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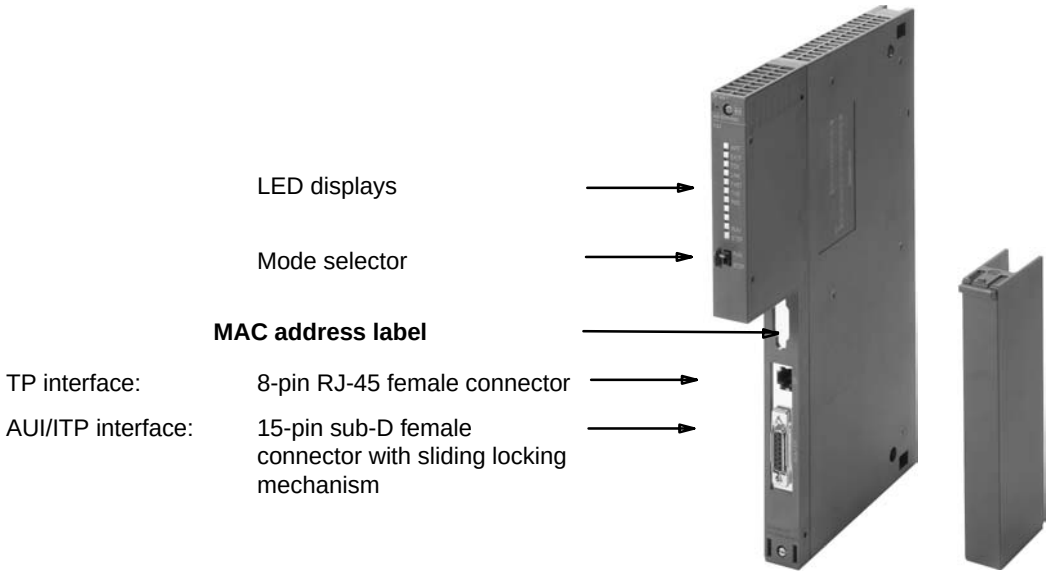
S7–CPs for Industrial Ethernet

Manual Part B5

CP 443-1 IT

6GK7 443–1GX11–0XE0 Version 2 or later (Firmware version V2.0)

for SIMATIC S7–400



1 Properties and Services

Application

The CP 443-1 IT communications processor is designed for operation in an S7-400 (standard) programmable logic controller. It allows the S7-400 to be attached to Industrial Ethernet.

Services

The CP 443-1 IT supports the following communication services:

- S7 communication with
  - PG functions
  - Operator monitoring and control functions
  - Data exchange on S7 connections (fault-tolerant S7 connections also possible)
- S5-compatible communication with
  - SEND/RECEIVE interface via ISO transport connections
  - SEND/RECEIVE interface via ISO-on-TCP and UDP connections
  - SEND/RECEIVE interface via TCP connections

    With the SEND/RECEIVE interface via TCP connections, the CP 443-1 IT supports the socket interface to TCP/IP available on practically every end system.
  - 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 ISO transport connections, ISO-on-TCP connections and TCP connections

    Here, the SIMATIC S7-400 with the CP 443-1 IT is always the server (passive connection establishment) while the fetch or write access (client function with active connection establishment) is always initiated by a SIMATIC S5 or a device from another range.
  - LOCK/UNLOCK with FETCH/WRITE services (depending on the CPU)
- 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 on the CPU (client and server roles).

- Time-of-day synchronization over Industrial Ethernet according to the following defined procedure:
  - SIMATIC mode

    The CP receives MMS time-of-day messages and synchronizes its local time;

  or

  - NTP mode (NTP: Network Time Protocol)

    The CP sends time queries to an NTP server at regular intervals.
- Can be addressed using a factory-set MAC address

  The CP can be reached using the factory-set MAC address to allow IP address assignment; the CP supports the PST function (Primary Setup Tool).

Configuration

You can configure the CP 443-1 via MPI or LAN/Industrial Ethernet. The following version of the software package STEP 7 V3.x with NCM S7 for Industrial Ethernet is required:

Table 1-1

Version STEP 7/NCM IE *)	Functions of the CP 443-1 IT
V2.x to V5.0 + SP2	The same functionality is available as provided by the CP 443-1 IT with order number: 6GK7 443-1GX00-0XE0.
V5.0 + SP3 or higher	The same functionality is available as provided by the CP 443-1 IT with order number: 6GK7 443-1GX10-0XE0.
V5.1 + SP1 or higher	The same functionality is available as provided by the CP 443-1 IT with order number: 6GK7 443-1GX11-0XE0 edition 1 (Firmware version V1.1.0).
V5.1 + SP3	The full functionality including the extended functions listed in Chapter 6 can be used.

*) Configuration data created with these STEP 7 or NCM versions can be downloaded to the CP 443-1 IT.

