


SIMATIC NET

S7-CPs for Industrial Ethernet

Manual Part B8

CP 343-1 Lean

6GK7 343-1CX00-0XE0 Version 1 or higher (Firmware Version V1.0)
for SIMATIC S7-300 / C7-300



The diagram shows a CP 343-1 Lean module. On the left side of the front panel, there is a vertical row of five LED indicators labeled SF, LINK, RX/TX, RUN, and STOP. A white oval highlights these indicators, with a line pointing to the text 'LED displays'. On the right side of the front panel, there is a hinged cover. A white arrow points to the bottom edge of this cover, with text indicating a 'TP port: 8-pin RJ-45 jack (behind the hinged front panel)'. The front panel also features the 'SIMATIC NET' logo and the model number '343-1CX00-0XE0' at the bottom left.

LED displays

TP port:
8-pin RJ-45 jack
(behind the hinged front panel)

Notes on the Product

Product Names

This description contains information on the following product

- CP 343-1 Lean

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.

Address label with unique MAC address preset for the CP

The CP 343-1 Lean is supplied with a MAC address preset in the factory. The MAC address is not changed during configuration.

Contents

Contents - Part A

Ethernet CPs - General Information	See General Part
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Note

Please remember that Part A of the manual also belongs to the description of the CP. Among other things, it contains explanations of the safety notices, the references to literature, and general information that applies to all S7 CPs for Industrial Ethernet.

You can also obtain the current Part A from the Internet:

<http://www4.ad.siemens.de/view/cs/en/8777865>

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1 Properties / Services

Application

The CP 343-1 Lean 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 Lean supports the following communication services:

- S7 communication and PG/OP communication
 - PG functions (including routing)
 - Operator control and monitoring functions (HMI)
 - Server for data exchange on S7 connections configured at one end only without communication blocks on the S7-300 / C7-300 station
- S5 compatible communication with
 - SEND/RECEIVE interface over ISO-on-TCP, TCP and UDP connections
 - 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) over ISO-on-TCP connections and 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;
- Internal time of day

If a time master exists (using the NTP or SIMATIC mode), the time for CP-internal diagnostic buffer is synchronized over the LAN.
- Can be addressed using a factory-set MAC address

The CP can be reached over the preset MAC address to allow the IP address to be assigned.
- SNMP Agent

The CP supports data queries over SNMP version V1 (**S**imple **N**etwork **M**anagement **P**rotocol) according to the MIB II standard.

- IP configuration

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

It is also possible, as an alternative, to assign the connection configuration to the CP using STEP 7 or using a block interface in the user program (FB55: CP_CONFIG) (see /Part A/).

Note: Does not apply to S7 connections.

Configuration

You can configure the CP 343-1 Lean over MPI or LAN/Industrial Ethernet. You require STEP 7 with NCM S7 for Industrial Ethernet (abbreviated to “NCM IE” below) with the following version:

Table 10-1

Version STEP 7 *)	Function of the CP 343-1 Lean / CP 343-1EX20
V5.3 SP1 or higher	Requirement for the configuration of the full functionality of the CP 343-1 Lean

*) As of V5.3, NCM is automatically part of the basic installation, as of this version no distinction between Ethernet and PROFIBUS is made.

Programming - Using Blocks

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

You will find a detailed description of these blocks in the NCM S7 for Ethernet manuals.

Notice

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 on the Internet:

<http://www4.ad.siemens.de/view/cs/de/8797900>

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

You will find further information and Internet addresses in the Preface of the General Part of this manual.

2 Requirements for Use

General Operation

The following table shows the S7-300 CPUs with which the CP 343-1 can be operated with this range of functions:

Notice

The table lists the CPUs approved at the time of printing this product information bulletin. S7-300 CPUs approved later and not listed in the table also support the range of functions described here.

