet inter	face is	
networked	not networked	
1	-	Ethernet interface
4	3	Internal CP interface

Access permissions using community name

The CP uses the following community names to control the access rights in the SNMP agent:

8.8 Possible security holes: Prevent unauthorized access

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

*) Note the use of lowercase letters!

MIB files for your SNMP tools

If you use an SNMP tool, you will find the MIB files relevant to the CP in the STEP 7 installation in the following folder:

<drive>\<installation directory>\Siemens\Step7\S7DATA\snmp\mib

For the Automation System MIB, for example, this means the following files:

- automationPS.mib
- automationSmi.mib
- automationSystem.mib
- automationTC.mib

If necessary, copy the required MIB files to your SNMP client.

8.8 Possible security holes: Prevent unauthorized access

Open interfaces and protocols

With various SIMATIC NET components, such as switches, a wide range of parameter assignment and diagnostic functions (for example, Web servers, network management) are available over open protocols and interfaces. The possibility of unauthorized misuse of these open protocols and interfaces by third parties, for example to manipulate data, cannot be entirely excluded.

When using the functions listed above and these open interfaces and protocols (for example, SNMP, HTTP), you should take suitable security measures to prevent unauthorized access to the components and the network particularly from within the WAN/Internet.

NOTICE

We expressly point out that automation networks must be isolated from the rest of the company network by suitable gateways (for example using tried and tested firewall systems). We do not accept any liability whatsoever, whatever the legal justification, for damage resulting from non-adherence to this notice.

The applies in particular to the connection to the company network when using ERPC functions.

If you have questions on the use of firewall systems and IT security, please contact your local Siemens office or representative. You will find the address in the SIMATIC catalog IK PI or on the Internet at

Link to contacts: (<u>http://www.automation.siemens.com/net</u>) \rightarrow Contacts & Partners \rightarrow Contacts.

8.9 Interface in the user program

8.9.1 Programmed communication connections with FB55 IP_CONFIG

Downloading the configuration using FB55

FB55 allows program controlled transfer of the configuration data.

Note

If the CP is in PG STOP mode, the configuration is downloaded using FB55; the CP then changes automatically to RUN.

8.9.2 IP access protection with programmed communication connections

In principle, it is possible to set up communication connections using FB55 by programming and at the same time by configuring IP access protection. Please note the following point:

NOTICE

When configuring specified connections in STEP 7 / NCM S7, the IP addresses of the partners are entered automatically in the IPACL (IP Access Control List).

The IP addresses of partners with unspecified connections (passive end points) and of partners on programmed communication paths are not entered in the IPACL. This means that communication with unspecified nodes is not possible if IP access protection is activated.

8.9.3 Programmed communications connections - Assigning parameters to the port

The CP now supports the following settings when assigning parameters to the port in the parameter block for TCP connections and UDP connections:

• SUB_LOC_PORT parameter

The port can be specified as an option when the connection is established actively.

SUB_REM_PORT parameter

The port can be specified as an option when the connection is established passively.

Further notes on operation

8.9 Interface in the user program

How to load new firmware

9.1 Firmware overview

There are two independent firmware parts available for the CP:

• The Siemens firmware

This firmware part is necessary for the basic functions of the CP. The CP ships with Siemens firmware installed.

• The ERPC firmware

The ERPC firmware only needs to be downloaded, if you want to use ERPC functions.

9.2 Downloading the ERPC firmware

Information on downloading the ERPC firmware

The ERPC firmware is downloaded from the ILS Workbench to the CP. Read the relevant documentation of our cooperation partners ILS Technology LLC.

Downloading the ERPC firmware during ongoing operation

Updating with a new firmware version of the ERPC software is possible during ongoing operation-. The CP can remain in RUN mode. Established communication connections area not terminated during the download.

Requirement for downloading the ERPC firmware

In the "Users" tab of the properties dialog of the CP in STEP 7, you entered a user name and password. In the next dialog "Edit User Entry", do not assign any special rights. The ERPC firmware must be downloaded under this user name.

