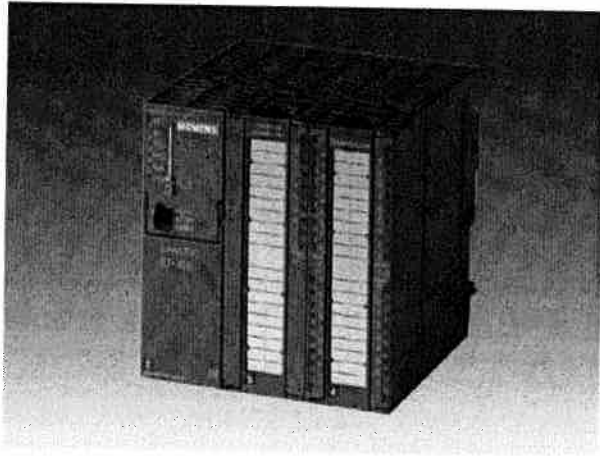


CPUs - CPU 314C-2 DP



Overview

- The compact CPU with integrated digital and analog I/Os and PROFIBUS DP master/slave interface
- With process-related functions
- For tasks with special functions
- For the connection of standalone I/O devices

Micro memory card required to operate the CPU

Area of application

The 314C-2 DP CPU is the compact CPU for installations with a decentralized structure. With its extended working memory the compact CPU is also suitable for medium-sized applications. Integrated digital and analog I/Os enable a direct connection to the process, the PROFIBUS DP master/slave interface allows the connection of standalone I/O units. The 314C-2 DP CPU can thus be used both as a local unit for quick pre-processing as a higher-level control with a subordinate fieldbus system.

Additional possibilities of use are provided with the integrated process-related functions:

- Count
- Frequency measurement
- PID control

Design

The 314C-2 DP CPU includes:

- Microprocessor;
the processor reaches a processing time of 100 - 200 ns per binary instruction
- Extended memory;
48 KB fast RAM (corresponds to about 16 K instructions) for execution-relevant program parts provide user programs with sufficient space;
Micro memory cards (4 MB max.) as load memory for the program allow additional projects to be stored (including symbols and comments) in the CPU.
- Flexible expansion;
up to 31 modules, (four-part structure)

- Multi-point interface MPI;
the integrated MPI interface can establish up to 12 simultaneous connections to S7-300®/400® or to PG, PC, OP. Among these connections, one is always reserved for PG and another for OP. The MPI can be used to establish a simple network with up to 16 CPUs using the "Global data communication".
- PROFIBUS DP interface:
The 314C-2 DP CPU with PROFIBUS DP master/slave interface makes it possible to create high-speed easy-to-use decentralized automation systems. The decentralized peripheral unit is handled as a centralized unit from the user's perspective (same configuration, addressing and programming).
- Password protection;
A password concept protects the user program from unauthorized access.
- Diagnostics buffer;
the last 100 error and interrupt events are stored in a buffer for diagnostics purposes.
- Maintenance-free data back-up;
the CPU automatically writes retentive data to the micro memory card in case of power failure, so that it remains available unchanged when the power is turned on again.
- Integrated I/Os;
24 digital inputs (all for interrupt handling) and 16 digital outputs, as well as 4 analog inputs and 2 analog outputs make the 314C-2 PtP CPU a perfect PLC.
- Integrated communications functions;
 - Programming device/OP communications
 - S7 standard communication
 - S7 communication (server only)

Functions

Programmable properties

STEP 7 can be used to configure the S7 configuration as well as the properties and behavior of the CPUs:

- Multi-point interface MPI;
Determination of station addresses.
- Startup/Cycle behavior;
Determination of the maximum cycle time and load, as well as of the self-testing functions.
- Retentive areas;
Determination of the number of retentive bit memories, counters, times and data blocks.
- Clock bit memory;
Address settings.
- Protection level;
Determination of the access rights to the program and data.
- System diagnostics;
Determination of handling and scope of diagnostics messages.
- Integrated function "Counter"
- Integrated function "Frequency measurement"
- Integrated function "Adjust"
- Watchdog interrupts;
Periodicity settings.
- Time-of-day interrupts;
Start date, start time and periodicity settings.