Table 11-1

CPU	Order Number
CPU 312 IFM	6ES7 312-5AC02-0AB0
CPU 312 (T)	6ES7 312-5AC82-0AB0
CPU 312	6ES7 312-1AD10-0AB0
CPU 313	6ES7 313-1AD03-0AB0
CPU 314	6ES7 314-6CF01-0AB0
CPU 314	6ES7 314-1AF10-0AB0
CPU 314	6ES7 314-1AE04-0AB0
CPU 314 (T)	6ES7 314-1AE84-0AB0
CPU 314 IFM	6ES7 314-5AE03-0AB0
CPU 314 IFM (T)	6ES7 314-5AE83-0AB0
CPU 315	6ES7 315-2AF03-0AB0
CPU 315	6ES7 315-2AG10-0AB0
CPU 315	6ES7 315-6FF01-0AB0
CPU 315	6ES7 315-1AF03-0AB0
CPU 315-2 DP	6ES7 315-2AF03-0AB0
CPU 315-2 DP (T)	6ES7 315-2AF83-0AB0
CPU 316-2 DP	6ES7 316-2AG00-0AB0
CPU 318-2	6ES7 318-2AJ00-0AB0
CPU 614	6ES7 614-1AH03-0AB3
CPU 614-Z	6ES7 614-1AH03-0AB3-Z
CPU 312C	6ES7 312-5BD00-0AB0
CPU 313C	6ES7 313-5BE00-0AB0
CPU 313C-2 DP	6ES7 313-6CE00-0AB0
CPU 313C-2 PtP	6ES7 313-6BE00-0AB0

Table 11-1

CPU	Order Number
CPU 314C-2 DP	6ES7 314-6CF00-0AB0
CPU 314C-2 PtP	6ES7 314-6BF00-0AB0
CPU 316	6ES7 316-2AG00-0AB0
CPU 317	6ES7 317-2AJ10-0AB0

3 Installation and Commissioning

Procedure / Steps

Table 12-1

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. Note The CP cannot be used in an extension rack that is connected via the IM 365! Reason: The required communication bus is not connected to the extension rack via the IM 365.	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. Notes <ul style="list-style-type: none"> • 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! 	Follow the steps as described in detail in /1/ when wiring between the power supply and the CPU.
4. Attach the CP to Industrial Ethernet.	
5. The remaining steps in commissioning involve downloading the configuration data.	You can connect the PG when configuring the CP as follows: <ul style="list-style-type: none"> • via MPI • via Industrial Ethernet For further details, refer to the general Part A of this manual: <ul style="list-style-type: none"> - 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 1411 and must have the necessary software (for example the S7 1613 package or SOFTNET IE). The TCP/IP protocol must be installed. The protocol used must then be applied to the S7ONLINE access point.

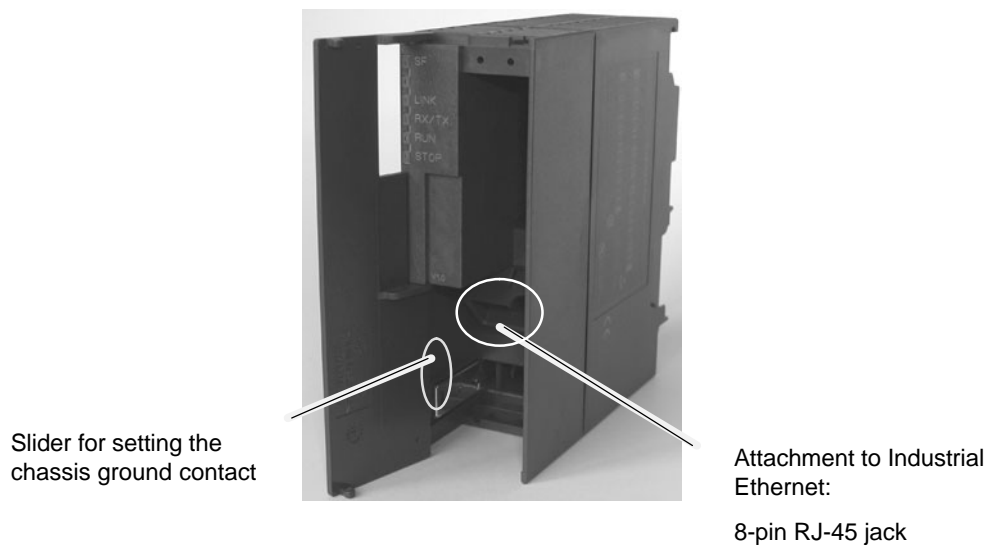


Figure 12-1

Ground/Chassis Ground Concept

Notice

Please keep to the instructions on the grounding and chassis concept in the installation instructions for the SIMATIC S7-300/S7-400; see installation manual SIMATIC S7 Programmable Controller S7-300 - Hardware and Installation:/1/.

