

SIMATIC NET

S7-CPs for Industrial Ethernet

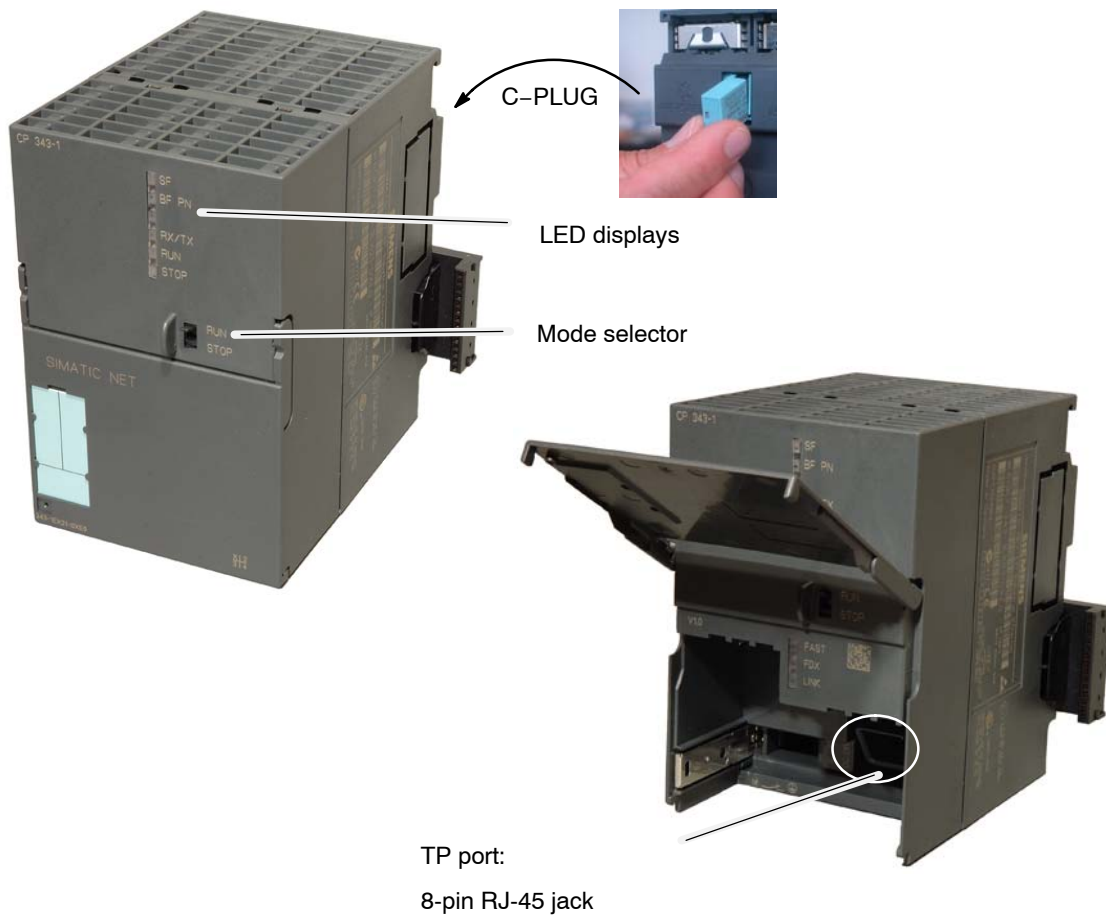
Manual Part B3A

CP 343-1 Advanced

6GK7 343-1GX21-0XE0

Version 1 or higher (Firmware Version V1.0)

for SIMATIC S7-300 / C7-300



Notes on the Product

Product Names

This description contains information on the following product

- CP 343-1 Advanced

Note

In this document, the term CP or CP 343-1 is used instead of the full product name.

Printed Product Information Supplied with the Product

Note

All the notices in the **Product Information Bulletin** shipped with this device are valid and must be adhered to.

Compatibility with the Previous Version

Note

Due to the **increased functionality and restrictions**, pay particular attention to the notes in Chapter 9 of this manual.

Address label: Unique MAC address preset for the CP

The CP ships with a factory-set MAC address.

