

SIEMENS

SIMATIC NET

S7 CPs for PROFIBUS CP 342-5 / CP 342-5 FO

Manual

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Manual Part B

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Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER
indicates that death or severe personal injury will result if proper precautions are not taken.
⚠ WARNING
indicates that death or severe personal injury may result if proper precautions are not taken.
⚠ CAUTION
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.
CAUTION
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.
NOTICE
indicates that an unintended result or situation can occur if the relevant information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

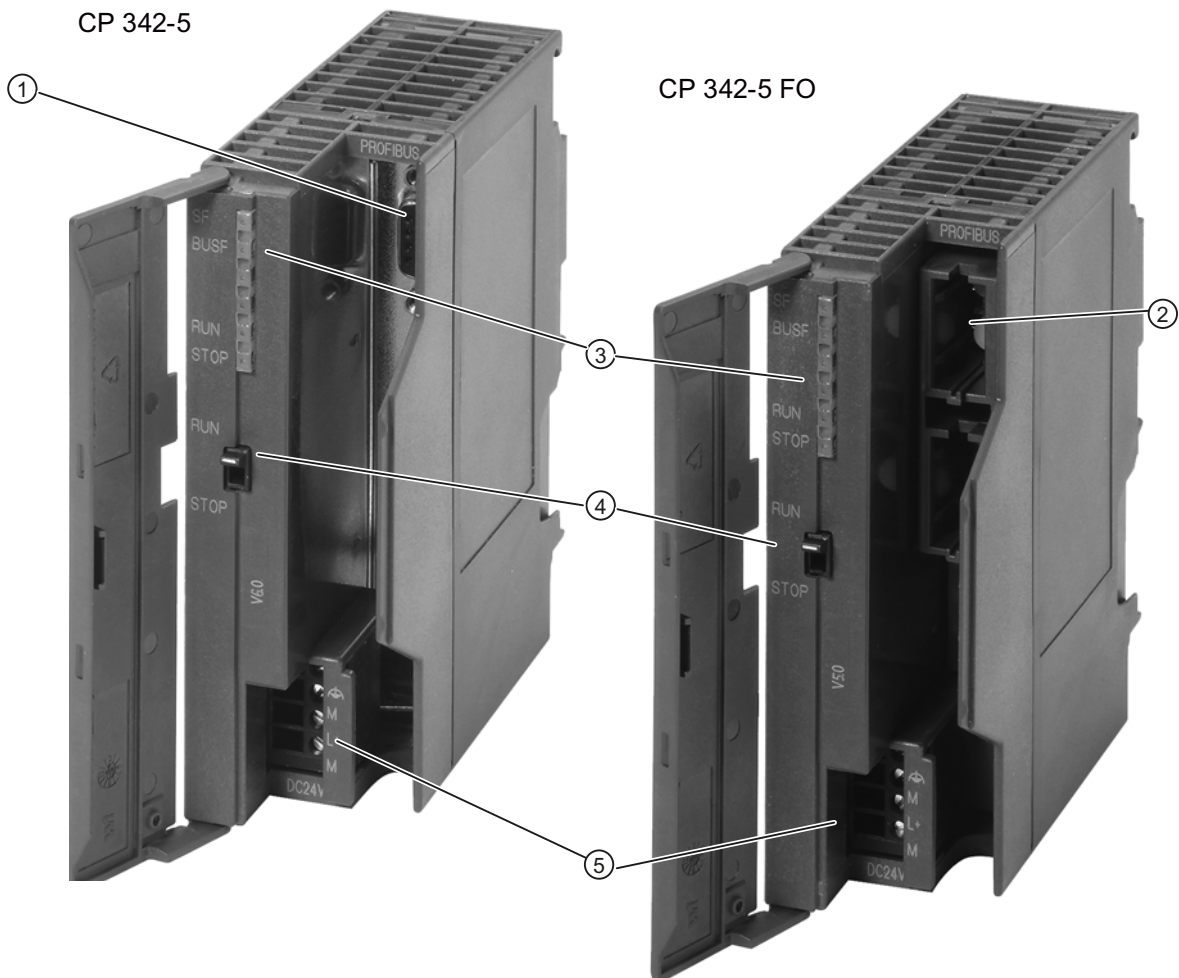
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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Product overview and notes



- ① 9-pin D-sub female connector
- ② Duplex sockets for optical connectors
- ③ Status and error displays
- ④ Mode selector
- ⑤ Connector for power supply and functional ground

Product names

This manual contains information on the following products:

- CP 342-5
order number 6GK7 342-5DA03-0XE0
hardware product version 1 / firmware version V6.0
for SIMATIC S7-300 / C7-300
- CP 342-5 FO
order number 6GK7 342-5DF00-0XE0
hardware product version 2 / firmware version V5.4
for SIMATIC S7-300 / C7-300

Structure of the documentation

The documentation for this device consists of the following parts:

- Manual Part A - Configuration manual "Configuring and Commissioning S7 CPs for PROFIBUS"

You will find this manual on the Manual DVD that ships with every CP or on the Internet under the following entry ID:

1158693 (<http://support.automation.siemens.com/WW/view/en/1158693>)

- Part B - Manual "S7 CPs for PROFIBUS CP 342-5 / CP 342-5 FO" (this manual)

License conditions

NOTICE
Open source software
Read the license conditions for open source software carefully before using the product. The acceptance of the disclaimers of liability and warranty it contains is a clear precondition of the use of open source software.
You will find the license conditions on the same data medium as this manual under the following file name:
DOC_OSS-S7-CM-CP_74.pdf

Note

NOTICE
Compatibility with previous versions
Read the information relating to enhanced functions and any restrictions that may apply in the section Compatibility with the previous product (Page 35).

 **WARNING**

Danger from emitted light beam (CP 342-5 FO)

Never look directly into the opening of the optical transmission diode or the optical fiber.
The emitted light beam could endanger your eyes.

Note

Difference between the CP 342-5 and CP 342-5 FO

When the function being described only applies to one of the two device types CP 342-5 or CP 342-5 FO, the text will point out which device the information applies to.

SIMATIC NET glossary

Explanations of the specialist terms used in this documentation can be found in the SIMATIC NET glossary.