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.

- Slider pushed in: chassis and reference ground connected (note: the slider must be felt to lock in place).
- Slider pulled out: No connection between chassis and reference ground

When shipped: Slider pushed in

Use a screwdriver to set the slider.

Note

You can connect to Ethernet and PROFIBUS even with the power switched on.

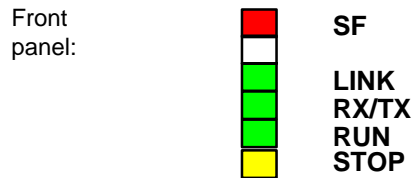
Note

The hinged front panel must be kept closed during operation.

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

4 Displays

The display on the front panel consists of 5 LEDs that indicate the operating mode and display the communication status.



LEDs Displaying the CP Operating Mode

The different combinations of the LEDs on the front panel indicate the operating mode:

Table 13-1

SF(red)	RUN(green)	STOP (yellow)	CP Operating Mode
●	○	●	<ul style="list-style-type: none"> Starting up after power up The startup behavior differs depending on the configuration as follows: <ul style="list-style-type: none"> Ethernet cable inserted After a few seconds, the CP also signals the existing connection to ITP/TP with the LINK LED. The CP then changes to RUN mode. Ethernet cable not inserted After 10 seconds, the CP changes to the "Ready to begin firmware download" status. or Stopped (STOP) with errors In this state, the CPU or intelligent modules in the rack remain accessible using PG functions.
○	●	○	Running (RUN)
○	☀	●	Starting up (STOP->RUN)
○	●	☀	Stopping (RUN->STOP)
○	○	☀	<p>Ready to begin firmware download (this mode is active for approximately 15 seconds)</p> <p>This mode is activated after the "Starting up after power on" mode if the Ethernet cable was previously removed.</p> <p>During this phase, the Ethernet cable must be inserted again and the firmware download started.</p>

Table 13-1 , continued

SF(red)	RUN(green)	STOP (yellow)	CP Operating Mode
●	○	☀	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.

Legend: ● on ○ off ☀ flashing

LED Display of the CP Communication status

In addition to the LEDs that signal the CP mode, the front panel also includes LEDs that provide information about the status of the CP interface to Industrial Ethernet.

Table 13-2

LED	Meaning
LINK LED (green)	● On: Indicates an established connection to TP
RX/TX LED (green)	☀ Flashing: CP sending/receiving via TP

5 Performance Data

5.1 General Characteristics

Table 14-1

Characteristic	Explanation / Values
Number of simultaneous connections in total over Industrial Ethernet	Maximum 12

Example of Maximum Load

You can operate:

- 4 S7 connections
- 4 ISO-on-TCP connections
- 2 TCP connections
- 2 UDP connections

5.2 Characteristics of S7 Communication

Table 14-2

Characteristic	Explanation / Values
Number of connections for S7 communication on Industrial Ethernet	in each case, up to <ul style="list-style-type: none"> • 4 Operator control and monitoring functions (HMI) • 4 S7 connections configured at one end The number depends on the CPU type being used. Please refer to /1/ for the values for your CPU.
LAN interface - data record length per PDU <ul style="list-style-type: none"> • Sending • Receiving 	240 bytes / PDU 240 bytes / PDU