Note

Replacing an older CP

The compatibility of this CP compared with older versions is shown on page B5–21. The CP 443-1 IT described here supports all the previous functions of the CPs listed there.

For NCM diagnostics, the new CP type must be registered in STEP 7. This is already the case with STEP 7 Version V5.1 + SP3. With older STEP 7 versions, the CP type must be registered extra. Further information and a file for downloading is available at:

http://www.ad.siemens.de/csi/net

under the topic NCM–>Configuration Software for S7–>FAQs–>Download

Note

Note the recommendations in Section 8.4 on operation with a higher communications load.

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.

3 Installation and Commissioning

Procedure / Steps in Installation

Installing the CP 443-1 IT involves the following steps.

Table 3-1

Step	Explanation / Meaning
1. Plugging in the CP 443-1 IT	The CP 443-1 IT can be plugged into all racks with slots for P and K bus attachment. The following racks are suitable: • Central rack CR2 • Universal rack UR1 or UR2 as the central or expansion rack
Notice When using the universal rack UR1 or UR2 as an expansion rack, a communication bus transceiver is necessary!	
	Suitable slots in the rack: With the exception of the slots reserved for the power supply, the CP 443-1 IT can be inserted in all slots with a P and K bus attachment.
2. 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.
3. Attach the CP to Industrial Ethernet.	
4. The remaining steps in commissioning involve downloading the configuration data.	You can connect the PG when configuring the CP as follows: • via MPI • via Industrial Ethernet For more detailed information, refer to the manual NCM S7 for Ind. Ethernet /3/ : – 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 or ISO protocol must be installed. The protocol used must then be applied to the S7ONLINE access point.

Note

The CP 443-1 IT can also be inserted or removed while the power supply is on.

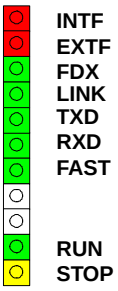
Notice

If the CP 443-1 IT is operated with an older CPU, overload may result if the standard setting of 20% is used for the CPU. In this case, you should set the communication load for the CPU in STEP 7/HW Config (parameter “Scan cycle load from communication”) to a lower value – for example 10%.

4 Displays and Mode Selector

LED Displays

The CP 443-1 IT has 9 display elements on the front panel to display the CP state and the communication state:



CP Operating Mode

INTF LED (red)	EXTF LED (red)	RUN LED (green)	STOP LED (yellow)	CP Operating Mode
○	○	☀	●	Starting up (STOP->RUN)
○	○	●	○	Running (RUN)
○	○	●	☀	Stopping (RUN->STOP)
○	○	○	●	Stopped (STOP) In the STOP mode configuring and performing diagnostics on the CP remain possible.
●	○	○	●	STOP with internal error or memory reset. In this state, the CPU or intelligent modules in the rack remain accessible using PG functions.
○	●	○	●	STOP with external error
●	●	○	☀	Waiting for firmware update (CP currently has an incomplete or incorrect firmware version)
○	○	○	☀	Ready for firmware loading (this mode is active for ten seconds following power up when the mode selector is set to STOP)
Legend:	● lit	○ off	☀ flashing	

CP Communication State

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

Table 4-1

LED	Meaning (LED on)
FDX LED (green)	Signals an existing full duplex connection
LINK LED (green)	Signals an existing connection to ITP/TP
TXD LED (green)	Flashing: The CP is transmitting via AUI / ITP
RXD LED (green)	Flashing: The CP is receiving via AUI / ITP
FAST LED (green)	Signals an existing connection to ITP/TP at 100 Mbps (Fast Ethernet) Flashing: the CP is in the “Autosensing/Autonegotiation” phase; see also Section 8.2.

Note

Read the explanations of the operating modes in the NCM S7 for Industrial Ethernet manual /4/.

Controlling the Operating Mode

You can control the mode of the CP 443-1 IT as follows:

- Mode selector
- NCM S7 configuration software
- 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 downloaded data into the work memory and then changes to the RUN mode.

- 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 (transitional phase with LED display “STOPPING”);

  In the STOP mode:

  – all connections are terminated

  – configuration and diagnostics are possible

  – the time of day is passed on (time-of-day frames are passed on by Industrial Ethernet to the CPU only via the communication bus).

  – FTP access to the file system is possible

  – HTTP access is possible

Note

If you plug in the CP with the mode selector set to STOP or turn on the power supply, the display “Firmware Download” appears for approximately 10 seconds. When necessary, this function also allows the current firmware version to be downloaded. In normal operation, you can ignore this display and switch to RUN immediately.

For more information on downloading new firmware, refer to Section 9.

Note

Refer to the explanations in the manual /4/ on the topic of loading the database on the CP.

5.4 Characteristics of HTTP Mode and FTP Mode

TCP Connections for FTP

- FTP in the Client Mode:

  Up to 2 TCP connections are occupied per configured FTP connection; a maximum of 10 FTP connections can be configured.