To ensure a unique address assignment, we recommend that you use this factory set MAC address when configuring the module!



1 Properties / Services

Application

The CP 343-1 communications processor is designed for operation in an S7-300 programmable logic controller. It allows the S7-300 to be attached to Industrial Ethernet.

Services

The CP 343-1 supports the following communication services:

- PROFINET IO Controller

PROFINET IO allows direct access to IO devices over Ind. Ethernet.

- PROFINET CBA

Use of a SIMATIC S7-300 for Component based Automation based on the new PROFINET Standard of the PNO. This standard allows:

- Component technology in automation
- Graphic configuration of communication between intelligent devices instead of laborious programming
- Vendor-independent, plant-wide engineering

Component based Automation allows access to the variables of PROFINET components from all standard PC applications with the OPC client interface, for example, visualization systems. Over the OPC server, objects can be selected directly from a variable selection list of the selected PROFINET component.

- S7 communication and PG/OP communication
 - PG functions (including routing)
 - Operator control and monitoring functions (HMI) multiplexing TD/OP connections
 - Client and server for data exchange using communication blocks ¹⁾ on S7 connections configured at both ends
 - Server for data exchange on S7 connections configured at one end only without communication blocks on the S7-300 / C7-300 station

1)

Blocks for S7 communication (see also STEP 7 online help or manual

“System Software for S7-300/400 System and Standard Functions”):

BSEND	FB12
BRCV	FB13
PUT	FB14
GET	FB15
USEND	FB8
URCV	FB9
C_CNTRL	FC62

- IT functions
 - sending E-mails
 - Monitoring devices and process data (HTML process control)
 - FTP functions (File Transfer Protocol) for file management and access to data blocks in the CPU (client and server functions).

Configuration

You can configure the CP 343-1 over MPI or LAN/Industrial Ethernet. You require STEP 7 with NCM S7 for Industrial Ethernet with the following version:

Table 1-1

Version STEP 7 / NCM IE	Functions of the CP 343-1
V5.3 Service Pack 2 or higher *)	Prerequisite for configuring all functions of the CP 343-1.

Project engineering for the use of PROFINET CBA

To be able to work in the PROFINET environment, you require the SIMATIC iMap engineering tool.

SIMATIC iMap requires a connection over Industrial Ethernet (TCP/IP protocol).

The following SIMATIC iMap project engineering software is required:

Table 1-2

Version of SIMATIC iMap	Functions of the CP 343-1
V2.0 + SP1	The full functionality of the device can be used as of hardware version 1 and firmware version V1.0.

To operate PROFINET CBA, you require the current service packs of SIMATIC iMap containing the current FB88 V1.5 function block:

SIMATIC iMap V2.0 – Download Service Pack 1:

<http://www4.ad.siemens.de/WW/view/en/19762802>

SIMATIC iMap STEP 7 Add-on V2.0 – Download Service Pack 3:

<http://www4.ad.siemens.de/WW/view/en/21981502>

Programming – Using Blocks

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

2 Requirements for Use

General Operation

The CP can be operated in the following device families:

- S7-300 stations with the CPU types
 - Standard
 - Compact
 - Modular
- C7 control systems in C7 packaging system

The following tables show the devices with which the CP 343-1 can be operated with this range of functions:

Notice

The tables list the CPUs and devices approved at the time of printing this manual. S7-300 CPUs or C7 or C7 control systems approved later and not listed in the table also support the range of functions described here.

Table 2-1 Use of the CP with S7-300

CPU	Order Number
CPU 312C	6ES7312-5BD01-0AB0
CPU 313C	6ES7313-5BE01-0AB0
CPU 313C PtP	6ES7313-6BE01-0AB0
CPU 313C-2DP	6ES7313-6CE01-0AB0
CPU 314C PtP	6ES7314-6BF01-0AB0
CPU 314C PtP	6ES7314-6BF02-0AB0
CPU 314C-2DP	6ES7314-6CF01-0AB0
CPU 314C-2DP	6ES7314-6CF02-0AB0
CPU 312	6ES7312-1AD10-0AB0
CPU 314	6ES7314-1AF10-0AB0
CPU 314	6ES7314-1AF11-0AB0
CPU 315-2 DP	6ES7315-2AG10-0AB0
CPU 315-2PN/DP ¹⁾	6ES7 315-2EG10-0AB0
CPU 317-2 DP	6ES7317-2AJ10-0AB0
CPU 317-2PN/DP ¹⁾	6ES7317-2EJ10-0AB0
CPU 317T-2 DP	6ES7317-6TJ10-0AB0
CPU 318-2 DP	6ES7318-2AJ00-0AB0