You will find the SIMATIC NET glossary here:

- SIMATIC NET Manual DVD
The DVD ships with most SIMATIC NET products.
- On the Internet under the following entry ID:
50305045 (<http://support.automation.siemens.com/WW/view/en/50305045>)

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Properties / services

1.1 Application

Automation system

The CP 342-5/342-5 FO communications processor is intended for operation in a SIMATIC S7-300 / C7-300 automation system. It allows connection of the S7-300 / C7-300 to a PROFIBUS fieldbus system.

1.2 Communications services

Supported communications services

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

- **PROFIBUS DP**
 - as DP master class 1 (PROFIBUS DP according to EN 50170 DPV0, DP master)
 - as DP slave (PROFIBUS DP according to EN 50170 DPV0, DP slave)

NOTICE
DP master or DP slave
Please note, however: The CP 342-5/342-5 FO supports operation as a DP master or DP slave only as alternatives. You can also deselect DP mode altogether.

- **S7 communication and PG/OP communication**

- PG functions with uploading / downloading of FM modules, configuration / diagnostics and routing
- Operator control and monitoring functions (HMI)
Multiplexing TD/OP connections

When multiplexing OP connections, the following acyclic services are supported:

- read once
- write once
- read system status list
- Client and server for data exchange via communication blocks on S7 connections configured at both ends

The following blocks / functions are available:

BSEND FB 12, BRCV FB 13,
PUT FB 14, GET FB 15
USEND FB 8, URCV FB 9
C_CNTRL FC 62

You will find a more detailed description in /5/ (Page 49)

Note

The partner station can be an S7-300, S7-400 or PG/PC application with SIMATIC NET OPC server; raw data tags using BSEND/BRECV to WinCC are not supported.

- Server for data exchange on connections configured at both ends without communications blocks on the S7-300 / C7-300 station
- **Open communications services (SEND/RECEIVE interface) over FDL connections of the following type:**
 - Specified FDL connections
 - Free layer 2 connections (SDA, SDN)
 - Broadcast
 - MulticastThe services of the CP 342-5/342-5 FO listed here can be used independently at the same time.

Requirements for use

2.1 Operation in control device families

SIMATIC device families

You can operate the CP in the following device families:

- SIMATIC S7-300 stations with the following CPU types:
 - Standard
 - Compact
 - Modular
- SIMATIC C7 compact units in C7 packaging system
- SINUMERIK

2.2 Project engineering

Configuration and downloading the configuration data

It is possible to download the configuration data to the CP via MPI or PROFIBUS. The following version of STEP 7 is required:

STEP 7 version	Functions of the CP
STEP 7 as of V5.1	The functional range of the following CP type can be configured: <ul style="list-style-type: none"> • 6GK7 342-5DA02-0XE0 • 6GK7 342-5DF00-0XE0
<ul style="list-style-type: none"> • STEP 7 as of V5.4.5 with Hotfix 4 and HSP 1049 • STEP 7 as of V5.5.2 • STEP 7 Professional V11 	The functional range of the following CP type can be configured: <ul style="list-style-type: none"> • 6GK7 342-5DA03-0XE0.

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.

NOTICE

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!

Note

Extensive configuration

Before loading an extensive configuration over a previous configuration, you should run a memory reset on the CP.

By doing this, you avoid the configuration storage space on the CP being exceeded. If the configuration storage space on the CP is not adequate, the diagnostics buffer of the CP reports a lack of resources when you download the configuration data.

Replacing a module without a programming device

The CP supports the option of storing the configuration data of the CP on the CPU. If you use this option, this means that module replacement is possible without having to load the configuration data from the PG again.

The configuration data is then stored in load memory of the CPU. Storage of the configuration data is protected from power failure by the battery backup or the EPROM module card in the CPU.

2.3 Programming

Program blocks

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

NOTICE

Current program blocks

We recommend that you always use the latest block versions for all module types.

You will find information on the current block versions and the current blocks to download from the Internet in our Customer Support under entry ID:

8797900 (<http://support.automation.siemens.com/WW/news/en/8797900>)

This recommendation assumes that you are using the latest firmware for the particular module type.

Further information

- On programming and use of the CP as DP master or DP slave
On initializing the CP as DP master or DP slave and on the running of the program, see /1/ (Page 47)
- Interfaces and program sequence
Refer to the documentation of the program blocks in the online help of STEP 7 or in the manual /4/ (Page 48)

Installation and commissioning

3.1 Important notes on using the device

Safety notices on the use of the device

The following safety notices must be adhered to when setting up and operating the device and during all associated work such as installation, connecting up, replacing devices or opening the device.

General notices

 **WARNING**

Danger from emitted light beam (CP 342-5 FO)

Never look directly into the opening of the optical transmission diode or the optical fiber. The emitted light beam could endanger your eyes.

 **WARNING**

Safety extra low voltage

The equipment is designed for operation with Safety Extra-Low Voltage (SELV) by a Limited Power Source (LPS). (This does not apply to 100 V...240 V devices.)

This means that only SELV / LPS complying with IEC 60950-1 / EN 60950-1 / VDE 0805-1 must be connected to the power supply terminals. The power supply unit for the equipment power supply must comply with NEC Class 2, as described by the National Electrical Code (r) (ANSI / NFPA 70).

There is an additional requirement if devices are operated with a redundant power supply:


If the equipment is connected to a redundant power supply (two separate power supplies), both must meet these requirements.


 **WARNING**


Opening the device


DO NOT OPEN WHEN ENERGIZED.


General notices on use in hazardous areas

 WARNING
Risk of explosion when connecting or disconnecting the device EXPLOSION HAZARD DO NOT CONNECT OR DISCONNECT EQUIPMENT WHEN A FLAMMABLE OR COMBUSTIBLE ATMOSPHERE IS PRESENT.


 WARNING
Replacing components EXPLOSION HAZARD SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2 OR ZONE 2.

 WARNING
Requirements for the cabinet/enclosure When used in hazardous environments corresponding to Class I, Division 2 or Class I, Zone 2, the device must be installed in a cabinet or a suitable enclosure.

 WARNING
Restricted area of application This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D or non-hazardous locations only.

 WARNING
Restricted area of application This equipment is suitable for use in Class I, Zone 2, Group IIC or non-hazardous locations only.