Requirement for the use of the ILS license

To use ERPC communication, you require a license from ILS Technology LLC. The relevant license file is loaded on the CP.

Make sure that the current time of the CPU is set on the station in which the ERPC-CP is inserted. If the CPU time is not up-to-date, the license file will be shown as invalid.

9.3 Downloading Siemens firmware

9.3 Downloading Siemens firmware

Requirements

You download new firmware to a SIMATIC NET CP using the firmware loader shipped with STEP 7 / NCM S7.

Requirements for downloading

- To download firmware, you require an Industrial Ethernet CP module in the PG/PC (for example, CP 1613) or a normal Ethernet module with the "Softnet" software package.
- The S7ONLINE interface must be set to the "ISO Industrial Ethernet" protocol. It is not possible to download using TCP/IP (and therefore not to other networks).

How to download new firmware

You always start the download using the MAC address of the CP set in the factory!

LED display of the download status

The different combinations of the LEDs on the front panel indicate the download status:

SF (red)	BF (red)	RUN (green)	STOP (yellow)	Download status of the CP
		-À.	\bigcirc	Downloading firmware.
.	÷.	-Ò.	0	Firmware was successfully downloaded.
- ` .	÷.	0	- ``	Firmware could not be downloaded.

Legend - meaning of the symbols:

Symbol		0	¢ ¢
Status	ON (steady light)	OFF	Flashing

Restarting the CP

After downloading the firmware, restart the S7 station with the CP by cycling power.

What to do if a download is interrupted

Disturbances or collisions on the network can lead to packets being lost. In such cases, this can lead to an interruption of the firmware download. The firmware loader then signals a timeout or negative response from the module being loaded. In this case, turn the station off and on again and repeat the download.

Technical specifications

10

Technical specifications

Transmission speed		
Ethernet interface	1 x RJ45 jack	
	10 Mbps, 100 Mbps and 1 Gbps	
Power supply	+24 V DC (permitted range: +20.4 V to +28.8 V)	
Current consumption		
from backplane bus	0.27 A maximum, 0.14 A typical	
• from external 24 V DC	• TP: approx. 0.62 A maximum, 0.48 A typical	
Power loss approx.	14.7 W maximum	
Permitted ambient conditions		
Operating temperature	 0 °C to +60 °C in vertical operation 	
	• 0 °C to +40 °C in horizontal operation	
Transportation/storage temperature	• -40 °C to +70 °C	
Relative humidity max.	• 95% at +25 °C	
Altitude	 up to 2000 m above sea level 	
Pollutant concentration	 According to ISA-S71.04 severity level G1, G2, G3 	
Design		
Module format	Compact module S7300; double width	
• Dimensions (W x H x D) in mm	• 80 x 125 x 120	
Weight approx.	• 800 g	

In addition to this, all the information in the S7300 reference manual "Module Data" /10/ in the section "General Technical Specifications" on the topics listed below applies to the CP:

- Electromagnetic compatibility
- Transportation and storage conditions
- Mechanical and climatic ambient conditions
- Insulation tests, class of protection and degree of protection

Technical specifications

Other information available about the CP

FAQs on the Internet

You will find detailed information (FAQs) on using the Industrial Ethernet S7-CPs at the following Internet address (entry type: FAQ):

Link to FAQs: (http://support.automation.siemens.com/WW/view/en/10806074)

You will find the following information in the general Part A of the manual:

- A list of the documents require for configuration, commissioning and operation (Preface)
- Detailed descriptions of configuration and commissioning of the module
- Description of the IT functions
- Description of Web diagnostics and NCM S7 Diagnostics
- Notes and explanations on the standards and approvals

Relating to the general part A of the manual, see /1/.
Approvals



Approvals for the CP 343-1 ERPC

Information on standards and approvals

Before you put the device into operation, read the information on standards and approvals in Part A of this manual /1/.