5.3 Characteristics of the SEND/RECEIVE Interface

Table 14-3

Characteristic	Explanation / Values
Total number of ISO-on-TCP connections + TCP connections	Maximum 8
Total number of UDP connections	Maximum 8 Notes: <ul style="list-style-type: none"> All UDP connections are also possible in the multicast mode Free UDP connections (program-controlled addressing of the communication partner) are not supported by the CP.
Maximum data length for blocks AG_SEND (V4.2 and higher) and AG_RECV (V4.7 and higher)	AG_SEND and AG_RECV allow the transfer of data fields of between 1 and 240 bytes. <ul style="list-style-type: none"> 1 to 8192 bytes for ISO-on-TCP, TCP; 1 to 2048 bytes for UDP
Restrictions for UDP <ul style="list-style-type: none"> Transfer is not confirmed Data field length No reception of UDP broadcast 	<p>The transmission of UDP frames is unconfirmed, in other words the loss of messages is not detected or displayed by the send blocks (AG_SEND).</p> <p>The maximum length of the data fields is 2048 bytes.</p> <p>To avoid overload resulting from a high broadcast load, the CP does not permit reception of UDP broadcast.</p>

Reaction Times of ISO-on-TCP and TCP Connections

The calculation of the reaction times with ISO-on-TCP or TCP connections is determined by the run time of the function blocks required on the S7-300 CPU (AG_SEND, AG_RECV).

Table 14-4

Component	Explanation / Values
Run time in the CPU 314-1	per block AG_SEND, AG_RECV: 2.5 ms to 5 ms

6 Further Notes on Operation

6.1 Memory Reset

Available Functions

The CP has a two-level function available for resetting memory:

- 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 and IP parameters
- LAN settings

- Resetting to factory settings

After this memory reset, the CP retains only the factory-set MAC address (as shipped).

Note

Using the functions described here to reset the memory, you do not modify the configuration data on the CPU!

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

How to Use the Function

You can start the memory reset functions in STEP 7.

- Clear / reset

In STEP 7/HW Config with **PLC ▶ Clear/Reset**

or

In STEP 7 / NCM Diagnostics with **Operating Mode ▶ Clear/Reset Module**

- Factory defaults reset

In STEP 7 / NCM Diagnostics with **Operating Mode ▶ Reset to Factory Defaults**

Behavior after Memory Reset

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 Chapter 4).

The configuration data must then be reloaded.

if the configuration data are stored on the CPU, you can start a download with power down/up.

6.2 Working with Fast Ethernet - automatic switchover

How Autosensing and Autonegotiation Work

The CP has a 10/100 Mbps full duplex interface with autosensing and autonegotiation of the network settings. After turning on the CP, these functions work as explained below:

The CP attempts to detect the transmission rate used by the partner.

If detection is possible, the CP attempts to negotiate an optimum duplex mode with the partner.

If no negotiation is possible, the CP uses the previously detected transmission rate and half duplex.

Time required: 2 seconds

Automatic Setting or Individual Network Settings

As default, the CP is configured for automatic detection. As soon as you define a configuration manually when configuring the CP with STEP 7/HW Config (in the properties dialog of the CP - “Options” tab), the automatic switchover is no longer effective.

Further Notes:

- 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 STEP 7 / HW Config (in the properties dialog of the CP). As default, the CP is configured for automatic detection.
- Forcing a specific mode instead of “Autonegotiation”
If your application requires a fixed mode instead of “Autonegotiation”, you will need to match up the partner devices.
- 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 set the required mode and communication will not be ideal.

Example:

If, for example, 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 using the "Individual network settings" option of the CP, these changes will be adopted by the CP and activated when the configuration data is downloaded to the CP.

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, 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.

NCM Diagnostics displays the operating mode

You will find more information about the currently used network settings in NCM diagnostics in the diagnostic object "Industrial Ethernet" in the Section "Network Attachment".

6.3 FC Call Interface

Status of the FC Call Interface; special situation with FC versions *)

With the FCs AG_SEND (FC5) and AG_RECV (FC6), the following situations

- The CP is in the STOP mode.
- The connection is not configured.
- The connection is not established
- The connection was aborted;

are indicated by the following codes:

- AG_SEND:
DONE=0; ERROR=0; Status=8181_H
or
DONE=0; ERROR=1; Status=8183_H
- AG_RECV:
DONE=0; ERROR=0; Status=8180_H
or
DONE=0; ERROR=1; Status=8183_H

*) valid for FCs with version 4.0 and higher

Calling Communications Blocks for S7-300

Notice

Calling communications blocks for S7-300 (SIMATIC NET block libraries for S7-300 in STEP 7) in several priority classes is not permitted! If, for example, you call a communications block in OB1 and in OB35, the block execution could be interrupted by the higher-priority OB.