General notices on use in hazardous areas according to ATEX

 WARNING
Requirements for the cabinet/enclosure To comply with EU Directive 94/9 (ATEX95), this enclosure must meet the requirements of at least IP54 in compliance with EN 60529.

⚠ WARNING**Suitable cables for temperatures in excess of 70 °C**

If the cable or conduit entry point exceeds 70°C or the branching point of conductors exceeds 80°C, special precautions must be taken. If the equipment is operated in an air ambient in excess of 50 °C, only use cables with admitted maximum operating temperature of at least 80 °C.

⚠ WARNING**Protection against transient voltage surges**

Provisions shall be made to prevent the rated voltage from being exceeded by transient voltage surges of more than 40%. This criterion is fulfilled, if supplies are derived from SELV (Safety Extra-Low Voltage) only.

3.2 Procedure for installation and commissioning

What to do / steps

1. Install the CP on the S7 standard rail.
Slots 4 to 11 are permitted for the CP in racks 0 to 3 (connected by IM 360/361).
2. Establish the connection via the enclosed bus connector to the backplane bus.

Proceed as described in the sections dealing with installation and wiring, explained in detail in /2/ (Page 48).

NOTICE**No operation in the expansion rack with connection via an IM 365**

The CP cannot be used in an expansion rack that is connected via the IM 365! Reason: The required communication bus is not connected to the extension rack via the IM 365.

3. Connect the CP to the power supply.

Follow the instructions as described in detail in /2/ (Page 48) when wiring between the power supply and the CPU.

NOTICE
Connecting to the power supply <ul style="list-style-type: none">• Connect the CPU, CP and IM (if used) to the same power supply.• Only wire up the S7300 / C7300 with the power switched off!

NOTICE
Guidelines for grounding and chassis grounding concept <p>When it ships, the CP has a jumper inserted between the M and functional earth terminals. If you want to ground the reference potential, do not remove the jumper between the M and functional earth terminals.</p> <p>Note the information in the SIMATIC S7 installation guidelines for grounding and chassis grounding, see Auto-Hotspot</p> <p>In this document, you will find information on the topic "Setting up an S7-300 with Earthed Reference Potential" and "Setting up an S7-300 with Unearthed Reference Potential".</p>

4. Connect the CP to PROFIBUS.

The remaining steps in commissioning involve downloading the configuration data.

For more information on configuration and in particular on node initialization, refer to the manual /1/ (Page 47) and the online help of the configuration tool.

Displays and operator controls

4.1 LED displays

LEDs on the front panel

On the front panel, you will see the following LEDs for displaying the operational and communications status:



Figure 4-1 LEDs on the front panel

The LEDs have the following meaning:

- SF: Group error
- BUSF: Bus faults on the PROFIBUS interface
- RUN: RUN mode
- STOP: STOP mode

Unlabeled LED placeholders have no meaning.

LEDs for displaying the operating mode

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

Table 4- 1 LED display schemes

SF(red)	BUSF (red)	RUN (green)	STOP (yellow)	CP operating mode
○	○	●	●	Starting up (STOP → RUN)
○	○	●	○	Running (RUN)

4.1 LED displays

SF(red)	BUSF (red)	RUN (green)	STOP (yellow)	CP operating mode
				Stopping (RUN → STOP) The time required for the signaled mode change depends on the size of the STEP 7 project; this can take up to 1 minute in large projects. On completion of the mode change, the data exchange with the DP slaves continues.
				Stopped (STOP) In STOP mode, configuring and performing diagnostics on the CP remain possible.
				Stopped (STOP) with error(s). In this state, the CPU or intelligent modules in the rack remain accessible using PG functions.
				Running (RUN) with problems on PROFIBUS.
				Running (RUN) with problems on the DP slaves.
				<ul style="list-style-type: none"> Ready to begin loading firmware. (Operating mode active for a period of 10 s) or <ul style="list-style-type: none"> CP is in DP slave mode and is not involved in cyclic data exchange with the DP master.
				Loading firmware.
				Invalid firmware was loaded
				Waiting for firmware update. (CP currently has an incomplete firmware version)
				Module fault / system error Note: The two unlabeled LEDs also flash in this operating status

Legend - meaning of the symbols:

Symbol				-
Status	ON (steady light)	OFF	Flashing	Any

4.2 Mode selector

Controlling the mode

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

- Mode selector
- STEP 7 configuration software:
 - SIMATIC Manager / menu command: PLC > Display Accessible Nodes
 - NetPro / menu command: PLC > Operating Mode...
 - HW Config / menu command: PLC > Operating Mode...
 - NCM Diagnostics / menu command: Operating Mode

To control the CP mode from STEP 7, the mode selector must be set to RUN.

Mode selector

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

- Change from STOP to RUN:

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

Diagnostics of the CP is possible.
- Change from RUN to STOP:

The CP changes to STOP with the following response

 - Established connections (FDL and S7 connections) are terminated.
 - Configuration and diagnostics of the CP are possible
 - The following applies to DP mode:
 - DP slave mode: the CP is no longer in data transfer
 - DP master mode: the mode is "OFFLINE".

NOTICE
Longer transition times in complex systems
Depending on the extent of the configuration, it can take up to 1 minute before the CP reaches the "OFFLINE" mode.

Further information

Read the explanations relating to the topic of "Downloading the configuration to the target system" in the /1/ (Page 47) manual.

Performance data and behavior in operation

5.1 Transmission speeds supported

The transmission speed is set with the SIMATIC STEP 7 configuration software. For permitted values, refer to Table 8-1 CP 342-5 (Page 43) and Table 8-2 CP 342-5 FO (Page 44)

NOTICE
Remember the cable length
The permitted cable length must be kept to depending on the transmission speed. Refer to the information in /3/ (Page 48)

5.2 Characteristic data of the DP interface / DP master

General characteristic data

When operating the CP 342-5/342-5 FO as a DP master, the following characteristic data is significant:

Characteristic	Explanation / values
Number of operable DP slaves	124 max.
Total number of operable slots	1024 max.
Size of the DP data areas (total):	
• DP input area	2160 bytes max.
• DP output area	2160 bytes max.
Size of the DP data areas (per DP slave):	
• DP input area	244 bytes max.
• DP output area	244 bytes max.
Size of the DP diagnostics data:	240 bytes per DP slave
PROFIBUS address range for DP master mode	1 - 125

Note

Optimum token passing

You can achieve optimum token passing by taking the following measures:

- Assign the lower PROFIBUS addresses to the active nodes.
- In the "Highest PROFIBUS address" input box, enter the highest PROFIBUS address of an active node.