The same approvals apply to the CP 343-1 ERPC described here as for the following module described in Part A of this manual:

CP 343-1 Advanced
 Order number: 6GK7 343-1GX30-0XE0

You will find the general Part A of this manual at the following Internet address:

Link to Part A: (http://support.automation.siemens.com/WW/view/en/30374198)

```
→ Entry type: Manuals
```

By entering the entry ID 30374198 in the search box at the top right, you go to the valid release 05/2008 of the general Part A of the manual.

The CP has the following approvals or conforms to the following directives:

- IEC 61131-2
- CE mark
- EMC directive for an industrial environment
 - emission: EN 61000-6-4 : 2007
 - immunity: EN 61000-6-2 : 2005
- Explosion protection directive (KEMA)
- EC machinery directive
- UL 508
- CSA C22.2 No. 142
- UL 1604 / UL 2279 Pt. 15 cULus HazLoc Class I, Div. 2 / Class I, Zone 2, T4 or ANSI/ISA 12.12.01 cULus HazLoc Class I, Div. 2 / Class I, Zone 2, T4
- FM 3611

Class I, Division 2, Group A, B, C, D T4 or Class I, Zone 2, Group IIC, T4

- ATEX 94/9 EG
 II 3G Ex nA II T4 (Zone 2)
- C-TICK

Note

The approvals that apply to the device are printed on the device.

EU declaration of conformity

You will find the EU declaration of conformity for this product on the Internet at the following address:

Link to the declaration of conformity: (<u>http://support.automation.siemens.com/WW/view/en/10805878</u>) \rightarrow "Entry list" tab

Filter settings:

- Entry type: "Certificates"
- Certificate type: "EU declaration of conformity"
- Search item(s): <name of the module>

Training, Service & Support

Online support

In addition to our product documentation, the comprehensive online information platform supports you in all aspects of our Service & Support at any time and from any location in the world. You will find this on the Internet at the following address: www.siemens.com/automation/service&support

Here, you will find the following information:

- Support news, newsletter
- Product information, Product Support, Applications & Tools
- Technical Forum
- Access to other features of our Service & Support offer:
 - Technical Consulting
 - Engineering Support
 - Field Service

Phone: +49 911 895 7444

- Spare parts and repairs

Phone: +49 911 895 7448

- Optimization and modernization
- Technical Support

Expert advice on technical questions with a wide range of demand-optimized services for all our products and systems.

Phone: +49 911 895 7222 www.siemens.de/automation/support-request

You will find contact addresses on the Internet at the following address:

www.automation.siemens.com/partner

SITRAIN - Siemens training for automation and industrial solutions

With over 300 different courses, SITRAIN covers the entire Siemens product and system spectrum in the field of automation and drive technology. Advanced training tailored to your needs is also available. In addition to our classic range of courses, we also offer a combination of various training media and sequences. You can, for example, use self-study programs on CD-ROM or on the Internet as preparation or to consolidate training.

You will find detailed information on our training curriculum and how to contact our customer consultants at the following Internet address:

(www.siemens.com/sitrain)

С

References

Where to find Siemens documentation

You will find the order numbers for Siemens documentation in the catalogs "SIMATIC NET Industrial Communication, catalog IK PI" and "SIMATIC Products for Totally Integrated Automation and Micro Automation, catalog ST 70".

You can request these catalogs and additional information from your Siemens representative.

Some of the documents listed here are also on the SIMATIC NET Manual Collection CD supplied with every S7-CP.

You will find many SIMATIC NET manuals on the Internet pages of Siemens Customer Support for automation:

Link to Customer Support: (http://support.automation.siemens.com/WW/view/en)

Enter the ID of the relevant manual as the search item. The ID is listed below some of the reference entries in brackets.

Manuals that are included in the online documentation of the STEP 7 installation on your PG/PC can be found in the start menu (Start > SIMATIC > Documentation).

