



SIMATIC

S7-300 CPU 31xC and CPU 31x: Specifications

Manual

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Guide to the S7-300
documentation

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This manual is included in the documentation package
with Order No.:

6ES7398-8FA10-8BA0

06/2008

A5E00105475-08

Preface

Purpose of the Manual

This manual contains essential information:

- about installation
- about communication
- about the memory concept
- about the cycle and response times,
- about the CPU technical data,
- about changing to one of the CPUs discussed here.

Required basic knowledge

- To understand this manual, you require a general knowledge of automation engineering.
- You require a knowledge of STEP 7 basic software.

Area of application

Table 1 Scope of this manual

CPU	Convention: CPU designations:	Order number	As of Version firmware
CPU 312C	CPU 31xC	6ES7312-5BE03-0AB0	V2.6
CPU 313C		6ES7313-5BF03-0AB0	V2.6
CPU 313C-2 PtP		6ES7313-6BF03-0AB0	V2.6
CPU 313C-2 DP		6ES7313-6CF03-0AB0	V2.6
CPU 314C-2 PtP		6ES7314-6BG03-0AB0	V2.6
CPU 314C-2 DP		6ES7314-6CG03-0AB0	V2.6
CPU 312	CPU 31x	6ES7312-1AE13-0AB0	V2.6
CPU 314		6ES7314-1AG13-0AB0	V2.6
CPU 315-2 DP		6ES7315-2AG10-0AB0	V2.6
CPU 315-2 PN/DP		6ES7315-2EH13-0AB0	V2.6
CPU 317-2 DP		6ES7317-2AJ10-0AB0	V2.6
CPU 317-2 PN/DP		6ES7317-2EK13-0AB0	V2.6
CPU 319-3 PN/DP		6ES7318-3EL00-0AB0	V2.7

7.5 CPU 314C-2 PtP and CPU 314C-2 DP

Technical Data

Table 7- 6 Technical data of CPU 314C-2 PtP and CPU 314C-2 DP

Technical data		
	CPU 314C-2 PtP	CPU 314C-2 DP
CPU and version	CPU 314C-2 PtP	CPU 314C-2 DP
Order no. [MLFB]	6ES7 314-6BG03-0AB0	6ES7 314-6CG03-0AB0
• Hardware version	01	01
• Firmware version	V2.6	V2.6
Associated programming package	STEP 7 V5.4 + SP3 and higher, or STEP 7 V5.3 + SP2 and higher with HSP 0123	STEP 7 V5.4 + SP3 and higher, or STEP 7 V5.3 + SP2 and higher with HSP 0123
Memory	CPU 314C-2 PtP	CPU 314C-2 DP
Work memory		
• Integrated	96 KB	
• Expandable	No	
• Capacity of retentive memory for retentive data blocks	64 KB	
Load memory	Pluggable by means of SIMATIC Micro Memory Card (max. 8 Mbytes)	
Data storage life on the MMC (following final programming)	At least 10 years	
Buffering	Guaranteed by SIMATIC MMC (maintenance-free)	
Execution times	CPU 314C-2 PtP	CPU 314C-2 DP
Processing times of		
• Bit operations	Min. 0.1 µs	
• Word instructions	Min. 0.2 µs	
• Fixed-point arithmetic	Min. 2 µs	
• Floating-point arithmetic	Min. 3 µs	
Timers/counters and their retentive address areas	CPU 314C-2 PtP	CPU 314C-2 DP
S7 counters	256	
• Retentivity	Configurable	
• Default	from C 0 to C 7	
• Counting range	0 to 999	
IEC Counters	Yes	
• Type	SFB	
• Number	unlimited (limited only by work memory size)	