NOTICE

Possible lack of resources with extensive configuration and parameter assignment data

The maximum number of connectable DP slaves as shown in the table can be reduced if the DP slaves require extensive configuration and parameter assignment data.

In this case, the configuration memory on the CP is not adequate. You will receive a message in the diagnostics buffer of the CP indicating a lack of resources when you load the configuration data.

Enhanced DP master functions

As DP master, the CP 342-5/342-5 FO supports the following:

- SYNC/FREEZE (acyclic)
- Shared input/output (acyclic)
- Enable / disable DP slaves
- Settings that can be changed at run time:
 - own PROFIBUS address
 - DP operating mode (no DP, DP master, DP slave active/passive)
- Hardware interrupts / diagnostics interrupts

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

You can use single diagnostics to obtain interrupt information.

Execution times of the program blocks for PROFIBUS DP

The following table will help you to calculate the CPU cycle times (OB1) in DP master mode. The table contains the execution time of the program blocks (DP_SEND, DP_RECV) required for DP processing on the S7-300 / C7-300 CPU.

Component	Explanation / guideline values	
Execution time on the CPU 314C-2DP (6ES7 314-6CF00-0AB0)	Per DP_Send block call: <ul style="list-style-type: none"> • <3.0 ms at 8 bytes • <5.0 ms at 2160 bytes ¹⁾ 	Per DP_RECV block call: <ul style="list-style-type: none"> • <3.3 ms at 8 bytes • <5.8 ms at 2160 bytes ¹⁾
Execution time on the CPU 317-2PN/DP (6ES7 317-2EJ10-0AB0)	Per DP_SEND block call: <ul style="list-style-type: none"> • <1.5 ms at 8 bytes • <2.3 ms at 2160 bytes ¹⁾ 	Per DP_RECV block call: <ul style="list-style-type: none"> • <1.7 ms at 8 bytes • <2.8 ms at 2160 bytes ¹⁾

¹⁾ the following applies at data lengths > 240 bytes: The data is transferred segmented over several block calls.

NOTICE
Time values are guidelines
The times shown for DP master mode should only be considered as guideline values. The values apply only for a mono master configuration when no other services (for example PG functions) are processed on the CP.

NOTICE
DP master mode and S7 slaves (ET-200)
You will find important information on using and configuring (importing the GSD file) S7 slaves (ET200) when operating the CP as DP master on the Internet under the following entry ID: 21628502 (http://support.automation.siemens.com/WW/view/en/21628502)

5.3 Characteristic data of the DP interface / DP slave

General characteristic data

The following characteristic data is important for successful data transfer from the DP master to the DP slave:

Characteristic	Explanation / values	
Generic station description (GSD)	Depending on the CP type, use the following GSD files:	
	CP 342-5 (6GK7 342-5DA02-0XE0)	SIEM80D6.GSD

5.3 Characteristic data of the DP interface / DP slave

Characteristic		Explanation / values
	CP 342-5 (6GK7 342-5DA03-0XE0)	SI0180D6.GSD
	CP 342-5 FO(6GK7 342-5DF00-0XE0)	SIEM80D7.GSD
	You will find the GSD files on the Internet under the following entry ID: 113652 (http://support.automation.siemens.com/WW/view/en/113652)	
Size of the DP data areas		
	DP input area	240 bytes max.
	DP output area	240 bytes max.
Min. slave interval		0.6 ms
SYNC / FREEZE	CP 342-5 (6GK7 342-5DA03-0XE0)	Is supported
	CP 342-5 FO(6GK7 342-5DF00-0XE0)	The following is not supported
User parameter assignment data		3 bytes; value: 40 00 00 (fixed)
User diagnostics data		0 bytes

NOTICE
Fail-safe
Fail-safe mode is possible only if you use the GSD files listed in the table above.

Execution times of the program blocks for PROFIBUS DP

The following table will help you to calculate the CPU cycle times (OB1) in DP slave mode. The table contains the execution time of the FCs (FC DP_SEND, FC DP_RECV) required for DP processing on the S7-300 / C7-300 CPU.

Component	Explanation / values	
Execution time on the CPU 314C-2DP (6ES7 314-6CF00-0AB0)	Per DP_SEND block call: <ul style="list-style-type: none"> • <3.0 ms at 8 bytes • <5.0 ms at 240 bytes 	Per DP_RECV block call: <ul style="list-style-type: none"> • <3.3 ms at 8 bytes • <5.8 ms at 240 bytes
Execution time on the CPU 317-2PN/DP (6ES7 317-2EJ10-0AB0)	Per DP_SEND block call: <ul style="list-style-type: none"> • <1.5 ms at 8 bytes • <2.3 ms at 240 bytes 	Per DP_RECV block call: <ul style="list-style-type: none"> • <1.7 ms at 8 bytes • <2.8 ms at 240 bytes

Note**Time values are guidelines**

The times shown for DP slave mode should only be considered as guideline values. The values apply only when no other services (for example PG functions) are processed on the CP.

5.4 Characteristic data of open communications services (SEND/RECEIVE interface) over FDL connections

General characteristic data

The characteristic data is important when operating FDL connections (specified, free layer 2 (SDA and SDN), broadcast, multicast):

Characteristic	Explanation / values
Total number of FDL connections that can be operated.	16 max.
Size of the transferable data area on FDL connections.	1-240 bytes maximum 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.

Execution times of the program blocks AG_SEND / AG_RECV

The following table will help you to calculate the CPU cycle times (OB1) for FDL connections. The table contains the execution time of the FCs (FC AG_SEND, FC AG_RECV) required for DP processing on the S7-300 / C7-300 CPU.