You will find an overview of the SIMATIC documentation at:

Link to the documentation: (http://www.automation.siemens.com/simatic/portal/html_76/techdoku.htm)

On configuration, commissioning and use of the CP

/1/

SIMATIC NET S7 CPs for Industrial Ethernet Configuring and Commissioning Manual Part - General Application Configuration Manual Siemens AG

(SIMATIC NET Manual Collection)

Link to Part A: (<u>http://support.automation.siemens.com/WW/view/en/30374198</u>) (release 05/2008, ID: 30374198)

or

Overview of the manuals: (<u>http://support.automation.siemens.com/WW/view/en/27103175</u>) \rightarrow Entry list \rightarrow Entry type "Manuals"

0 On configuring with STEP 7 / NCM S7

/2/

Version History/Current Downloads for the SIMATIC NET S7CPs History document Siemens AG (SIMATIC NET Manual Collection)

On configuring with STEP 7 / NCM S7

/3/

NCM S7 for Industrial Ethernet Primer Siemens AG (part of the online documentation in STEP 7)

/4/

SIMATIC NET Commissioning PC Stations - Manual and Quick Start Configuration Manual Siemens AG (SIMATIC NET Manual Collection)

/5/

SIMATIC Configuring Hardware and Connections with STEP 7 Siemens AG
(part of the documentation package "STEP 7 Basic Knowledge")
(part of the online documentation in STEP 7)

On programming

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SIMATIC NET Functions (FCs) and Function Blocks (FBs) for SIMATIC NET S7-CPs Programming Manual Siemens AG
(SIMATIC NET Manual Collection)
Version History of the SIMATIC NET Function Blocks and Functions for SIMATIC S7 Reference Manual Siemens AG
(SIMATIC NET Manual Collection)

References

0 On installing and commissioning the CP

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SIMATIC Programming with STEP 7 Siemens AG (part of the STEP 7 documentation package STEP 7 Basic Knowledge) (part of the online documentation in STEP 7) Automatisieren mit STEP 7 in AWL und SCL (ISBN: 978-3-89578-280-0) / Automating with STEP 7 in STL and SCL (ISBN: 978-3-89578-295-4)

User manual, programming manual Berger, Hans Publicis KommunikationsAgentur GmbH, GWA, 2006

On installing and commissioning the CP

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SIMATIC S7 Automation System S7-300

- CPU 31xC and 31x Installation: Operating Instructions (ID: 13008499)
- Module Data: Reference Manual (ID: 8859629)

Siemens AG

and

SIMATIC S7 Automation System S7-400, M7-400

- Installation: Installation Manual (ID: 1117849)
- Module Data: Reference Manual (ID: 1117740)

Siemens AG

On the IT functions of the CP

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Data Security in Industrial Communication White Paper Siemens AG

(SIMATIC NET Manual Collection)

(http://www.automation.siemens.com/net/html_76/support/whitepaper.htm)

References

0 On setting up and operating an Industrial Ethernet network

On setting up and operating an Industrial Ethernet network

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SIMATIC NET Twisted-Pair and Fiber-Optic Networks Manual Siemens AG (SIMATIC NET Manual Collection)

/13/

SIMATIC NET Manual for Triaxial Networks (SIMATIC NET Manual Collection)

Basics of SIMATIC and STEP 7

/14/

Communication with SIMATIC System Manual Siemens AG (ID: 25074283)

/15/

Documentation package "STEP 7 Basic Knowledge"

- Working with STEP 7 Getting Started (ID: 18652511)
- Programming with STEP 7 (ID: 18652056)
- Configuring Hardware and Connections with STEP 7 (ID: 18652631)
- From S5 to S7, Converter Manual (ID: 1118413)

Siemens AG Order number 6ES7 810-4CA08-8AW0 (part of the online documentation in STEP 7)

/16/

CPU 31xC and CPU 31x: Technical Specifications Manual Siemens AG (ID: 12996906)