3 Installation and Commissioning

3.1 Procedure / Steps

Step	Explanation / Meaning
1. Install the CP on the S7 standard rail. 2. 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 in the sections dealing with setup and wiring, described in detail in /1/.
3. Connect the CP to the power supply.	Follow the steps as described in detail in /1/ when wiring between the power supply and the CPU.
Notes • The CPU, CP and IM (if one exists) must be connected to the same power supply. • Only wire up the S7-300 / C7-300 with the power switched off!	
4. Attach the CP to Industrial Ethernet.	
5. The remaining steps in commissioning involve downloading the project engineering data.	You can connect the PG when configuring the CP as follows: • via MPI • via Industrial Ethernet For further details, refer to the general Part A of this manual: – addressing the first time (IP address assignment / node initialization); – downloading the defined configuration The PG/PC requires a LAN attachment, for example via a CP 1613 or CP 1612 and must have the necessary software (for example the S7-1613 package or SOFTNET IE). The TCP/IP protocol or ISO protocol must be installed. The protocol used must then be applied to the S7ONLINE access point.

Step	Explanation / Meaning
6. User diagnostics for commissioning and to analyze problems.	The following options are available: • Hardware diagnostics and troubleshooting with STEP 7 • Communication diagnostics with STEP 7 / NCM Diagnostics • Standard information using HW Config
7. Optional when using with PROFINET CBA: Download PROFINET CBA component	If the S7 station in which the CP is operated is used as a PROFINET CBA component, the interconnections are downloaded using SIMATIC iMap; for more detailed information, refer to the topic "Using the CP with PROFINET CBA".

Notice

Please note the startup behavior:

Starting IT services, particularly when initializing the flash file system, may result in delays during startup. It may be necessary to set the CPU parameter "Monitoring time for transfer of parameters to modules" to a higher value – for example 200 ms instead of the default 100 ms.

This avoids the CP changing to STOP "Stopped by error".

You will find the parameter in the Properties dialog of the CPU in the "Startup" tab.

Notice

The 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.

Configuration

To initialize the CP for communication services, use the configuration tool STEP 7 / NCM S7. Refer to Chapter 1 of this manual.

3.2 C-PLUG (Configuration Plug)

Exchangeable C-PLUG

The CP has a receptacle for 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 basic device (CP 343-1). This means that configuration data remains available if the basic device is replaced. It is possible to replace the module without a PG.

We always recommend that you store the project engineering data on the CPU. In cases in which the project engineering data storage of the CPU is not adequate (large PROFINET IO configurations), the project engineering data can be stored on C-PLUGs inserted in the CP.

The retentively stored parameters include the complete configuration data:

- IP address and IP parameters
- A newly set MAC address
- LAN settings
- SNMP Variables (modifiable)
- Interconnection information for PROFINET CBA (C-PLUG necessary)

Notice

The 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.

Principle

The power is supplied by the basic device. When powered 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 5.9.

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!



Figure 3-2 Fitting the C-PLUG and Removing It from the CP with a Screwdriver

Function

If the C-PLUG has not yet been written to (as shipped), when the device starts up, all the configuration data of the CP is saved automatically on it. Modifications to the configuration during operation are also saved on the C-PLUG without any action by the user being necessary.

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. As soon as it starts up, the replacement automatically has the same device configuration as the failed device.

C-PLUG Formatting

Use only C-PLUGs that are formatted for the CP 343-1. C-PLUGs that have already been used and formatted in other device types must first be formatted for the CP 343-1 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. Project engineering is adopted by the CPU only after reloading or after turning on the power supply again.

Removing the C-PLUG

It is only necessary to remove the C-PLUG if a fault occurs on the basic device (see Figure 3-2).

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 (SF-LED red).