Component	Explanation / values	
Execution time on the CPU 314C-2DP (6ES7 314-6CF00-0AB0)	Per AG_SEND block call: • <5.1 ms at <=240 bytes	Per AG_RECV block call: • <5.7 ms at <=240 bytes
Execution time on the CPU 317-2PN/DP (6ES7 317-2EJ10-0AB0)	Per AG_SEND block call: • <2.4 ms at <=240 bytes	Per AG_RECV block call: • <2.8 ms at <=240 bytes

Time response on FDL connections

Refer to the following table for transmission rates with FDL connections dependent on the following parameters:

- Frame length (number of bytes)
- CPU type

The values were measured while sending or receiving successively (at a transmission rate of 1.5 Mbps; bus profile standard; 9 nodes).

Table 5- 1 Number of FDL frames per second for CPU 317

Frame length	Number of FDL frames per second
8 bytes	140 / s
128 bytes	138 / s
240 bytes	135 / s

5.5 Characteristics of S7 communication

General characteristic data

The following information is important when operating S7 connections:

Characteristic	Explanation / values
Number of operable S7 connections	16 maximum S7 connections configured at one end / both ends; including PG and TD/OP connections

Dependencies and restrictions relating to the number of S7 connections

Depending on the configuration and modes, remember the following:

- The actual possible number of S7 connections that can be operated depends on the type of CPU being used. Further restrictions result from multiprotocol mode; note the information in the section Parallel use of communications services (multiprotocol mode) (Page 30).
- If the CP is configured as a DP slave, the following restrictions apply:
 - S7 connections cannot be operated;
 - OP multiplex mode is not possible.

Execution times for program blocks for S7 connections

The following table will help you to calculate the CPU cycle times (OB1) for S7 connections. The table contains the execution time of the program blocks (PUT, GET, USEND, URCV, BSEND, BRCV) required for DP processing on the S7-300 / C7-300 CPU.

Block type	Execution time on the CPU per block call					
	PUT	GET	USEND	URCV	BSEND	BRCV
Data length	<=160 bytes				<=16 K bytes	
CPU 314C-2DP (6ES7 314-6CF00-0AB0)	<5.6 ms	<5.8 ms	<6.0 ms	<5.6 ms	<5.7 ms	<5.8 ms
CPU 317-2PN/DP (6ES7 317-2EJ10-0AB0)	<2.1 ms	<2.5 ms	<2.0 ms	<2.4 ms	<2.1 ms	<2.7 ms

Time response on S7 connections

Refer to the following table for transmission rates with S7 connections dependent on the following parameters:

- Frame length (number of bytes)
- Job type
- CPU type

The values were measured while sending or receiving successively (at a transmission rate of 1.5 Mbps; bus profile standard; 9 nodes).

Table 5- 2 Number of S7 frames per second for CPU 317

Request type	Frame length	Number of S7 frames per second
PUT	<=160 bytes	29 / s
GET	<=160 bytes	26 / s
USEND/URCV	<=160 bytes	35 / s
BSEND/BRCV	<=160 bytes	25 / s
	<=400 bytes	14 / s
	<=800 bytes	8 / s

5.6 Characteristic data for multiplexing OP connections

General characteristic data

The following information is important when operating HMI (TD/OP) connections:

Characteristic	Explanation / values
Number of operable HMI connections	16 max.

When multiplexing OP connections, the following acyclic services are supported:

- read once
- write once
- read system status list

If cyclic services or ProAgent interfacing (ALARM_S message block) are required, please continue to use the rack/slot addressing of the remote S7-300 CPU.

NOTICE
PG connections and connections to WinCC PG connections and connections to WinCC are not operated over the multiplexer. When operating a PG, a connection resource is always occupied.

5.7 Parallel use of communications services (multiprotocol mode)

Performance

Using the various available communications services at the same time affects communication performance.

Note

Recommendation for multiprotocol mode

In multiprotocol mode - DP + FDL + S7 functions / TD/OP connections - you should select a delay time of 2-5 ms.

Overall operational limits

When using communications connections/services at the same time, it is not possible to achieve the maximum values as when using the communications connections/services alone.

Note the following limits:

Characteristic	Explanation / values
Number of operable connections in total:	
<ul style="list-style-type: none"> in operation with PROFIBUS DP (DP master with up to 15 DP slave ¹⁾) 	44 maximum Of these, up to 16 FDL connections and 12 S7 connections and 16 OP connections in multiplex mode.
<ul style="list-style-type: none"> in operation without PROFIBUS DP 	48 maximum

1) The number of S7 connections that can be operated when using the module as DP master depends on the number and configuration of the assigned DP slaves (see table below).

Influence of the data length in S7 communication

In S7 communication, the data length of the jobs and in DP mode, the number of DP slaves and the length of the I/O data mean the following restrictions:

- Number of S7 connections
- Number of jobs that can be sent at one time

The decisive factor is the job with the highest data length.

The information in the following table applies to S7 job types BSEND/BRCV, PUT/GET, and USEND/URCV.

Data length in bytes ¹⁾	Number of S7 connections or number of S7 jobs		
	S7 communication only	With DP master and 32 DP slaves ET200B (1 byte I data and 1 byte Q data)	With DP master and 32 DP slaves ET200M (32 byte I data and 32 byte Q data)
<=1000	16	10	8
2000	16	8	6
4000	16	6	5
8000	8	4	4
16000	4	2	2
32000	2	1	1

1) A maximum of 32 Kbytes can be transmitted with one BSEND/BRCV block, with PUT/GET/USEND/URCV a maximum of 160 bytes in each case.

Further notes on operation

6.1 General operation on PROFIBUS

Startup response with modified transmission speed

If you change the transmission speed when downloading the configuration, expect a significantly longer startup delay on the CP. The startup delay can run into several minutes.

NOTICE
Clear/reset CP
Reset the CP memory before you download configuration data with a different transmission speed.
To reset memory, use the corresponding function in the configuration tool or in special diagnostics.

6.2 DP mode

DP data exchange

If the central CPU is in STOP mode, substitute values are transferred in the DP data exchange.

The following applies: Default value = 0

6.3 Interface in the user program

Status displays with the program block AG_SEND

For the CP 342-5 (6GK7 342-5DA03-0XE0), note the following over and above the information in /4/ (Page 48), Release 03/2010:

DONE	ERROR	STATUS	Meaning
0	1	8315H	Possible additional meaning: This error code can also occur with bus problems (for example physical disturbances due to bad cable connections or different settings for the transmission speed on the nodes).