Technical data		
	CPU 314C-2 PtP	CPU 314C-2 DP
S7 timers	256	
• Retentivity	Configurable	
• Default	Not retentive	
• Timer range	10 ms to 9990 s	
IEC timers	Yes	
• Type	SFB	
• Number	unlimited (limited only by work memory size)	
Data areas and their retentive address areas	CPU 314C-2 PtP	CPU 314C-2 DP
Bit memory	256 bytes	
• Retentivity	Configurable	
• Preset retentive address areas	MB0 to MB15	
Clock flag bits	8 (1 memory byte)	
Data blocks	Max. 511 (in the 1 to 511 range of numbers)	
• Size	max. 16 KB	
• Non-retain support (configurable retentive address areas)	Yes	
Local data per priority class	max. 510 bytes	
Blocks	CPU 314C-2 PtP	CPU 314C-2 DP
Total	1024 (DBs, FCs, FBs) The maximum number of blocks that can be loaded may be reduced if you are using another MMC.	
OBs	See the Instruction List	
• Size	max. 16 KB	
• Number of free-cycle OBs	1 (OB 1)	
• Number of time-of-day interrupt OBs	1 (OB 10)	
• Number of time-delay interrupt OBs	1 (OB 20)	
• Number of watchdog interrupts	1 (OB 35)	
• Number of process interrupt OBs	1 (OB 40)	
• Number of DPV1 interrupt OBs	-	3 (OB 55, 56, 57)
• Number of startup OBs	1 (OB 100)	
• Number of asynchronous error OBs	4 (OB 80, 82, 85, 87)	5 (OB 80, 82, 85, 86, 87)
• Number of synchronous error OBs	2 (OB 121, 122)	
Nesting depth		
• Per priority class	8	
• Additional within an error OB	4	

Technical data		
	CPU 314C-2 PtP	CPU 314C-2 DP
FBs		
• Number, max.	1024 (in the 0 to 2047 range of numbers)	
• Size	max. 16 KB	
FCs		
• Number, max.	1024 (in the 0 to 2047 range of numbers)	
• Size	max. 16 KB	
Address areas (I/O)	CPU 314C-2 PtP	CPU 314C-2 DP
Total I/O address area		
• Inputs	1024 bytes (user-specific addressing)	1024 bytes (user-specific addressing)
• Outputs	1024 bytes (user-specific addressing)	1024 bytes (user-specific addressing)
• Distributed – Inputs – Outputs	none none	979 bytes 986 bytes
I/O process image		
• Inputs	128 bytes	128 bytes
• Outputs	128 bytes	128 bytes
Digital channels		
• Integrated channels (DI)	24	24
• Integrated channels (DO)	16	16
• Inputs	1016	7856
• Outputs	1008	7904
• Inputs, central	1016	1008
• Outputs, central	1008	1008
Analog channels		
• Integrated channels (AI)	4 + 1	4 + 1
• Integrated channels (AO)	2	2
• Inputs	253	494
• Outputs	250	495
• Inputs, central	253	253
• Outputs, central	250	250
Removal	CPU 314C-2 PtP	CPU 314C-2 DP
Racks	Max. 4	
Modules per rack	max. 8; max. 7 in rack 3	
Number of DP masters		
• Integrated	No	1
• Via CP	4	4

Technical data		
	CPU 314C-2 PtP	CPU 314C-2 DP
Operable function modules and communication processors		
• FM	Max. 8	
• CP (PtP)	Max. 8	
• CP (LAN)	Max. 10	
Time	CPU 314C-2 PtP	CPU 314C-2 DP
Clock	Yes (HW clock)	
• Buffered	Yes	
• Buffered period	Typically 6 weeks (at an ambient temperature of 40 °C)	
• Behavior of the clock on expiration of the buffered period	The clock keeps running, continuing at the time-of-day it had when power was switched off.	
• Accuracy	Deviation per day < 10 s	
Operating hours counter	1	
• Number	0	
• Value range	2 ³¹ hours (if SFC 101 is used)	
• Granularity	1 hour	
• Retentive	Yes; must be manually restarted after every restart	
Clock synchronization	Yes	
• In the AS	Master	
• On MPI	Master/slave	
• On DP	-	Master/slave (only time slave if DP slave)
S7 message functions	CPU 314C-2 PtP	CPU 314C-2 DP
Number of stations that can log in for signaling functions (e.g. OS)	Max. 12 (depends on the number of connections configured for PG / OP and S7 basic communication)	
Process diagnostics messages	Yes	
• Simultaneously enabled interrupt S blocks	Max. 40	
Test and startup functions	CPU 314C-2 PtP	CPU 314C-2 DP
Status/control variables	Yes	
• Variable	Inputs, outputs, memory bits, DBs, timers, counters	
• Number of variables	Max. 30	
– of those as status variable	Max. 30	
– of those as control variable	Max. 14	
Force	Yes	
• Variable	Inputs, outputs	
• Number of variables	Max. 10	
Block status	Yes	