Other areas of interest

/17/

RFC 793 (TCP) http://www.ietf.org

/18/

RFC 791 (IP) http://www.ietf.org

D

Error messages of the ERPC application

Error messages of the ERPC application

The table describes error messages that you will find in NCM S7 Diagnostics in the "Application" diagnostic object. The errors coded in hexadecimal have the following meaning:

Code	Meaning	Meaning / notes
0080 _h	deviceWISE was started.	
0081h	Missing time synchronization in the CP configuration	Since time synchronization was not set in the parameters, the time information of the CP is wrong.
0082h	Free memory capacity of the internal file system of the CP is below < <i>value</i> > %	If this message is displayed, reduce the amount of data for current transactions by reducing the number of variables or the length of arrays.
0083 _h	Free memory capacity of the flash system of the CP is below < <i>value</i> > %	If this message is displayed, reduce the number of triggers or the data in the CP-internal database.
0084 _h	The "Attention bit" was set in deviceWISE.	Group error that can be configured in deviceWISE (see deviceWISE documentation)
0085h	Error no. < value> occurred in deviceWISE.	(see deviceWISE documentation)

Table D-1 Meaning of the error coding

Glossary

Autocrossing	Function that allows the automatic crossing over of the send and receive lines on twisted- pair interfaces.
Autonegotiation	Configuration protocol in Fast Ethernet Devices on the network negotiate a transmission mode that each device is capable of using (100 Mbps or 10 Mbps; Full Duplex or Half Duplex) prior to the actual data transfer.
Autosensing	Capability of a device to detect the transmission speed (10 Mbps or 100 Mbps) automatically and to send/receive at this rate.
Broadcast	A broadcast is like "calling all stations": Broadcast packets are received by all nodes configured to receive broadcasts.
Client	A client is a device or, in general terms, an object that requests a service from a \rightarrow server.
Configuration dat	ta Parameters that determine the modes and functions of a CP. They are set and downloaded using the STEP 7 or NCM S7 configuration tool.
СР	Communications processor Module for communications tasks
C-PLUG	The C-PLUG is an exchangeable medium for storage of the configuration and project engineering data of a basic device. This means that the configuration data remains available if the basic device is replaced.

CPU

Central Processing Unit Main processor of a SIMATIC controller

ERP subscriber

Network subscriber that communicates with a SIMATIC S7 station with CP 343-1 ERPC. An ERP subscriber can, for example, be an Enterprise Resource Planning (ERP) system at the enterprise management level or an \rightarrow MES.

ERPC

Enterprise Resource Planning Connect Connection between the process level (SIMATIC S7) and the enterprise level (\rightarrow ERP subscriber)

ERPC application

Software package of the cooperation partners ILS Technology LLC for communication between an S7 station and \rightarrow ERP subscribers. The ERPC software is also loaded on the CP 343-1 ERPC. The ERPC software consists of the following two parts:

• The \rightarrow ERPC firmware

This installs the ERPC application on the CP. The application handles \rightarrow ERPC communication.

• The → ILS Workbench configuration

This supplies the ERPC application with the required parameters for ERPC communication.

ERPC communication

Communication between a SIMATIC S7 station with a CP 343-1 ERPC and an \rightarrow ERP subscriber. ERPC communication is handled using TCP/IP on Industrial Ethernet.

ERPC communication is possible using two methods, the \rightarrow logical trigger and/or spontaneous or cyclic read and write jobs.

Using read jobs, data is read from the CPU and sent to the ERP subscriber. With write jobs, data is written by the ERP subscriber to the CPU.

ERPC communication is possible only when the ERPC software and the ERPC-specific STEP 7 configuration is loaded on the CP. See also \rightarrow ERPC application.

ERPC firmware

Firmware part of the cooperation partners ILS Technology LLC for communication between the CP 343-1 ERPC and an \rightarrow ERP subscriber. To use the ERPC functions, the ERPC firmware must be loaded on the CP 343-1 ERPC and activated in the \rightarrow ILS Workbench. See also \rightarrow ERPC application.

