SIEMENS

SIMATIC NET

Manual

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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)

06/2000
C79000–G8976–C146
Release 01

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

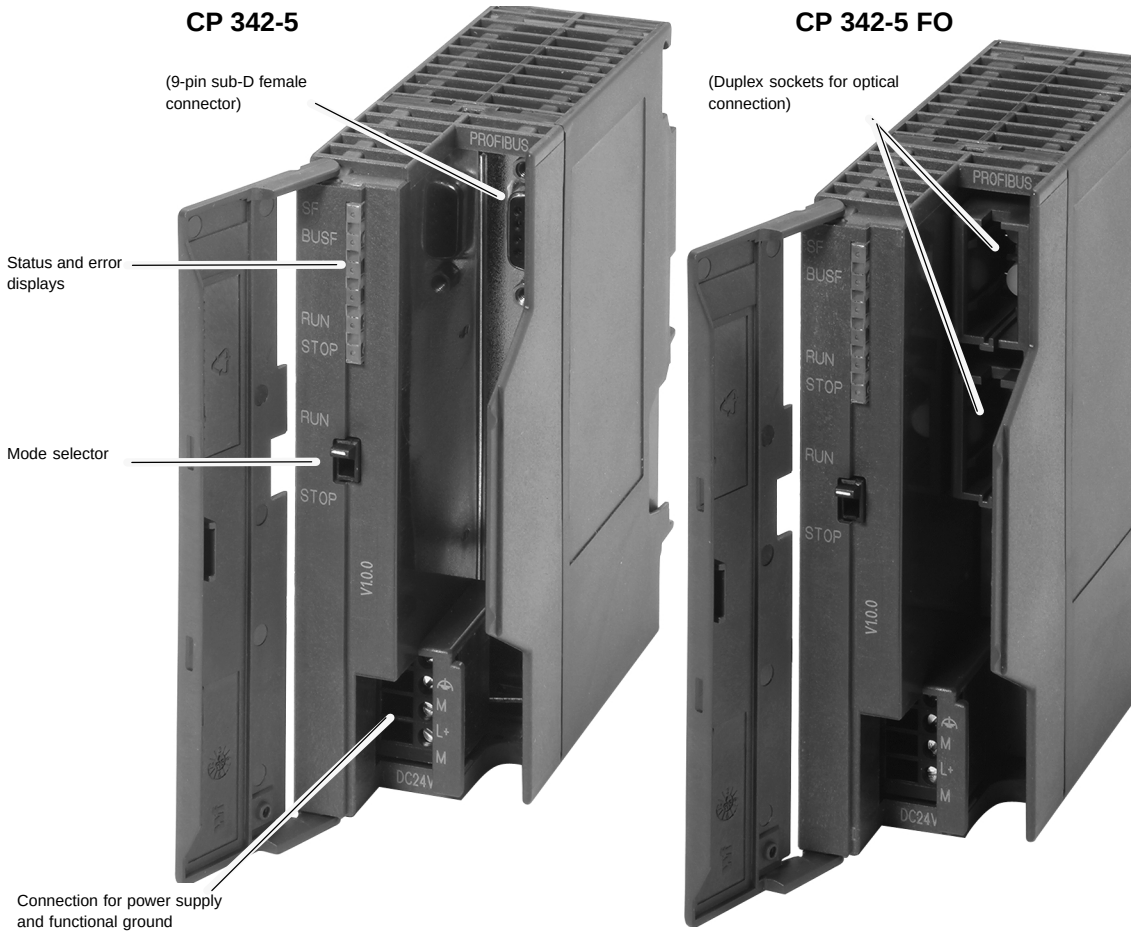

Figure 1 Front View of the CPs 342-5 / 342-5 FO

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.

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.

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	–	–	–