SIEMENS

SIMATIC NET

Manual

CP 342–5   6GK7 342-5DA02-0XE0

version 1 or higher (firmware V4.0.0)

CP 342–5 FO   6GK7 342-5DF00-0XE0

version 1 or higher (firmware V4.0.0)

Safety Guidelines

This manual contains notices which you should observe to ensure your own personal safety, as well as to protect the product and connected equipment. These notices are highlighted in the manual by a warning triangle and are marked as follows according to the level of danger:

Danger

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

Warning

indicates that death, severe personal injury or substantial property damage can result if proper precautions are not taken.

Caution

indicates that minor personal injury or property damage can result if proper precautions are not taken.

Note

draws your attention to particularly important information on the product, handling the product, or to a particular part of the documentation.

Qualified Personnel

Only **qualified personnel** should be allowed to install and work on this equipment. Qualified persons are defined as persons who are authorized to commission, to ground, and to tag circuits, equipment, and systems in accordance with established safety practices and standards.

Correct Usage

Note the following

Warning

This device and its components may only be used for the applications described in the catalog or the technical description, and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens.

This product can only function correctly and safely if it is transported, stored, set up, and installed correctly, and operated and maintained as recommended.

Trademarks

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Third parties using for their own purpose any other names in this document which refer to trademarks might infringe upon the rights of the trademark owners.

Contents

Product Notes

Note

All the information in the **product information bulletin** accompanying the device described here is up to date and valid and must be read thoroughly.

Compatibility with the Previous Version

The CP 342–5 described here can be used to replace the following CPs

– CP 342–5	6GK7 342–5DA00–0XE0
– CP 342–5	6GK7 342–5DA01–0XE0

The CP 342–5 FO and CP 342–5 are compatible in terms of function.

Note

Please note the **extended functions and restrictions** as described in Chapter 2 of this manual!

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1 CP 342-5/342-5 FO Communications Processor

Application

The CP 342-5/342-5 FO communications processor is intended for operation in a programmable controller of the SIMATIC S7-300 series. It allows the S7-300 to be connected to a PROFIBUS fieldbus system.

Design

CP 342-5

(9-pin sub-D female connector)