Display and information functions

- Status and error indications;
LEDs show, e.g., hardware, programming, time or I/O errors and operating modes such as RUN, STOP, startup.
- Testing functions;
the programming device allows signal states to be displayed in the program execution, process variables to be modified independently of the user program and the contents of stack memories to be output.

- Information functions;
the programming device allows the user to get information concerning the storage capacity and operating mode of the CPU, the current workload of the working and load memories, as well as the current cycle times and diagnostics buffer contents in clear text.

Integrated functions

- Counters;
4 counters (up to 60 kHz) with comparators independent of the direction and with direct connection to 24 V incremental sensors.
- 4 channels for frequency measurement;
the frequency measurement (up to 60 kHz) allows, for example, the acquisition of the rotational speed of a shaft with speed range monitoring or throughput (pieces per measurement period) with range monitoring.
- Pulse width modulation;
4 outputs for direct control of valves, actuators, switching devices, heating installations, etc., sampling frequency 2.5 kHz. The period length can be configured and the pulse-pause relation can be modified.
- Controlled positioning;
an SFB integrated in the operating system enables the positioning of an axle using 2 digital outputs or one analog output.
- Interrupt inputs (all digital inputs);
interrupt inputs enable the detection of process events and the triggering of reactions within the shortest possible time.

Technical Specifications

	CPU 314C-2DP
Memory	
RAM	
• Integrated	48 KB for program and data
• Expandable	No
Load memory	
• Integrated	-
• Upgradable FEPRM	With micro memory card (MMC) up to 4 MB
Backup	Performed by MMC (maintenance free)
• With battery	-
• Without battery	Program and data
Execution times	
Processing times for	
• Bit operations, min.	0.1 µs to 0.2 µs
• Word operations, min.	0.5 µs
• Fixed-point addition, min.	1 µs
• Floating-point addition, min.	15 µs
Timers/counters and their retentivity	
S7 counters	256
• Retentivity selectable	From C 0 to C 256
• Counting range	1 to 999
IEC counters	Yes
• Type	SFB
S7 timers	256

• Retentivity selectable	From T 0 to T 256
• Range	10 ms to 9990 s
IEC timers	Yes
• Type	SFB
Data ranges and their retentivity	
Bit memories	256 bytes
• Retentivity selectable	From M 0 to M 255
Blocks	
Max. block size	16 KB
Number of	
• Watchdog interrupts	1
• Process alarms	1
• Time-of-day interrupts	1
• Delay interrupts	1
Nesting depth	
• Per priority class	8
• Additional within an error OB	4
FBs, max.	128
FCs, max.	128
Data blocks, max.	127 (DB 0 reserved)
Programming	
Programming language	STEP 7 V5.1 SP2 (LAD, FBD, STL); SCL, CFC, GRAPH, HiGraph
Nesting levels	8
User program protection	Password protection
Address areas (inputs/outputs)	
Total I/O address area	1024 / 1024 bytes (freely addressable)
Process image	128/128 bytes
Digital channels	992 / 992 max.
Analog channels	248 / 124 max.
Design	
Central controllers/expansion units, max.	1 / 3
No. of modules per system	31
Number of DP masters	
• Integrated	1
• Via CP	1
Suitable modules (recommendation)	
• FMs	8
• CPs, point-to-point	4
• CPs, LAN	2
Time-of-day	
Clock	Yes
• Backed up	Yes

Hours counter	1
Time-of-day synchronization	Yes
Communications functions	
Total number of connections usable for	12
• Programming device communications	Yes
- Reserved	1
- Adjustable	1 to 11
• OP communications	Yes
- Reserved	1
- Adjustable	1 to 11
• S7 standard communications	Yes
- Reserved	8
- Adjustable	0 to 8
• Routing	4
S7 message functions	
Number of stations that can be defined for message functions (e.g. OS)	7
Interfaces	
1. interface	
Functionality	
• MPI	Yes
• DP master	No
• DP slave	No
• Galvanic isolation	No
MPI	
Cable length (without repeater)	50m
Transmission rates	Up to 187.5 kbit/s
Number of connections	12
Services	
• Programming device/OP communications	Yes
• Global data communication	Yes
• Number of GD circuits	
- Sender, max.	4
- Receiver, max.	4
• Size of the GD packets, max.	22 bytes
S7 standard communications	Yes
• User data per job, max.	76 bytes
S7 communication	
• As server	Yes
• As client	No
• User data per job, max.	64 KB
2. interface	