ERPC software

→ ERPC application

Fast Ethernet

Compared with 10 Mbps Ethernet, frames at 100 Mbps are transported much faster and therefore occupy the bus for a very short time.

FΜ

Factory Mutual Research US certificate for the installation of devices in dangerous locations

Functions (FCs)

STEP 7 code blocks of the type "function"

Gigabit Ethernet

Compared with Fast Ethernet, Gigabit Ethernet operating at 1 Gbps is faster by a factor of 10 and bus occupation reduces to 1/10 of the time.

Hardware product version

With SIMATIC NET products, this is the version released for delivery to customers.

HTML

Hyper Text Markup Language is the name of an intermediate file format that is understood by all browsers and makes data communication easier.

HTML page

A file created in HTML format that can be made available, for example on Web servers and can be called in the intranet/Internet.

HTTP

Hypertext Transfer Protocol

Transmission protocol for Web pages on the Internet

ILS Workbench

Configuration and diagnostics tool of the cooperation partners ILS Technology LLC See also \rightarrow ERPC application.

ILS Workbench configuration

Configuration in the ILS Workbench of the cooperation partners ILS Technology LLC. Here, ILS Workbench configuration means only the configuration data loaded on the CP and required by the \rightarrow ERPC application.

Industrial Ethernet

LAN system complying with IEEE 802.3 (ISO 8802-2)

IP

Internet Protocol

A network protocol widely used in computer networks. It represents the network layer of the OSI model for TCP/IP-based networks. The IP protocol alone is connectionless and not permitted. The most important information is the unique IP address.

The blocks of data are sent to the destination computer independently. IP does not negotiate anything with the destination computer. There is no end-to-end error check.

Frames can arrive in a different order from the order they were sent in. TCP is responsible for putting them together in the correct order.

IP access control list

Access control list for IP access protection in Ethernet

Connections are only possible to communications partners whose IP address is listed in the IP-ACL.

IP access protection

Access protection based on IP addresses. This makes it possible to restrict access to the device (for example a communications processor) via defined IP address ranges or single IP addresses.

IP address

An IP address consists of a numeric code made up of four numbers from 0 to 255 (for example 192.168.0.55). It is the numeric address of a particular computer in the network / Internet.

ISO-on-TCP

Communication connection of the transport layer (layer 4 communication complying with ISO) mapped to TCP.

Messages can be exchanged bi-directionally on an ISO-on-TCP connection. TCP provides data stream sequence communication without segmenting data in messages. ISO on the other hand is message-oriented. With ISO-on-TCP, this mechanism is mapped on TCP. This is described in RFC1006 (Request For Comment).

ISO-on-TCP connections all program/event-controlled communication on Ethernet from SIMATIC S7 to the following systems:

- SIMATIC S7 with an Ethernet CP
- SIMATIC S5 with an Ethernet CP
- PC/PG with an Ethernet CP
- any other suitable system

ISO-on-TCP connection

Type of communications connection over which communication is handled in Industrial Ethernet according to the TCP/IP (Transmission Control Protocol/Internet Protocol) standard with RFC1006 (Request For Comment).

Local Area Network (LAN)

Local area network

Logical trigger

A logical trigger is the method used for event-oriented data transmission in \rightarrow ERPC communication. Data is read from the CPU of the S7 station containing the CP 343-1 ERPC. The data read out is sent by the \rightarrow ERPC application in the CP to one or more \rightarrow ERP subscribers.

The basic configuration of the logical trigger is created in the \rightarrow ILS Workbench.

The triggering of the logical trigger takes place in the user program of the CPU. The relevant data areas of the CPU and the software blocks required for the logical trigger are configured in the STEP 7 project.

MAC

Media Access Control

Protocol with which access to a transmission medium (cable, wireless) is controlled if it cannot be used by all nodes at the same time.

MAC address

Hardware address for the unique identification of a device in an Ethernet network. The MAC address is assigned by the manufacturer. On some devices it can be modified.