Status displays with the program block DP_DIAG

For the CP 342-5 (6GK7 342-5DA03-0XE0), note the following over and above the information in /4/ (Page 48), Release 03/2010:

DONE	ERROR	STATUS	Possible with DTYPE	Meaning
1	0	0000H	0, 1 and 4-9	Job completed without error Note: With DTYPE 2, 3 and 10, error-free execution is indicated by a status code other than "0". Below (see table DP_DIAG codes in /4/ (Page 48)), you will see the detailed status codes for error-free execution for the range: 82XX_H If an error occurs in execution, you receive status codes in the following ranges: 80XX_H, 83XX_H, 8FXX_H
1	0	8248H	2, 3, 10	Job completed without error Note: This is the default code for the named diagnostics types if there is no special situation to signal.

6.4 Other information available about the CP

FAQs on the Internet

You will find detailed information (FAQs) on using the PROFIBUS S7-CPs at the following Internet address (entry type: FAQ):

10805945 (<http://support.automation.siemens.com/WW/view/en/10805945>)

Compatibility with the previous product

7.1 Enhanced functions and modifications

Replacing a module

The CP 342-5 (6GK7 342-5DA03-0XE0) is suitable as a replacement for the following predecessor products:

- CP 342-5 (6GK7 342-5DA00-0XE0)
- CP 342-5 (6GK7 342-5DA01-0XE0)
- CP 342-5 (6GK7 342-5DA02-0XE0)

The CP 342-5 (6GK7 342-5DF00-0XE0) is also functionally compatible with the named CPs, however it uses an optical instead of the electrical PROFIBUS interface.

Functional differences

In the following table, you can see the performance and functional characteristics that differ from the previously available device types.

Performance/functional characteristics	CP type 6GK7 342-5-****-0XE0				
	-5DA00-	-5DA01-	-5DA02-	-5DF00-	-5DA03-
Number of connectable DP slaves	64	124	124	124	124
I/O configuration limits DP master	240 bytes	2160 bytes	2160 bytes	2160 bytes	2160 bytes
I/O configuration limits DP slave	86 bytes	240 bytes	240 bytes	240 bytes	240 bytes
Also supports transmission speeds > 1.5 Mbps			•	• ¹⁾	•
Supports SYNC / FREEZE in DP slave mode					•
Interface in the user program in DP mode	Refer to the information in section Compatibility in the user program in DP mode (Page 38).				

1 except 3 Mbps and 6 Mbps

7.1 Enhanced functions and modifications

All other functional and performance characteristics of CP 342-5 and CP 342-5 FO functionally compatible.

Note

Time for loading firmware

During the construction of the new hardware, both the hardware and software were redesigned for the CP342-5 (6GK7342-5DA03-0XE0). This resulted in a larger firmware load file that requires longer to load.

7.2 Replacing older modules / module replacement

Module replacement

If you replace one of the modules listed below with the new module CP 342-5 (6GK7 342-5DA03-0XE0), remember the following procedure:

Module used up to now	What to do / module replacement
6GK7 342-5DA00-0XE0	<p>Supply the new module with an adapted configuration as follows:</p> <ol style="list-style-type: none"> In STEP 7 / HW Config, replace the already configured CP 342-5 with the new module; You will find this in the hardware catalog. Save, compile and load the configuration data to the CPU or CP again.
6GK7 342-5DA01-0XE0 6GK7 342-5DA02-0XE0	<p>Case a: Configuration unchanged</p> <p>If you have no requirements beyond what you had with the previous CP (for example configuration limits), you do not need to make changes in the configuration.</p> <p>You only need to remember the following distinction during commissioning:</p> <ul style="list-style-type: none"> With the module you are replacing, you chose to have the configuration data stored on the CPU. <p>When you start up the CP, the configuration data will be loaded automatically from the CPU.</p> <ul style="list-style-type: none"> You had not chosen this option for the CP you are replacing. <p>In this case, load the configuration data again from your PG/PC to the CP.</p> <p>Case b: adapted configuration</p> <p>If you want to use the extended options of the new CP, follow the steps below:</p> <ol style="list-style-type: none"> Use the new FCs (version 3.0 or higher; see also section Compatibility in the user program in DP mode (Page 38)) in your user program. <p>Note: If applicable, remember changes to the data format of the ANY pointer on the FC interface; you will find more detailed information in the online help for the blocks.</p> <ol style="list-style-type: none"> In STEP 7 / HW Config, replace the already configured CP 342-5 with the new module; You will find this in the hardware catalog. Expand your configuration to suit your needs, for example the connection configuration. Save, compile and load the configuration data to the CPU or CP again.

Note

What to do with a slot left empty

If you cannot eliminate gaps in the slots left by replacing modules by closing up the remaining modules, you will need to use a dummy module (6ES7 370-0AA01-0AA0). The dummy module is not configured and does not occupy any address space.

In this case, the address switch on the rear of the module must be set to "Non Address Mode" (NA).

7.3 Compatibility in the user program in DP mode

Device-dependent differences on the program block interface

Compared with previous modules, the CP 342-5/342-5 FO reacts differently in the following ways. Remember the effects in your user program. The following table provides an overview:

Table 7- 1 Changes in response

Topic / relates to		Response of the device types CP 342-5 6GK7 342-5DA00-0XE0 CP 342-5 6GK7 342-5DA01-0XE0	New response of the device types CP 342-5 6GK7 342-5DA02-0XE0 CP 342-5 6GK7 342-5DF00-0XE0 CP 342-5 6GK7 342-5DA03-0XE0
1.	DPSTATUS output parameter in program block DP_RECV		
	DP master mode:	Bit 6: Display of "received data overflow"	Bit 6: is no longer set
	DP slave mode:	Bit 3: Display of "No frame from DP master within the watchdog time" Bit 4: Display of "DP data overflow"	Bit 3: is no longer set Bit 4: is no longer set
2.	DP modes	A distinction is made between STOP and OFFLINE.	The STOP mode is mapped to the OFFLINE mode.
3.	Set current DP mode	- is supported -	With the version of the CP 342-5 described here, the following job parameters are no longer supported for program block DP_CTRL with CTYPE 4: <ul style="list-style-type: none"> • RUN with AUTOCLEAR • RUN without AUTOCLEAR