Status and error displays

Mode selector

Connection for power supply and functional ground

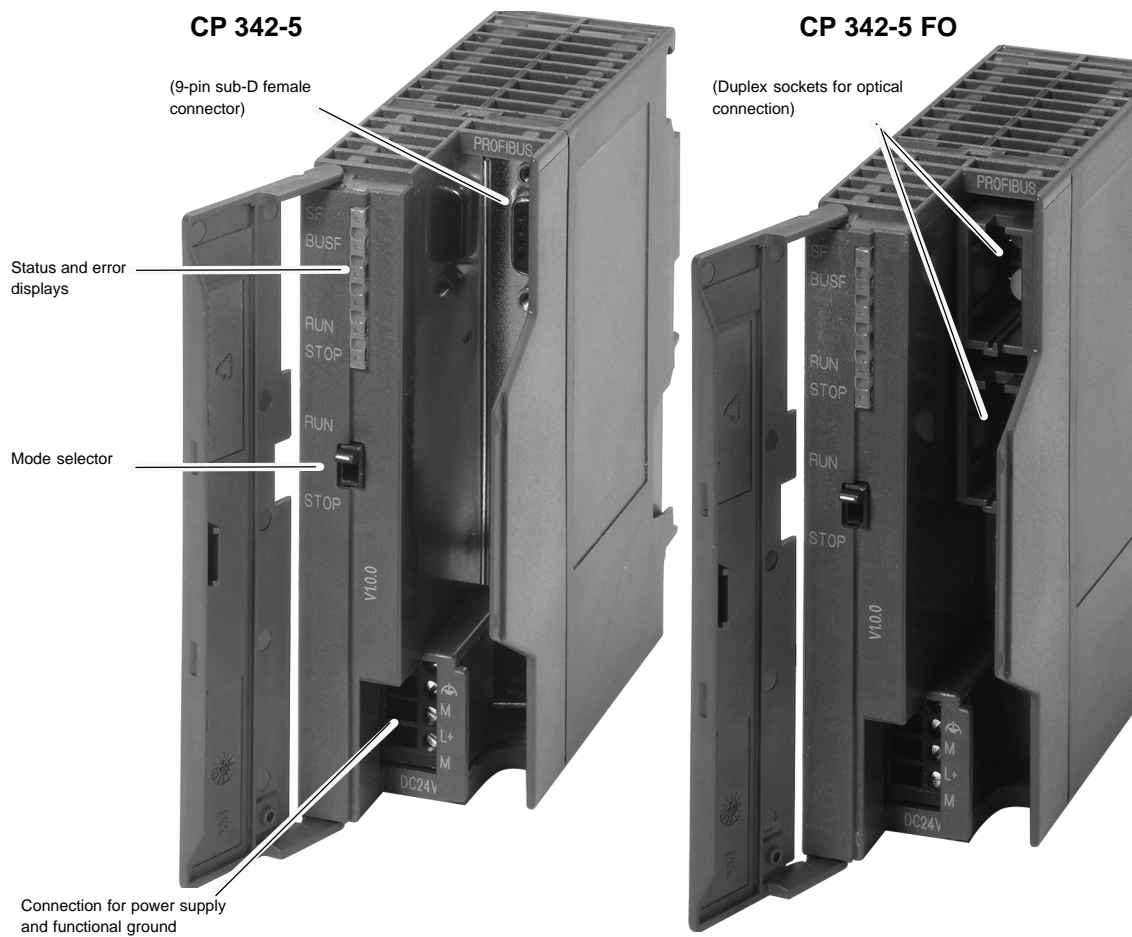**CP 342-5 FO**

(Duplex sockets for optical connection)

Figure 1   Front View of the CPs 342-5 / 342-5 FO

Configuration

Configuration is possible via MPI or LAN/PROFIBUS.

1.1 Characteristics

Services

The current version of the CP 342-5/342-5 FO supports the following communication services:

- PROFIBUS-DP

    – as DP master class 1 and class 2 (PROFIBUS-DP complying with EN 50170, DP Master)

    – as DP slave (PROFIBUS DP complying with EN 50170, DP Slave)

Note

Note however, that the CP 342-5/342-5 FO can only be operated as DP master or DP slave but not both. The DP mode can also be completely deselected.

- S5-compatible communication (SEND/RECEIVE interface) on FDL connections of the following types:

    – Specified FDL connections

    – Free layer 2 connections (SDA, SDN)

    – Broadcast

    – Multicast

- S7 communication and PG/OP communication

    – PG functions (including routing)

    – Operator control and monitoring functions (HMI)

    – Server for data exchange using communication FBs

The services of the CP 342-5/342-5 FO listed here can all be used at the same time independent of each other.

PG Functions with

- upload / download of FM modules
- Configuration / diagnostics
- Routing

Module Replacement without PG

The CP supports the option of storing the CP configuration data on the CPU. If you use this option, you can replace a module without having to download the configuration data from the programming device.

The configuration data are then stored in the load memory of the CPU. The non-volatile storage of the configuration data on the CPU is guaranteed by battery backup or by using an EPROM module card.

Configuration

For configuration, you require STEP 7, version V5.1 or higher; for FDL connections and diagnostic functions, you require the NCM S7 for PROFIBUS optional package supplied with STEP 7.

Note

If you modify the bus parameters in the configuration data, you can only download the configuration data to the CP via MPI!

1.2   Performance

1.2.1   Transmission Rates

The transmission rate is set with the SIMATIC STEP 7 configuration software. The following values are permitted:

Table 1-1

Transmission rate	CP 342-5	CP 342-5 FO
9.6 Kbps	✔	✔
19.2 Kbps	✔	✔
45.45 Kbps	✔	✔
93.75 Kbps	✔	✔
187.5 Kbps	✔	✔
500 Kbps	✔	✔
1.5 Mbps	✔	✔
3 Mbps	✔	–
6 Mbps	✔	–
12 Mbps	✔	✔

1.2.2   Basic Data of the DP Interface/DP Master

General Data

The following data are important if you want to operate the CP 342-5/342-5 FO as a DP master:

Table 1-2

Feature	Explanation / Values
Number of DP slaves that can be operated	124 maximum
Size of the DP data areas (total): – DP input area – DP output area	 2160 bytes maximum 2160 bytes maximum
Size of the DP data areas (per DP slave): – DP input area – DP output area	 244 bytes maximum 244 bytes maximum
Size of the DP diagnostic data:	240 bytes per DP slave

Extended Master Functions

The CP 342-5/342-5 FO supports the following:

- SYNC/FREEZE (acyclic)
- Shared input/output (acyclic)
- Activating/deactivating DP slaves
- Modifications during runtime
  - own PROFIBUS address
  - DP mode (no DP, DP master, DP slave active/passive)
- Hardware interrupts / diagnostic interrupts

  Hardware and diagnostic interrupts do not need to be evaluated in the user program. Hardware and diagnostic interrupts are acknowledged automatically by the CP.

  You can use single diagnostics to obtain interrupt information.

Reaction Times of a DP Master

To calculate the reaction times when operating the module as a DP master, the runtime of the function blocks required for DP processing in the S7-300 CPU (DP_SEND, DP_RECV) is the decisive factor.

Table 1-3

Components	Explanation / Values (Guidelines)	
Runtime on the CPU 314-1 (6ES7 314–1AE04–0AB0)	Per DP_SEND block call: • 0,2 – 3,4 ms at 16 bytes • 0,2 – 5,9 ms at 240 bytes [1]	Per DP_RECV block call: • 0,3 – 3,5 ms at 16 bytes • 0,3 – 6,9 ms at 240 bytes [1]

[1] At data lengths > 240 bytes: The data is transferred segmented. This then involves several block calls.

Note

The reaction times listed above are only intended as a guideline and only apply to a single-master configuration when no other services (for example PG functions) are processed on the CP.

1.2.3 Basic Data of the DP Interface / DP Slave

The following characteristics are important for successful data transfer to a DP slave:

Table 1-4

Feature	Explanation / Values
Device database file (*.GSD)	File name: CP 342-5: SIEM8093.GSD CP 342-5 FO: SIEM8095.GSD You can obtain device database files as follows: • By modem from the mailbox in the Interface Center, Fürth Tel. 0911-737972 (from outside Germany +49-911-737972 • On the Internet http.\\www.ad.siemens.de under "Support, Training and Service...Customer Support, Downloads"
Vendor ID	CP 342-5: 8093_H CP 342-5 FO: 8095_H
Size of the DP data areas: – DP input area – DP output area	 240 bytes maximum 240 bytes maximum
Min. slave interval	2 ms
SYNC / FREEZE	not supported
User parameter assignment data	3 bytes; value: 00 00 00 (fixed)
User diagnostic data	0 bytes

Reaction Times of a DP Slave

To calculate the reaction times when operating the module as a DP slave, the runtime of the function blocks required for DP processing in the S7-300 CPU (DP_SEND, DP_RECV) is the decisive factor.

Table 1-5

Components	Explanation / Values	
Runtime on the CPU 314-1 (6ES7 314–1AE04–0AB0)	Per DP_SEND block: • 0,3 – 3,2 ms at 16 bytes • 0,2 – 5,7 ms at 240 bytes	Per DP_RECV block: • 0,3 – 3,5 ms at 16 bytes • 0,3 – 6,4 ms at 240 bytes

> **Note**
>
> The reaction times listed above are only intended as a guideline and only apply when no other services (for example PG functions) are processed on the CP.

1.2.4 Data for S5-Compatible Communication (SEND/RECEIVE interface) on FDL Connections:

The following data are important when operating FDL connections (Specified, Free Layer 2 (SDA and SDN), Broadcast, Multicast):

Table 1-6

Feature	Explanation / Values
Total number of FDL connections that can be operated.	maximum 16
Size of the transferable data area for FDL connections	maximum 240 bytes per specified FDL connection (for sending and receiving); Free layer 2, broadcast and multicast: Up to 236 bytes of user data can be transferred per job. The job header occupies an additional 4 bytes.