Technical data		
	CPU 314C-2 PtP	CPU 314C-2 DP
Single-step	Yes	
Breakpoint	2	
Diagnostics buffer	Yes	
• Number of entries (not configurable)	Max. 100	
Communication functions	CPU 314C-2 PtP	CPU 314C-2 DP
PG/OP communication	Yes	
Global data communication	Yes	
• Number of GD circuits	4	
• Number of GD packets	Max. 4	
– Sending stations	Max. 4	
– Receiving stations	Max. 4	
• Length of GD packets	max. 22 bytes	
– Consistent data	22 bytes	
S7 basic communication	Yes	
• User data per job	max. 76 bytes	
– Consistent data	76 bytes (for X_SEND or X_RCV) 64 bytes (for X_PUT or X_GET as the server)	
S7 communication		
• As server	Yes	
• As client	Yes (via CP and loadable FBs)	
• User data per job	max. 180 bytes (with PUT/GET)	
– Consistent data	64 bytes	
S5-compatible communication	Yes (via CP and loadable FCs)	
Number of connections	Max. 12	
can be used for		
• PG communication	Max. 11	
– Reserved (default)	1	
– Configurable	from 1 to 11	
• OP communication	Max. 11	
– Reserved (default)	1	
– Configurable	from 1 to 11	
• S7-based communication	Max. 8	
– Reserved (default)	0	
– Configurable	from 0 to 8	
Routing	No	Max. 4
Interfaces	CPU 314C-2 PtP	CPU 314C-2 DP
1st interface		
Type of interface	Integrated RS485 interface	
Physics	RS 485	
electrically isolated	No	
Interface power supply (15 to 30 VDC)	Max. 200 mA	

Technical data		
	CPU 314C-2 PtP	CPU 314C-2 DP
Functionality		
• MPI	Yes	
• PROFIBUS DP	No	
• Point-to-point connection	No	
MPI		
Number of connections	12	
Services		
• PG/OP communication	Yes	
• Routing	No	Yes
• Global data communication	Yes	
• S7 basic communication	Yes	
• S7 communication	Yes No (but via CP and loadable FBs)	
– As server		
– As client		
• Transmission rates	max. 187.5 kbps	
2nd interface	CPU 314C-2 PtP	CPU 314C-2 DP
Type of interface	Integrated RS422/RS485 interface	Integrated RS485 interface
Physics	RS 422/485	RS 485
electrically isolated	Yes	Yes
Interface power supply (15 to 30 VDC)	No	Max. 200 mA
Number of connections	None	12
Functionality		
• MPI	No	No
• PROFIBUS DP	No	Yes
• Point-to-point connection	Yes	No
DP master		
Number of connections	–	12
Services		
• PG/OP communication	–	Yes
• Routing	–	Yes
• Global data communication	–	No
• S7 basic communication	–	Yes (only I blocks)
• S7 communication	–	Yes (only server; configured unilateral connection)
• Constant bus cycle time	–	Yes
• Isochronous mode	–	No
• SYNC/FREEZE	–	Yes