Functionality	
• MPI	No
• DP master	Yes
• DP slave	Yes
• Point-to-point	No
• Galvanic isolation	Yes
Point-to-point	
Transfer physics	-
Transmission speed	-
Line length	-
Implemented protocols	-
DP master	
Number of connections	12 for PG/OP communication
• Of which reserved	1 for PG, 1 for OP
Services	
• Programming device/OP communications	Yes
• Support for intermode communications	Yes
• Equidistance	Yes
• SYNC/FREEZE	Yes
• Global data communication	No
• S7 standard communications	No
• S7 communication	
- As server	No
- As client	No
Transmission rates	Up to 12 Mbit/s
Number of DP slaves, max.	32
Address range max. (I/O)	1024/1024 bytes
User data per DP slave, max. (I/O)	244/244 bytes
Voltages, currents	
Supply voltage	
• Rated value	24 V DC
• Permissible range	20.4 to 28.8 V
Current consumption typ.	1.0 A
Starting current, typ.	11 A
Power losses, typically	14 W
Dimensions	
Installation dimensions (W x H x D) in mm	120 x 125 x 130
Weight, approx.	680 g
On-board digital inputs	
Number	24
Input voltage	
• Rated value	24 V DC
• For "1" signal	15 to 30 V

• For "0" signal	-3 to +5 V
Isolation	Yes
• In groups of	16
Input current	
• For "1" signal, min./typ.	-/8 mA
Input delay (at rated value of the input voltage)	
• For standard inputs, typ./max.	0.1 / 0.3 / 3 / 15 ms
• For process-related functions	8 µs
Connection of 2-wire BERO	
• Acceptable quiescent current	1.5 mA
Cable lengths	
• Unshielded	600 m
• Shielded	1000 m (100 m for process-related functions)
Integral digital outputs	
Number	16
Rated load voltage L+/L1	24 V DC
• Permissible range	20.4 to 28.8 V
Output voltage	
• For "1" signal, max.	L+ - 0.8 V
Isolation	Yes
• In groups of	8
Maximum output current	
• For "1" signal	
- Rated value at 40 °C	0.5 A
- Rated value at 60 °C	0.5 A
- Min. current	5 mA
• For "0" signal, max.	0.5 mA
Total load capability	
• At 40 °C	100 %
• At 60 °C	50 %
Switching frequency of outputs	
• For resistive load	100 Hz
• For inductive load	0.5 Hz
Voltage induced on circuit interruption limited to	Type (L+) -48V
Short-circuit protection	Electronic, clocked
Cable lengths	
• Unshielded	600 m
• Shielded	1000 m
Integrated analog inputs (for current / voltage)	
• Number	4
• Voltage	±10 V, 0 to 10 V
• Current	±20 mA, 0/4 to 20 mA
Isolation	Common for analog I/O

Bipolar resolution	11 bits +sign
Integration time (adjustable)	
• Per channel	2.5 / 16.6 / 20 ms
Basic error threshold (operating error threshold at 25 °C, referred to input range), max.	±0,7%
Integrated analog inputs (for resistance / temperature)	
Number	1
Resistance	0 to 600 Ω, Pt 100
Isolation	Common for analog I/O
Bipolar resolution	11 bits +sign
Integration time (adjustable)	
• Per channel	2.5 / 16.6 / 20 ms
Basic error threshold (operating error threshold at 25 °C, referred to input range), max.	±3%
Integrated analog outputs	
Number	2
Output ranges (rated values)	
• Voltage	±10 V, 0 to 10 V
• Current	±20 mA, 0/4 to 20 mA
Isolation	Common for analog I/O
Conversion time per channel	1 ms
Basic error threshold (operating error threshold at 25 °C, referred to output range), max.	±0,7%
• Required front connector	2 40-pin
• Integral functions	
• Counters	4
• Counting speed max.	60 kHz
• Pulse outputs	4
• Switching frequency max.	2.5 kHz
• Frequency measurement	Yes
• Open-loop positioning	Yes
• Integral "Closed loop control" function blocks	PID