Reaction Times of FDL Connections

To calculate the reaction times when operating with FDL connections, the runtime of the function blocks required in the S7-300 CPU (AG_SEND, AG_RECV) is the decisive factor.

Table 1-7

Components	Explanation / Values	
Runtime on the CPU 314-1 (6ES7 314–1AE04–0AB0)	Per AG_SEND block: • 0,2 – 3,2 ms at 16 bytes • 0,2 – 5,7 ms at 240 bytes	Per AG_RECV block: • 0,2 – 3,5 ms at 16 bytes • 0,3 – 6,4 ms at 240 bytes

1.2.5 Basic Data for S7 Communication

The following characteristic data are important for operating S7 connections:

Table 1-8

Feature	Explanation / Values
Number of S7 connections that can be operated	16 maximum [1]

1) The actual number of S7 connections that can be operated depends on the CPU type you are using. There are further restrictions if you operate in mixed mode. Refer to Section 1.2.6 for more information.

1.2.6 Using Parallel Communications Services (Multiprotocol Operation)

Performance

If you want to use the available communications services at the same time, there are restrictions in terms of communication performance.

The following table shows the transmission rate for FDL connections dependent on the following:

- The frame length (number of bytes)
- The number of connections

The values were measured when sending and receiving in direct succession (at a transmission rate of 1.5 Mbps, bus profile universal, two stations, mode "no DP").

Table 1-9   Number of FDL Frames per Second

Number of connections / Frame length	1	4	8	16
1 byte	77 / s	92 / s	92 / s	92 / s
100 bytes	73 / s	88 / s	88 / s	88 / s
240 bytes	67 / s	82 / s	83 / s	84 / s

Note

Recommendation: In the mixed mode – DP + FDL + S7 functions – a delay time should be selected.

Number of Connections in Mixed Mode

If you use a connection configuration involving the maximum number of FDL connections (16) and the use of DP at the same time, the maximum number of S7 connections reduces from 16 to 12.

1.3   Displays and Mode Selector

LED Display of the CP Mode

The four LEDs on the front panel provide information about the mode of the CP coded as shown below:

Table 1-10

SF (red)	BUSF (red)	RUN (green)	STOP (yellow)	CP Mode
○	○	flashing	●	Starting up (STOP–>RUN)
○	○	●	○	Running (RUN)
○	○	●	flashing	Stopping (RUN–>STOP)
○	○	○	flashing	Ready for firmware download (mode active for 10 seconds)
○	○	flashing	○	Loading firmware
●	●	○	flashing	Waiting for firmware update (CP currently has incomplete firmware)
○	○	○	●	Stopped (STOP)
●	○	○	●	Stopped (STOP) with error
○	●	●	○	Running (RUN) with problems on PROFIBUS
○	flashing	●	○	Running (RUN) with error on DP slave(s)
flashing	flashing	flashing	flashing	Module fault or error/ system error

Key: ● on   ○ off   flashing

Note

Refer to the NCM S7 for PROFIBUS /2/ manual for detailed information about operating modes.

Controlling the Operating Mode

There are different ways in which you can control the operating mode of the
CP 342-5/342-5 FO, as follows:

- Using the mode selector

- Using the NCM S7 for PROFIBUS configuration software

- SIMATIC Manager in STEP 7

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

Mode Selector

You can set the following operating modes with the mode selector:

- Switch from STOP to RUN:

  The CP enters configured and/or loaded data in the work memory and changes
  to the RUN mode.

- Switch from RUN to STOP:

  The CP changes to the STOP mode. Established connections (FDL and S7
  connections) are terminated.

  This affects DP operation as follows:

  – DP slave mode: the CP is no longer involved in data transfer.

  – DP master mode: the mode is "OFFLINE".

  In the STOP mode, it is possible to configure the CP 342-5/342-5 FO and run
  diagnostic functions.

Note

Refer to the manual /2/ for detailed information about downloading a database to
the CP.