Technical data		
	CPU 314C-2 PtP	CPU 314C-2 DP
• Activate/deactivate DP slaves – Max. number of DP slaves that can be activated/deactivated simultaneously	–	Yes 4
• DPV1	–	Yes
• Transmission rates	–	Up to 12 Mbaud
• Number of DP slaves per station	–	Max. 32
• Address area	–	Max. 1 KB I / 1 KB O
• User data per DP slave	–	max. 244 bytes I / 244 bytes O
DP slave		
Number of connections	–	12
Services		
• PG/OP communication	–	Yes
• Routing	–	Yes (only if interface is active)
• Global data communication	–	No
• S7 basic communication	–	No
• S7 communication	–	Yes (only server; configured unilateral connection)
• Direct data exchange	–	Yes
• Transmission rates	–	Up to 12 Mbaud
• Intermediate memory	–	244 bytes I / 244 bytes O
• Automatic baud rate search	–	Yes (only if interface is passive)
• Address areas		Max. 32, with max. 32 bytes each
• DPV1	–	No
GSD file	–	The latest GSD file is available at: http://www.automation.siemens.com/csi/gsd
Point-to-point connection		
• Transmission rates	38.4 Kbaud half duplex 19.2 Kbaud full duplex	–
• Cable length	Max. 1200 m	–
• User program can control the interface	Yes	–
• The interface can trigger a break or an interrupt in the user program	Yes (message with break ID)	–
• Protocol driver	3964 (R); ASCII and RK512	–
Programming		
Programming language	LAD/FBD/STL	
Instruction set	see the Instruction List	
Nesting levels	8	

Technical data		
	CPU 314C-2 PtP	CPU 314C-2 DP
System functions (SFC)	see the Instruction List	
System function blocks (SFB)	see the Instruction List	
User program protection	Yes	
Integrated I/O	CPU 314C-2 PtP	CPU 314C-2 DP
- Default addresses of the integrated - Digital inputs - Digital outputs - Analog inputs - Analog outputs	124.0 to 126.7 124.0 to 125.7 752 to 761 752 to 755	
Integrated functions		
Counters	4 channels (see the Manual <i>Technological Functions</i>)	
Frequency counters	4 channels, max. 60 kHz (see the Manual <i>Technological Functions</i>)	
Cycle duration measurement	4 channels (see the Manual <i>Technological Functions</i>)	
Pulse outputs	4 channels for pulse width modulation, max. 2.5 kHz (see the Manual <i>Technological Functions</i>)	
Controlled positioning	1 channel (see the Manual <i>Technological Functions</i>)	
Integrated "Controlling" SFB	PID controller (see the manual <i>Technological Functions</i>)	
Dimensions	CPU 314C-2 PtP	CPU 314C-2 DP
Mounting dimensions W x H x D (mm)	120 x 125 x 130	
Weight	approx. 676 g	
Voltages and currents	CPU 314C-2 PtP	CPU 314C-2 DP
Power supply (rated value)	24 VDC	
Permissible range	20.4 V to 28.8 V	
Current consumption (no-load operation)	Typically 150 mA	
Inrush current	Typically 11 A	
Power consumption (nominal value)	800 mA	1000 mA
I^2t	0.7 A ² s	
External fusing of power supply lines (recommended)	LS switch type C min. 2 A, LS switch type B min. 4 A	
Power loss	Typically 14 W	

... then please note if you upgrade to one of the following CPUs

CPU	Order number	as of version	Hereafter called
		Firmware	
312	6ES7312-1AE13-0AB0	V2.6	CPU 31xC/31x
312C	6ES7312-5BE03-0AB0	V2.6	
313C	6ES7313-5BF03-0AB0	V2.6	
313C-2 PtP	6ES7313-6BF03-0AB0	V2.6	
313C-2 DP	6ES7313-6CF03-0AB0	V2.6	
314	6ES7314-1AG13-0AB0	V2.6	
314C-2 PtP	6ES7314-6BG03-0AB0	V2.6	
314C-2 DP	6ES7314-6CG03-0AB0	V2.6	
315-2 DP	6ES7315-2AG10-0AB0	V2.6	
315-2 PN/DP	6ES7315-2EH13-0AB0	V2.6	
317-2 DP	6ES7317-2AJ10-0AB0	V2.6	
317-2 PN/DP	6ES7317-2EK13-0AB0	V2.6	
319-3 PN/DP	6ES7318-3EL00-0AB0	V2.7	

Reference

If you intend to migrate from PROFIBUS DP to PROFINET, we also recommend the following manual: *Programming manual From PROFIBUS DP to PROFINET IO*

See also

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