Media Access Control (MAC)

Bus access control: for controlling access by a station to a common transmission medium shared with other stations

MES

Manufacturing Execution System at the factory management level

MPI	Multi Point Interface. Multipoint interface for SIMATIC S7		
Multicast	A frame intended for the nodes in a network prepared to receive frames with the multicast address.		
National Electrical Code (NEC)			
	UL directive for laying cables in buildings		
NCM S7 for Indu	ustrial Ethernet		
	Configuration software for configuration and diagnostic functions on an Ethernet CP		
Network			
	A network consists of one or more interconnected subnets with any number of nodes. Several networks can exist side by side.		
Network ID			
	Network ID of the subnet: Based on the network ID, the router recognizes whether a target address is inside or outside the subnet. See also "Subnet".		
OP			
	Operation Panel, device for operator control and monitoring		
Open communication services			
	Communication services that allow non device dependent data exchange based on TCP communication via Industrial Ethernet.		
	Open communication services are, for example, access in SIMATIC S7 via the SEND/RECEIVE interface.		
PG			
	Programming device		
PG operation			
	A mode of the PROFIBUS/Ethernet CP in which the SIMATIC S7CPU is programmed, configured or diagnosed over PROFIBUS/Ethernet. This mode is handled by the S7		

functions.

Process image	The process image is a special memory area in the programmable logic controller. At the start of the cyclic program, the signal states of the input modules are transferred to the process input image. At the end of the cyclic program, the process output image is transferred as a signal state to the output modules.
Protocol	A set of rules for transferring data. Using these rules, both the formats of the frames and the data flow are specified.
RJ-45	Symmetrical connector for data cables. It is also known as a Western plug. Widely used connector used with telephone and ISDN technology; it is also used in LAN installations in both office and industrial environments.
S7 subnet ID	You will find detailed information on this topic in the STEP 7 online help.
Server	A server is a device, or in general terms, an object that provides certain services. A service is started at the instigation of a \rightarrow client.
Services	Services provided by a communication protocol
SNMP	Simple Network Management Protocol: A protocol of the Internet protocol family for monitoring, controlling and managing network nodes
Station	 A station is identified by a MAC address in the Ethernet network PROFIBUS address in the PROFIBUS network.
Subnet	A subnet is part of a -> network whose parameters (for example -> PROFIBUS) must be matched. The subnet includes bus components and all the attached stations. Subnets can, for example, be connected together by → gateways to form a network. A → system consists of several subnets with unique → subnet numbers. A subnet consists of several → stations with unique → PROFIBUS or MAC addresses (Industrial Ethernet).

Subnet mask

The subnet mask specifies which parts of an IP address are assigned to the network number. The bits in the IP address whose corresponding bits in the subnet mask have the value 1 are assigned to the network number.

Subnet number

A system consists of several subnets with unique subnet numbers.

System

This means all the electrical equipment within a system. A system includes programmable logic controllers, operator control and monitoring devices, bus systems, field devices, actuators, supply lines.

TCP/IP

→ Transport Connection Protocol / Internet Protocol

Transmission speed

The transmission speed specifies the number of bits transmitted per second. On PROFIBUS, transmission speeds of 9.6 Kbps to 12 Mbps are possible.

Transport Control Protocol (TCP)

Protocol for connection-oriented data transmission in networks; it belongs to the family of Internet protocols.

Trigger data

Data read from the data area of the CPU when a \rightarrow logical trigger is triggered and then sent to the \rightarrow ERP subscriber.

UDP

User Datagram Protocol

Datagram service for simple and data transfer beyond the boundaries of a network without acknowledgment.

UDP connection

Connection type that can be configured in STEP 7. To be able to transfer SIMATIC S7 UDP frames, UDP connections need to be configured. This provides the address information and system resources required for the transfer. Since UDP is a datagram service, there is no explicit connection establishment between the communications partners during operation - the datagrams are simply sent based on the configured information without previous connection establishment.

Web browser

A program for displaying Web pages

Web server

A program that provides information using HTTP.

Glossary

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