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2 Compatibility – Replacing older Modules

Replacing Modules

The table below describes the steps involved when replacing an older module with one of the modules described here:

Table 1-11

Previously Used Module	Steps in Configuration
6GK7 342-5DA00-0XE0	Supply the new module with the adapted configuration as described below: 1. In STEP 7 / HW Config, replace the previously configured CP 342-5 with the new module (you will find this in the hardware catalog). 2. Save, compile and download the configuration data to the CPU or CP again.
6GK7 342-5DA01-0XE0	Case a: Unchanged configuration If you do not require any extension of the functionality provided by the previous CP (such as amounts of data), you do not need to make any changes in the configuration. When commissioning, you then only need to remember the following difference: • If you selected the option of storing the configuration data of the CP you are replacing on the CPU, the configuration data will be downloaded to the CP from the CPU automatically when the CP starts up. • Otherwise, download the configuration data again to the CP from your programming device/PC. Case b: Adapted configuration If you want to use the extended functionality of the new CP, follow the steps outlined below: 1. Use the new FCs (version 3.0 or higher; see also page 21) in your user program. 2. In STEP 7 / HW Config, replace the previously configured CP 342-5 with the new module (you will find this in the hardware catalog). 3. Extend the configuration according to your requirements, for example in the configured connections. 4. Save, compile and download the configuration data to the CPU and CP again.

Information in the Online Help and Documentation regarding NCM S7 for PROFIBUS

The additional information "for newer modules" in the STEP 7 / NCM online help and in the NCM S7 for PROFIBUS manual applies to the CP described here. The symbol shown here is used to indicated the relevant passages.

Note on Installation

If you cannot close the slot gap resulting from replacing an older module by shifting the other modules, you must insert a dummy module (6ES7 370-0AA01-0AA0).

Compatibility

The CP 342-5/342-5 FO behaves differently from its predecessors in several ways. Remember that this affects your user program. The following table provides an overview:

Table 1-12   Changed Behavior

	Topic	Previously	New
1.	DPSTATUS output parameter in FC DP_RECV		
	DP master mode:	Bit 6: indicated "overflow of received data"	Bit 6: is no longer set
	DP slave mode:	Bit 3: indicated "no frame from DP master within watchdog time"	Bit 3: is no longer set
		Bit 4: indicated "overflow of DP data"	Bit 4: is no longer set
2.	DP modes	A distinction was made between STOP and OFFLINE.	The STOP mode is represented by the OFFLINE mode.
3.	Setting the current DP mode	– is supported –	In the version of the CP 342-5 described here, the following job parameters are not supported for FC DP_CTRL with CTYPE 4: • RUN with AUTOCLEAR • RUN without AUTOCLEAR
4.	Cyclic reading of the input/output data using FC DP_CTRL [1]	– supported	In the version of the CP 342-5 described here, the following services of FC DP_CTRL are not supported: CTYPE = 7 CTYPE = 8 These job types are rejected with the code 8311_H.

Table 1-12   Changed Behavior, continued

	Topic	Previously	New
5.	Triggering cyclic global control with FC DP_CTRL [1]	– supported	DP master mode: In the version of the CP 342-5 described here, the following services of FC DP_CTRL are not supported: CTYPE = 1 These job types are rejected with the code 8311$_H$.
6.	Triggering acyclic global control with the CLEAR job or with FC DP_CTRL [1]	– supported	DP master mode: In the version of the CP 342-5 described here, the following services of FC DP_CTRL are not supported: CTYPE = 0 command mode = CLEAR These job types are rejected with the code 8318$_H$.
7.	Triggering acyclic global control for group 0 using FC DP_CTRL [1]	– supported	DP master mode: In the version of the CP 342-5 described here, the following services of FC DP_CTRL are not supported: CTYPE = 0 group select = 0 These job types are rejected with the code 8318$_H$.
8.	Consistency in data transfer between CP and user program	Maximum DP data area: • 240 bytes in the DP master mode • 86 bytes in the DP slave mode	Maximum DP data area: • 2160 bytes in the DP master mode • 240 bytes in the DP slave mode
• You will find further information on consistency following this table		
9.	FCs for DP mode		Depending on the configuration, the older FC types (FC91 to 94) can be used alongside the new FC version (FC1 to 4).
• You will find further information on the FCs following this table		
10.	FCs: Evaluate general properties and codes on the call interface Description in the online help or in the NCM S7 for PROFIBUS manual		The additional information "for newer modules" applies to the CP described here. The passages are highlighted by this symbol:

Table 1-12   Changed Behavior, continued

	Topic	Previously	New
11.	Deterministic sending/receiving of data – coordination between CPU and CP/PROFIBUS	In the cyclic DP mode, the job confirmation on the FC interface contains the confirmation of the transfer to PROFIBUS.	In the cyclic DP mode, the execution cycle on the CPU is independent of the cycle on the CP. Sending data: The confirmation of the job does not include confirmation of the transfer to PROFIBUS that has already taken place. Receiving data: It is possible that the same data is received more than once.
12.	Jobs with DP_SEND and DP_RECV [1]	DP slave mode: To trigger job processing, the FCs DP_SEND **and** DP_RECV must be activated at least once. DP master mode: To trigger reception, FC DP_RECV must be activated at least once.	Depending on the use, job processing can be triggered simply by activating FC DP_SEND **or** DP_RECV. In the DP master mode, at least one of the two FCs **must** be activated once.
13.	Receive buffer not long enough for AG_RECV	If the receive buffer is too short, data are received up to the size of the buffer. The call is acknowledged with error code 8185_H.	If the receive buffer is too short, **no** data are received. The call is acknowledged with error code $80B1_H$.
14.	Responder functionality of the DP master (class 1); DP master (class 2) sends jobs to DP master (class 1) Functions: • "DDLM_GET_Master_Diag" • "DDLM_Act_Param"	– supported by DP master as responder –	– DP master **without** responder functionality –

[1] see also /2/ in the chapter on FC blocks and the STEP 7 online help on FCs;

Note on 8. : Consistency in data transfer between CP and user program

Depending on the response in the user program, you can assume different areas as consistent data areas on the transfer interface between the CP and user program.

Note

Please note the information on programming FCs in the online help on the FCs and in the manual /2/.

- Variant 1: NDR bit is evaluated on the FC interface

  You can assume a consistency over the entire DP data area used.

- Variant 2: NDR bit is not evaluated on the FC interface

  You can assume a data consistency in a contiguous, non overlapping 32-byte area.

  ("Non overlapping" means that 32-byte areas are counted starting from base address "0" of the relevant DP data area.)

Table 1-13   Consistency in the DP Master Mode

Data Access in User Program	Maximum Area with Data Consistency
Variant 1	2160 bytes
Variant 2	32 bytes

Table 1-14   Consistency in the DP Slave Mode

Data Access in User Program	Maximum Area with Data Consistency
Variant 1	240 bytes
Variant 2	32 bytes

Note on 9. :FCs for the DP mode

New FCs are supplied with STEP 7 V5.1 for the CP 342-5 described here. The following table shows how to use these new FC versions and the older FC versions for the available modules:

Table 1-15

FC Type (version)	Can be used with module type CP 342-5 with order no.			
	6GK7 342-5DA00-0XE0	6GK7 342-5DA01-0XE0	6GK7 342-5DA02-0XE0 configured as ..DA00 or ..DA01	6GK7 342-5DA02-0XE0
< V3.0	✔	✔	✔	–
>= V3.0	✔	✔	✔	✔

Note on the SIMATIC_NET_CP block library:

Please remember to check the version IDs of the subfolders in the SIMATIC_NET_CP block library and the version IDs of the blocks themselves. The subfolders CP 300 and CP 400 contain the new block versions (>= V3.0). FCs with older versions (<V3.0) are in separate block folders with names that reflect the versions they contain.

3   How to Install the Module

Installing the CP 342-5 involves the following steps:

Table 1-16

Step	Execution / Meaning
1. Fit the module onto the S7 rail. 2. Connect to the backplane bus with the accompanying bus interconnector.	You can install the CP in slots 4 through 11 in racks 0 through 3 (connected via the IM 360/361). Follow the detailed instructions on installation and wiring as described in /1/.
Note The CP cannot be operated in an expansion rack connected via the IM 365! Reason: the required communication bus is not routed via the IM 365 to the expansion rack.	
3. Connect the power supply.	Follow the detailed instructions in /1/, particularly with regard to the wiring between the power supply and the CPU.
Notes • Make sure that you connect the CP and CPU to a common power supply. • Switch off the power before wiring the S7-300! • When supplied, the CP has a jumper between the M terminals and functional ground. if you want to ground the reference potential, do not remove the jumper between the M terminals and functional ground (see also /1/ on the topic "S7–300 Configuration with Grounded Reference Potential" and "S7–300 Configuration with Ungrounded Reference Potential").	
4. Connect to PROFIBUS.	
5. The remaining steps involve downloading the configuration data.	For more detailed information, particularly on node initialization, refer to /2/.