3.3 Module Replacement without PG

General Procedure

The project engineering data for the CP 343-1 is stored optionally on the CPU or on the CP or in the C-PLUG of the CP; this means that the module can be replaced with the module of the same type (identical order number) without a PG.

This option can be selected in the properties dialog of the CP (in "Replace Module without PG").

For information on replacing previous modules, please refer to the section "Compatibility".

Module replacement: Special feature with PROFINET CBA

For PROFINET CBA, the interconnection information is stored on the C-PLUG. The following must therefore be distinguished when replacing a module:

- C-PLUG of the previous module is used
In this case, the interconnection information is available directly on the C-PLUG.
- A new C-PLUG is used
In this case, download the interconnection information again with SIMATIC iMap.

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

During configuration of the CP you can specify the IP configuration in the properties dialog; one option is to obtain the IP address from a DHCP server.

Notice

When replacing modules, remember that the factory-set MAC address of the new module is different from the previous module. When the factory-set MAC address of the new module is sent to the DHCP server, this will return either a different or 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.

If you have configured a new MAC address instead of the factory-set MAC address (generally the exception), the DHCP server always receives the configured MAC address and the CP obtains the same IP address as the replaced module.

4 Displays and Mode Selector

Along with the five LEDs on the front panel that are used to indicate the mode, there is an additional display with two LEDs (on the CP 343-1 located beside the RJ-45 jack hidden by the front panel) to indicate the communication status.

Front panel:		SF
		BF PN
		RX/TX
		RUN
		STOP
Beneath the front panel:		FAST
		FD
		LINK

LEDs Displaying the Status

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

SF(red)	BF PN (red)	RUN(green)	STOP(yellow)	CP Operating Mode
				Starting up (STOP->RUN)
				Running (RUN)
				Stopping (RUN->STOP)
				Ready for firmware loading (this mode is active for ten seconds following power up when the mode selector is set to STOP)
				RUN with external error; Diagnostic information from one or more IO devices is available.
				Waiting for firmware update (CP currently has an incomplete or incorrect firmware version)
				Stopped (STOP) In the STOP mode configuring and performing diagnostics on the CP remain possible.
				Stopped (STOP) with errors In this state, the CPU or intelligent modules in the rack remain accessible using PG functions.
				RUN with external error One or more IO devices are not obtainable.

SF(red)	BF PN (red)	RUN(green)	STOP(yellow)	CP Operating Mode
				Module fault / system error

Legend:  on  off  flashing (0.5 Hz)

CP Communication State

In addition to the LEDs that signal the CP state, behind the front panel there are also LEDs that provide information about the status of the CP interface to Industrial Ethernet.

Table 4-1

LED	Meaning (LED on)
LINK LED (green)	Indicates an established connection to Ethernet:
RX/TX LED (green)	Flashing: The CP is sending/receiving over Ethernet
FAST LED (green)	Signals an existing connection to TP at 100 Mbps (Fast Ethernet)
FD LED (green)	Signals an existing full duplex connection

Controlling the Operating Mode

There are different ways in which you can control the mode of the CP, as follows:

- Mode selector
- SIMATIC Manager in STEP 7

To control the mode from STEP 7 / NCM S7, the mode selector must be set to RUN.

Mode selector

With the mode selector, you can set the following modes:

- Switch from STOP to RUN:

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

Note

The modes can only be controlled using NCM S7 or the SIMATIC Manager when the selector is set to RUN.

- Switch from RUN to STOP:

The CP changes to STOP with the following results:

- Established connections (ISO transport, ISO-on-TCP, TCP connections) are terminated (this transition phase is signaled by the LEDs with the “Stopping” state).

The reaction is as follows in STOP:

- All connections are terminated
- The configuration and diagnostics of the CP remains possible (system connections for configuration, diagnostics, and PG channel routing are retained);
- FTP access to the file system is possible
- HTTP access is possible
- The routing function is active
- The time of day is not forwarded
- PROFINET IO is disabled
- PROFINET CBA is disabled

Note

Please read the explanations in the General Part A of this manual on the topic of downloading project engineering data to the CP.