- FTP in the Server Mode:

  Up to 2 TCP connections are occupied per FTP session (1 control connection and a data connection); a maximum of 2 FTP sessions are possible at one time.

TCP Connections for HTTP

Up to 4 TCP connections are occupied for an HTTP session as soon as you use one or more Web browsers to display data or files of the IT CP.

5.5 Characteristics of the FCs for the FTP Client

To be able to use the FTP client blocks, a TCP connection must be configured with the “Use FTP protocol” option. With this option, the CP 443–1 IT supports the configuration/use of a maximum of 10 TCP connections.

The following table shows the memory requirements of the FCs available for FTP services.

When using FTP, the block execution times depend on the reaction times of the partner device and the length of the user data so that it is impossible to make general statements about the execution times.

Table 5-4

Function (FC)		Memory Requirements / Bytes
FC40	FTP_CONNECT	1236
FC41	FTP_STORE	1514
FC42	FTP_RETRIEVE	1642
FC43	FTP_DELETE	1232
FC44	FTP_QUIT	796

6 The CP 443-1 IT as Web Server: HTML Process Control

The CP 443-1 IT provides you with the function of a Web server for access using a Web browser.

The CP 443-1 IT provides an additional memory area for storage of files. This area is used to store HTML pages and S7 applets.

HTML pages can be used to transfer and display information in a Web browser. The S7 applets are Java applets specially tailored to SIMATIC S7 that are responsible for write or read access to the S7 CPU.

When the CP 443-1 IT is supplied, there are HTML system pages, S7 applets, S7 beans and further information in the file system.

Please note the following special features when operating IT functions:

Note

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 in the HTLM process control in the Web browser.

Web Browser

To access the HTML pages on the CP 443-1 IT, you require a Web browser.

The following Web browsers are suitable for communication with the CP 443-1 IT (other browsers also possible):

- Netscape Communicator (recommended version: 4.7 or higher)
- Internet Explorer (recommended version: 5.0 or higher)

  These Web browsers support all the requirements necessary for the implementation of the IT functions (Java reference implementation – Java Development Kit) 1.1.x is supported) in conjunction with the CP 443-1 IT.

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

7 Compatibility with the Previous Product

7.1 Extended Functionality

Extended functions compared with 6GK7 443–1GX11–0XE0 to firmware version 1.1.0

- Time-of-day synchronization over Industrial Ethernet according to the following defined procedure:
  - SIMATIC mode

    The CP receives MMS time-of-day messages and synchronizes its local time.

  or

  - NTP mode (NTP: Network Time Protocol)

    The CP sends time queries to an NTP server at regular intervals.
- Can be addressed using a factory-set MAC address

  The CP can be reached using the factory-set MAC address to allow IP address assignment; the CP supports the PST function (Primary Setup Tool).
- Multicast over UDP connection

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

7.2 Replacing Older Modules / Replacing Defective Modules

The CP 443-1 IT described here allows communication both via the ISO transport protocol as well as via the TCP/IP protocol. Its functions are compatible and it can therefore replace the following:

- CP 443-1 ISO with order number 6GK7 443-1BX00-0XE0.
- CP 443-1 ISO with order number 6GK7 443-1BX01-0XE0.
- CP 443-1 TCP with order number 6GK7 443-1EX00-0XE0.
- CP 443-1 TCP with order number 6GK7 443-1EX01-0XE0.
- CP 443-1 with order number 6GK7 443-1EX02-0XE0.
- CP 443-1 with order number 6GK7 443-1EX10-0XE0.
- CP 443-1 with order number 6GK7 443-1EX11-0XE0.
- CP 443-1 IT with order number 6GK7 443-1GX00-0XE0.
- CP 443-1 IT with order number 6GK7 443-1GX10-0XE0.
- CP 443-1 IT with order number 6GK7 443-1GX11-0XE0 to V1.1.0.

The CP 443-1 IT described here has **more functions** as described below.

8 Further Information on Operation

8.1 Clear / 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

  – A newly set MAC address

  – LAN settings

- Resetting to factory settings

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

Note

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

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.

10 Technical Specifications

Table 10-1 Technical Specifications

Transmission rate	10 Mbps and 100 Mbps
Interfaces	
Attachment to Industrial Ethernet (10/100 Mbps)	15-pin sub-D female connector (automatic switchover between AUI and Industrial Twisted Pair)
Attachment to twisted pair	RJ-45 jack
Current consumption via the S7 backplane bus	
– from 24 V	0.4 A maximum
– from 5 V:	1.8 A maximum
Power loss	7.25 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 1500 m above sea level
Design	
Dimensions, module in casing H x W x D (mm)	290 x 25 x 210
Weight	approx. 750 g

All the information in /2/ in the Section “General Technical Data” regarding the following topics also applies to the CP 443-1 IT:

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

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