If you call the blocks in several OBs, you must write your program so that an executing communication block cannot be interrupted by another communication block (for example, by disabling/enabling SFC alarms).

Changing Call Parameters only after Job Confirmation

Notice

After a job has been triggered, you may only change the call parameters on the FC call interface of the FCs AG_SEND or AG_RECV again after the FC has confirmed job execution with DONE=1 or ERROR=1.

If you do not keep to this, it is possible that the job will be aborted with an error.

6.4 SNMP Agent

SNMP (Simple Network Management Protocol)

The CP supports data queries over SNMP in version 1.

SNMP is protocol language for managing networks and is easy to handle. To transmit data, SNMP uses the connectionless UDP protocol.

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

Supported MIB Objects

The CP supports all MIB objects of the standard MIB according to MIB II (RFC 1213).

Exceptions / restrictions:

- Write access is permitted only for the following MIB objects:
sysContact, sysLocation and sysName;
For security reasons, only read access is permitted for all other MIB objects.
- Traps are not supported by the CP.

Access Permissions using Community Name

The CP uses the following community names for assigning permissions:

- For read access: "public"
- for read and write access: "private"

(note the use of lower-case letters!)

6.5 Possible Security Gaps on Standard IT Interfaces / Preventing Illegal Access

With various SIMATIC NET components, such as OSMs/ESMs, 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, Telnet), 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.

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 NET Catalog IK PI or on the Internet at <http://www.siemens.de/automation/partner>

6.6 Influence of MPI on Connections via Industrial Ethernet

If a station on **MPI** is added or removed, for example because a service PG has been connected or disconnected, it is possible that all the 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.
- The connections on which a job on the communication bus with a data length > 240 bytes is being processed are aborted temporarily.
- FETCH/WRITE connections are temporarily aborted.

The return values must be handled accordingly on the FC interface in the user program.

6.7 Other Information Available about the CP

You will find detailed information (FAQs) on using the CP described here on the Internet under the following entry number:

<http://www4.ad.siemens.de/view/cs/en/10806025>

7 How to Load New 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 other Ethernet module with the "Softnet" software package.
- The S7-ONLINE 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 must always run the download using the MAC address of the CP!

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, repeat the download.

If you cannot start the download again with the preset MAC address following an aborted attempt, follow the steps below:

1. Remove the Ethernet cable from the device.
2. Turn the entire rack off and on again.

The LEDs of the CP now indicate "Starting up after power up" for 10 seconds.

Following this, the LED display "Ready for start of firmware download" is displayed for a further 15 seconds. During this time, take the following two actions:

3. Connect the CP to Industrial Ethernet again.
4. Restart the firmware download.

8 Technical Specifications

Table 17-1 Technical Specifications

Transmission rate	10 Mbps and 100 Mbps
Interfaces Attachment to Twisted Pair	RJ-45 jack
Power supply	DC +24 V (permitted range: +20.4 V to +28.8 V)
Current consumption <ul style="list-style-type: none"> • from backplane bus • from external 24 V DC 	200 mA maximum TP: approx. 0.2 A maximum
Power loss approx.	5.8 W
Permitted ambient conditions <ul style="list-style-type: none"> • Operating temperature • Transportation/storage temperature • Relative humidity max. • Altitude 	0 °C to +60 °C -40 °C to +70 °C 95% at +25 °C up to 2000 m above sea level
Design <ul style="list-style-type: none"> • Module format • Dimensions (W x H x D) in mm • Weight approx. 	Compact module S7-300; single width 40 x 125 x 120 220 g

In addition to this, all the information in the S7-300 reference manual /1/ "Module Data" in the section "General Technical Specification" 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