9 Compatibility with the Predecessor Product

9.1 Extended Functionality

What's New? Extended functionality compared with 6GK7 343-1GX20-0XE0

The following services and functions are new:

- PROFINET IO Controller
- ISO transport protocol
- Exchangeable C-PLUG
- PROFINET CBA
- FC10 (AG_CNTRL) is supported

9.2 Replacing Older Modules / Replacing Faulty Modules

The 6GK7 343-1GX21-0XE0 described here can be used as a replacement for the following predecessor products:

CP 343-1EX20 (6GK7 343-1EX20-0XE0)

CP 343-1 (6GK7 343-1EX11-0XE0) *)

CP 343-1GX20 (6GK7 343-1GX20-0XE0) **)

CP 343-1 (6GK7 343-1GX11-0XE0) *)

*) Please note that there is no longer an AUI interface as was available in these device types.

**) The new module type has less space for the file system in the flash.

Interface in the User Program



Danger

Please remember that if you use this module as a replacement, you should only use the blocks on the SEND/RECEIVE interface that are permitted for the CP type used! We recommend that you always use the latest block versions.

If you use the module described here as a replacement for one of the modules listed below, make sure that you use the block versions listed after the modules:

- 6GK7 343-1EX10-0XE0
- 6GK7 343-1EX11-0XE0 configured as 6GK7 343-1EX10-0XE0

Block versions:

AG_SEND (V4.2 and higher)

AG_RECV (V4.7 and higher)

AG_LOCK (V4.0 and higher)

AG_UNLOCK (V4.0 and higher)

Notice

For new user programs, please make sure that you always use the latest block versions. You will find information on the latest block version and links to download the current blocks on the Internet:

<http://www4.ad.siemens.de/WW/news/en/8797900>

Module Replacement

When replacing an older module with the module described here, please keep to the steps outlined below:

Table 9-1

Originally configured module	Configuration Steps
6GK7 343-1EX20-0XE0 6GK7 343-1EX11-0XE0 6GK7 343-1EX10-0XE0 *) **) 6GK7 343-1GX20-0XE0 6GK7 343-1GX11-0XE0	Case a: Configuration unchanged If you do not have any new requirements compared with the previous CP (numbers of connections etc.), no modification of the project engineering is necessary. When putting the module into operation, note the following difference: • If the option of storing the configuration data on the CPU was selected for the CP you are replacing, when the CP starts up, the configuration data will be transferred automatically from the CPU to the CP. • Otherwise, download the configuration data to the CP from your PG/PC again. Case b: Adapted project engineering data If you want to use the extended functionality of the new CP, follow the steps below: 1. In STEP 7 / HW Config, replace the previously configured CP 343-1 with the new module from the hardware catalog. 2. Extend the configuration to meet your requirements, for example in the connection configuration. 3. Save, compile and download the configuration data to the CPU or CP again.

Notice

Please read the following notes on the module types listed in Table 9-1:

*)

If you replace a module, you must download the adapted project engineering data to the new module types using STEP 7. The procedure is therefore possible only with "Case b / adapted configuration".

**)

If you replace a module, you must update the communication blocks to the latest version.

12 Technical Specifications

Transmission rate	10 Mbps and 100 Mbps Note: To operate with PROFINET IO and PROFINET CBA, the transmission rate of 100 Mbps full duplex is an absolute necessity.
Interfaces	
Connection to Ethernet	RJ-45 jack
C-PLUG (memory submodule)	
• Number of write cycles:	approx. 100 000
• Size of flash file system	28 MB
Power supply	+24 V DC (+/-5%)
Current consumption	
• from the S7-300 / C7-300 backplane bus	200 mA typical
• from external 24 V DC	200 mA maximum
Power loss approx.	5.8 W
Permitted ambient conditions	
• Operating temperature	0 °C to +60 °C
• Transportation/storage temperature	-40 °C to +70 °C
• Relative humidity max.	95% at +25 °C
• Altitude	up to 2000 m above sea level
Design	
• Module format	Compact module S7-300; double width
• Dimensions (W x H x D) in mm	80 x 125 x 120
• Weight approx.	600 g

All the information in /1/ in the Section “General Technical Specifications” regarding the following topics also applies to the CP 343-1:

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