Topic / relates to		Response of the device types CP 342-5 6GK7 342-5DA00-0XE0 CP 342-5 6GK7 342-5DA01-0XE0	New response of the device types CP 342-5 6GK7 342-5DA02-0XE0 CP 342-5 6GK7 342-5DF00-0XE0 CP 342-5 6GK7 342-5DA03-0XE0
4.	Cyclic reading of the input/output data using program block DP_CTRL 1)	- is supported -	With the version of the CP 342-5 described here, the following services of program block DP_CTRL are no longer supported: CTYPE = 7 CTYPE = 8 These job types are rejected with code 8311H.
5.	Trigger cyclic global control via program block DP_CTRL ¹⁾	- is supported -	The following applies to the DP master mode: With the version of the CP 342-5 described here, the following services of program block DP_CTRL are no longer supported: CTYPE = 1 These job types are rejected with code 8311H.
6.	Trigger acyclic global control with CLEAR job using program block DP_CTRL 1)	- is supported -	The following applies to the DP master mode: With the version of the CP 342-5 described here, the following services of program block DP_CTRL are no longer supported: CTYPE = 0 command mode = CLEAR These job types are rejected with code 8318H.
7.	Trigger acyclic global control with CLEAR job using program block DP_CTRL 1)	- is supported -	The following applies to the DP master mode: With the version of the CP 342-5 described here, the following services of program block DP_CTRL are no longer supported: CTYPE = 0 group select = 0 These job types are rejected with code 8318H.
8.	Consistency in the data transfer between CP and user program	The DP data area is: maximum: <ul style="list-style-type: none"> • 240 bytes in DP master mode • 86 bytes in DP slave mode 	The DP data area is: maximum: <ul style="list-style-type: none"> • 2160 bytes in DP master mode • 240 bytes in DP slave mode
<ul style="list-style-type: none"> • In terms of consistency, note the additional information following this table 			
9.	Program blocks for DP mode and for S5-compatible communication		Depending on the configuration, the older program block types can also be used along with the new program block versions. Note the version identifiers for the block library of STEP 7.
<ul style="list-style-type: none"> • Note the additional information on program blocks following this table 			
10.	Program blocks: Evaluating general properties and codes		For the CP described here, the information in the current description of the program blocks applies. Refer to /4/ (Page 48).

7.3 Compatibility in the user program in DP mode

Topic / relates to		Response of the device types CP 342-5 6GK7 342-5DA00-0XE0 CP 342-5 6GK7 342-5DA01-0XE0	New response of the device types CP 342-5 6GK7 342-5DA02-0XE0 CP 342-5 6GK7 342-5DF00-0XE0 CP 342-5 6GK7 342-5DA03-0XE0
11.	Deterministic sending / receipt of data - coordination between CPU and CP/PROFIBUS	In cyclic DP mode, the job confirmation on the program block interface includes the confirmation of the transfer to PROFIBUS.	In cyclic DP mode, the processing cycle on the CPU is separate from the processing cycle on the CP. Send data: The confirmation of the job includes no confirmation of the successful transfer to PROFIBUS. Receive data: It is possible that the same data was received several times.
12.	Jobs with DP_SEND and DP_RECV ¹⁾	DP slave mode: To start job processing, the program blocks DP_SEND and DP_RECV must be activated at least once. DP master mode: To start received data processing, the program block DP_RECV must be activated at least once.	Depending on the use, it is adequate to activate program block DP_SEND or DP_RECV to activate job processing. In DP master mode, at least of the two program blocks must be activated at least once.
13.	Receive buffer length too short for AG_RECV	If the receive buffer is too small, data is received until the buffer size is reached. The call is acknowledged with error code 8185 _H .	If the receive buffer is too small, no data is received. The call is acknowledged with error code 80B1 _H .
14.	Responder functionality of the DP master (class 1; DP master (class 2) passes 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 the STEP 7 online help on the SIMATIC NET program blocks for PROFIBUS DP.

Note on 8: Consistency in the data acceptance between CP and user program

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

- Variant 1: NDR bit is evaluated on the program block interface
 You can assume consistency over the entire DP data area used.
- Variant 2: NDR bit is not evaluated on the program block interface
 You can assume data consistency in a contiguous, non-overlapping 32-byte area.
 ("Non-overlapping" means: 32-byte areas must be counted or taken into account from the start address "0" of the DP data area under consideration.)

Table 7- 2 Consistency range in DP master mode

Access method in the user program	maximum area size with data consistency
Variant 1	2160 bytes
Variant 2	32 bytes

Table 7- 3 Consistency range in DP slave mode

Access method in the user program	maximum area size with data consistency
Variant 1	240 bytes
Variant 2	32 bytes

Note on 9: Program blocks for the DP mode

Program blocks with the current version of STEP 7 ship with the CP 342-5 / CP 342-5 FO described here. In the following table, you can see how you can use these block versions and the previous block versions for the available modules:

Program block type (version)	can be used with module type CP 342-5 with order no. 6GK7 342-			
	-5DA00-0XE0	-5DA01-0XE0	-5DA02-0XE0 configured as ..DA00 or ..DA01	-5DF00-0XE0 -5DA02-0XE0 -5DA03-0XE0
< V3.0	•	•	•	
>= V3.0	•	•	•	•

NOTICE

Current program blocks

We recommend that you always use the latest block versions for all module types.

You will find information on the current block versions and the current blocks to download from the Internet in our Customer Support under entry ID:

8797900 (<http://support.automation.siemens.com/WW/news/en/8797900>)

This recommendation assumes that you are using the latest firmware for the particular module type.

