Application and functions

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1.1 Application

Automation system

The CP 4435 Extended communications processor is designed for use in a SIMATIC S7400 (standard) and S7400H (faulttolerant system) automation system. The CP 443-5 Extended allows the S7400 / S7400H to be connected to a PROFIBUS fieldbus system.

You can use the CP as a router for data records intended for field devices (for example DP slaves).

1.2 Functions and communication services

Supported communications services

The current version of the CP 4435 Extended supports the following communication services in the standard and H systems:

- **PROFIBUS DP with the following characteristics:**
  - DP master (class 1) (redundant operation in faulttolerant system also possible)
  - Direct data exchange (DP slave to DP slave)

    As a DP master, the CP 4435 Extended is capable of enabling direct data exchange for "its" DP slaves.
  - SYNC / FREEZE

    The outputs or inputs can be synchronized by the user program using system function SFC11.

    (Refer to the information in Table 1-1 Use with the current CPU types (Page 13) and Table 1-2 Use with no longer available CPU types - part 1 (Page 14))
  - Constant bus cycle time (only in the standard system)

    The ability to set a constant bus cycle time means that the DP master always starts the DP bus cycle after the same interval.
  - Selectable DP modes:

DPV1 functionality (default in STEP 7)	**S7-compatible**
DP master mode for • DP slaves complying with the PROFIBUS DPV0 and DPV1 standard • Siemens DP slaves Refer to the information about the required CPU in: • Table 1-1 Use with the current CPU types (Page 13) • Table 1-3 Use with no longer available CPU types - part 2 (Page 15)	DP master mode for • DP Slaves complying with the PROFIBUS DPV0 standard (DP slaves complying with the DPV1 standard can only be used with restricted functionality) • Siemens DP slaves

(For more information on the topic of DPV1, refer to the STEP 7 online help)

- **CiR (Configuration in RUN) - in the standard system**

  By making a change to the configuration with CiR (Configuration in RUN), it is possible to put a DP slave / DP slot extension into operation or take it out of operation when necessary while the system is running.

  In other words, you can configure and activate additional DP slaves or DP slots while the S7 station is in RUN.

- **Enabling /disabling DP slave - in the standard system**

  DP slaves can be activated and deactivated by the user program using system function SFC12.

- **Diagnostics requests**

  As a DP master (class 1), the CP 4435 supports diagnostics requests of a DP master (class 2).

- **Getting the bus topology in a DP master system**

  The CP 443-5 Extended operating as DP master supports the measurement of the PROFIBUS bus topology in a DP master system using a diagnostics repeater (DP slave).

  System function SFC103 in the user program can instruct diagnostics repeaters to measure the PROFIBUS BUS topology in a DP master system. When completed, the results of the measurements made by the diagnostics repeater can then be read in and processed by the user program.

- **Open communications services (SEND/RECEIVE interface) over FDL connections of the following type:**
  - Specified FDL connections
  - Free layer 2 connections
  - Broadcast
  - Multicast

- **S7 communication and PG/OP communication**
  - PG functions with uploading / downloading of FM modules, configuration / diagnostics and routing

    Note on routing: Dynamic switchover to alternative paths (for example if there is a problem on one of the possible transmission paths) is not supported.
  - Operator control and monitoring functions (HMI)
  - Download S7 connections and gateways in RUN.
  - Client and server for data exchange on S7 connections using communications function blocks (faulttolerant S7 connections also possible)
- **Timeofday synchronization via PROFIBUS**
  - The CP forwards timeofday synchronization frames from the LAN to the station (CPU = time slave) or from the station to the LAN (CPU= time master).

    Another option is for this station to be synchronized via a different LAN. The timeofday synchronization frame must be forwarded over PROFIBUS for the synchronization of further stations.
  - The CP supports time stamping of distributed process signals in conjunction with the IM 153.
  - Timeofday status value (standard/daylight saving time switchover, synchronization status).
- **Data record routing**

  You can use the CP as a router for data records intended for field devices (for example DP slaves). SIMATIC PDM (Process Device Manager) is a tool that creates data records of this type for assigning parameters to field devices.

The services of the CP 4435 Extended module listed above can be used independently at the same time.

Replacing a module without a programming device

When installing the CP 4435 Extended, the configuration data of the CP is always stored in the CPU. This means that replacing modules is possible without having to download the configuration data from the PG.

Storage of the configuration data is protected from power failure by the battery backup or the flash memory card in the CPU.

See also section Converting older systems (Page 14).

1.3 Requirements for use

The CP 4435 Extended described here is supported by all CPU operating systems in the versions listed in Tables 2-1 and 2-2 below.

1.3.1 Use with the current CPU types

Configuration limits

To use the CP type described here, the following limits and constraints apply within a rack:

- Number of operable CPs: 14
- Max. number of external DP lines (CP as DP master): 10

Note

The number CPs that can be operated as DP masters depends on the number of CP 443-1 Advanced modules operated as PROFINET IO controllers in the S7-400 station. In total, 10 CPs can be operated as:

- PROFINET IO controller (CP 443-1 Advanced) - maximum 4
- DP masters (CP 443-5 Extended) - maximum 10

- Multicomputing is supported (except with CiR and H systems)

System environment

The CP 443-5 Extended is supported by the S7-400 CPUs and CPU operating systems with the order numbers and versions listed in the table below.

From the table, you can see which functionality is supported when you use the CP 4435 Extended V 6.1 with the various CPU types. The following characteristics are shown:

- CPU type, article number and edition
- Option of multicomputing
- The number of AG_SEND or AG_RECV calls on the SEND/RECEIVE interface that can be active at the same time (data exchange on FDL connections over PROFIBUS and corresponding connections over Industrial Ethernet)
- CPU support for SYNC/FREEZE functionality (SFC11) via the CP

Note

ET 200M devices that were assigned to SYNC/FREEZE groups with STEP 7 must not have modules of the type FM or CP inserted.

- CPU support of the "Activate / deactivate DP slave (SFC12)" functionality via the CP
- CPU support of the functionality for "identifying the bus topology in a DP master system" (SFC103) via the CP
- DPV1 functionality
- CiR functionality (DP slave / DP slot, configurable extension)

1.3.3 Project engineering

Configuration and downloading the configuration data

The following version of STEP 7 is required:

STEP 7 version	Functions of the CP
STEP 7 as of V5.5 SP1	The full scope of functionality of the CP can be configured according to the firmware version specified in the preface: • 6GK7443-5DX05-0XE0 • 6GK7443-5DX05-4XE0 (Conformal Coating)
STEP 7 Professional V11 SP1	The functional range of the following CP type can be configured: • 6GK7443-5DX04-0XE0
STEP 7 Professional V12	The full scope of functionality of the CP can be configured according to the firmware version specified in the preface: • 6GK7443-5DX05-0XE0

Depending on what is available on your PG / PC and the S7-300 station, use one of the following connectors to load the configuration data: MPI, Industrial Ethernet or PROFIBUS.

Note

Changing bus parameters

If you change the bus parameters in the configuration data, you must not load this configuration data on the CP via PROFIBUS!

1.3.4 Programming

Program blocks

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