4 Technical Data

General Technical Specifications

Table 1-17

Voltages, Currents, Operating Conditions, Cable Cross Sections	
Power supply	24 V DC
Current consumption - from 24 V: - from S7-300 backplane bus	0.25 A typical 150 mA typical
Cable cross section 24 V	0.25 to 2.5 mm^2
Power loss	6 W
Permitted ambient temperature: as stated in /1/, for operation of an S7-300 tier - for horizontal installation - for vertical installation,	0 to 60°C 0 to 40°C
Dimensions W x H x D (mm)	40 x 125 x 120
Weight	approx. 300 g

The information in /1/ Section "General Technical Specifications" also applies to the CP 342-5/342-5 FO.

- Electromagnetic compatibility

- Transport and storage

- Mechanical and climatic environmental conditions

- Information about insulation checks, class of protection and degree of protection

Pinout – 9-Pin Sub-D Female Connector

Pin no.	Signal name	PROFIBUS name	Used with RS-485
1	PE	Protective earth	yes
2	–	–	–
3	RxD/TxD-P	Data line B	yes
4	RTS (AG)	Control-A	–
5	M5V2	Data reference potential	yes
6	P5V2	Power supply plus	yes
7	BATT	–	–
8	RxD/TxD-N	Data line A	yes
9	–	–	–

5 Notes on the CE Mark on SIMATIC NET Products

Product Name

        CP 342-5   Order no.: 6GK7 342-5DA02-0XE0
        CP342-5 FO   Order no.: 6GK7 342-5DF00-0XE0

EU EMC Directive 69/336/EEC

The SIMATIC NET products listed above meet the requirements of the EU Directive 89/336/EEC "Electromagnetic Compatibility.

The EU conformity certificates are kept for the authorities responsible according to the EU directives listed above at the following address:
Siemens Aktiengesellschaft
Bereich A&D
Industrielle Kommunikation SIMATIC NET (A&D PT2)
Postfach 4848
D-90327 Nürnberg
Federal Republic of Germany

Area of Application

The product is designed for industrial application.

Area of Application	Requirements	
	Emission	**Immunity**
Industry	EN 50081-2 : 1993	EN 50082-2 : 1995

Directive on Machines

The product remains a component in compliance with Article 4(2) of the EU directive on machines 89/392/EEC.
According to the directive on machines, we are obliged to point out that this product is intended solely for installation in a machine. Before the final product is started up, it must be established that it conforms to the directive 89/392EEC.

Installation Guidelines

This product meets the requirements providing you adhere to the installation guidelines described in /1/ and /3/.

6 References

The following sources of information are required for configuration and operation or provide more detailed information:

/1/   For installing and commissioning the CP 342-5/342-5 FO
S7-300, Installation and Hardware
Manual

/2/   For using and configuring the CP 342-5/342-5 FO
SIMATIC NET NCM S7 for PROFIBUS, manual
Volume 1 and "Primer"

/3/   For installing and operating a SIMATIC NET PROFIBUS network
Industrial Communication Networks PROFIBUS Networks manual

/4/   On the topic of configuring:
STEP 7 User Manual

/5/   On the topic of communication:
Communication with SIMATIC manual

Order numbers

The order numbers for the SIEMENS documentation listed above can be found in the catalogs "SIMATIC NET Industrial Communication, Catalog IK 10" and "SIMATIC Programmable Logic Controllers SIMATIC S7 / M7 / C7 – Components for Fully Integrated Automation, Catalog ST 70".

These catalogs and additional information about the products and training courses can be obtained from your local SIEMENS office.❏