Further information

Refer to the documentation of the program blocks in the online help of STEP 7 or in the manual /4/ (Page 48)

Technical specifications

General technical specifications

Table 8- 1 CP 342-5

Technical specifications	Value
Transmission speeds supported	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
Interfaces	
Connection to PROFIBUS	9-pin D-sub female connector
Maximum current consumption on the PROFIBUS interface when connecting network components	100 mA at 5V
Rated voltage	
Rated voltage	24 V DC
Current consumption	
<ul style="list-style-type: none"> from 24 V from S7-300 / C7-300 backplane bus 	120 mA typical / 230 mA max. 40 mA typical
Cable cross section for 24 V	0.25...2.5 mm ²
Power dissipation	5 W
Permissible ambient temperature	
<ul style="list-style-type: none"> With horizontal installation of the rack With vertical installation of the rack 	0...60 °C 0...40 °C
<ul style="list-style-type: none"> Transport/storage temperature Max. relative humidity. Operating altitude 	-40 °C through +70 °C 95% at +25 °C Up to 2000 m above sea level
Dimensions W x H x D (mm)	40 x 125 x 120
Weight	Approx. 300 g

Table 8- 2 CP 342-5 FO

Technical specifications	Value
Transmission speeds supported	9.6 kbps, 19.2 kbps, 45.45 kbps, 93.75 kbps, 187.5 kbps, 500 kbps, 1.5 Mbps, 12 Mbit/s
Interfaces	
Connection to PROFIBUS	Duplex sockets for optical connectors
Maximum current consumption on the PROFIBUS interface when connecting network components (for example optical network components)	100 mA at 5V
Rated voltage	
Rated voltage	24 V DC
Current consumption	
• from 24 V	250 mA typical
• from S7-300 / C7-300 backplane bus	150 mA typical
Cable cross section for 24 V	0.25...2.5 mm ²
Power dissipation	6 W
Permissible ambient temperature	
• With horizontal installation of the rack	0...60 °C
• With vertical installation of the rack	0...40 °C
• Transport/storage temperature	-40 °C through +70 °C
• Max. relative humidity.	95% at +25 °C
• Operating altitude	Up to 2000 m above sea level
Dimensions W x H x D (mm)	40 x 125 x 120
Weight	Approx. 300 g


Over and above this, all the information relating to the following topics in /2/ (Page 48) and in the section "General technical specifications" apply to the CP 342-5/342-5 FO:

- Electromagnetic compatibility
- Transportation/storage conditions
- Mechanical and climatic environmental conditions
- Information on insulation checks, protection class and degree of protection

Certifications and approvals

A

Approvals of the CP 342-5 / CP 342-5 FO

 WARNING
Information on standards and approvals
Before you put the device into operation, read the information on standards and approvals in Part A of this manual /1/ (Page 47).

The CP has the following approvals or conforms to the following directives:

- IEC 61131-2
- CE mark
- EMC directive for an industrial environment
 - emission: EN 61000-6-4 : 2007
 - immunity: EN 61000-6-2 : 2005
- Explosion protection directive (KEMA)
- EC machinery directive
- UL 508
- CSA C22.2 No. 142
- UL 1604 / UL 2279 Pt. 15 cULus HazLoc Class I, Div. 2 / Class I, Zone 2, T4 or ANSI/ISA 12.12.01 cULus HazLoc Class I, Div. 2 / Class I, Zone 2, T4
- FM 3611
Class I, Division 2, Group A, B, C, D T4 or
Class I, Zone 2, Group IIC, T4
- ATEX 94/9 EG
II 3G Ex nA II T4 (Zone 2)
- C-TICK

Note

The approvals that apply to the device are printed on the device.

EU declaration of conformity

You will find the EU declaration of conformity for this product on the Internet under the following entry ID:

16689636 (<http://support.automation.siemens.com/WW/news/en/16689636>)

→ tab "Entry List"

Filter settings:

- Entry type: "Certificates"
- Certificate type: "Declaration of conformity"
- Search item(s): <name of the module>

References

Where to find Siemens documentation

- You will find the order numbers for the Siemens products of relevance here in the following catalogs:
 - SIMATIC NET Industrial Communication / Industrial Identification, catalog IK PI
 - SIMATIC Products for Totally Integrated Automation and Micro Automation, catalog ST 70

You can request the catalogs and additional information from your Siemens representative.

- You will find SIMATIC NET manuals on the Internet pages of Siemens Automation Customer Support:

Link to Customer Support (<http://support.automation.siemens.com/WW/view/en>)

Enter the entry ID of the relevant manual as the search item. The ID is listed below some of the reference entries in brackets.

As an alternative, you will find the SIMATIC NET documentation on the pages of Product Support:

10805878 (<http://support.automation.siemens.com/WW/view/en/10805878>)

Go to the required product group and make the following settings:

→ Entry list → Entry type "Manuals / Operating Instructions"

You will find the documentation for the SIMATIC NET products relevant here on the data medium that ships with the product:

- Product CD / product DVD or
- SIMATIC NET Manual Collection

B.1 On configuring and using the CP

/1/

SIMATIC NET
S7 CPs for PROFIBUS
Configuring and Commissioning
Manual Part - General Application
Configuration Manual
Siemens AG

B.2 On installing and commissioning the CP

(SIMATIC NET Manual Collection)

On the Internet under the following entry ID:

1158693 (<http://support.automation.siemens.com/WW/view/en/1158693>)

B.2 On installing and commissioning the CP

/2/

SIMATIC S7
Automation System S7-300

- CPU 31xC and 31x Installation: Operating Instructions
On the Internet under the following entry ID:

13008499 (<http://support.automation.siemens.com/WW/view/en/13008499>)

- Module Data: Reference manual
On the Internet under the following entry ID:

8859629 (<http://support.automation.siemens.com/WW/view/en/8859629>)

Siemens AG

/3/

SIMATIC NET
PROFIBUS Network Manual
Siemens AG

(SIMATIC NET Manual Collection)

On the Internet under the following entry ID: 10805945

(<http://support.automation.siemens.com/WW/view/en/35222591>)

B.3 On programming

/4/

SIMATIC NET
Functions (FCs) and Function Blocks (FBs) for SIMATIC NET S7-CPs
Programming Manual
Siemens AG

(SIMATIC NET Manual Collection)

On the Internet under the following entry ID:

30564821 (<http://support.automation.siemens.com/WW/view/en/30564821>)

/5/

SIMATIC
System and Standard Functions for S7-300/400 - Volume 1/2

Reference manual
Siemens AG

(part of the STEP 7 documentation package STEP 7 Basic Knowledge)

(part of the online documentation in STEP 7)

On the Internet under the following entry ID:

1214574 (<http://support.automation.siemens.com/WW/view/en/1214574>)

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