



SIMATIC S7-300, CPU 313C-2 PTP COMPACT CPU WITH MPI, 16 DI/16 DO, 3 FAST COUNTERS (30 KHZ), INTEGRATED INTERFACE RS485, INTEGRATED 24V DC POWER SUPPLY, 128 KBYTE WORKING MEMORY, FRONT CONNECTOR (1 X 40PIN) AND MICRO MEMORY CARD REQUIRED

### Product type designation

### General information

Hardware product version	01
Firmware version	V3.3
Engineering with	
<ul style="list-style-type: none"> <li>Programming package</li> </ul>	STEP7 as of V5.5 + SP1 or STEP 7 V5.3 + SP2 or higher with HSP 204

### Supply voltage

Rated value (DC)	
<ul style="list-style-type: none"> <li>24 V DC</li> </ul>	Yes
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
External protection for supply cables (recommendation)	Miniature circuit breaker, type C; min. 2 A; miniature circuit breaker type B, min. 4 A

### Mains buffering

<ul style="list-style-type: none"> <li>Mains/voltage failure stored energy time</li> </ul>	5 ms
<ul style="list-style-type: none"> <li>Repeat rate, min.</li> </ul>	1 s

### Digital inputs

Load voltage L+	
<ul style="list-style-type: none"> <li>Rated value (DC)</li> </ul>	24 V
<ul style="list-style-type: none"> <li>Reverse polarity protection</li> </ul>	Yes

### Digital outputs

Load voltage L+	
<ul style="list-style-type: none"> <li>Rated value (DC)</li> </ul>	24 V

— Reverse polarity protection

No

### Input current

Current consumption (rated value)	580 mA
Current consumption (in no-load operation), typ.	110 mA
Inrush current, typ.	5 A
$I^2t$	0.7 A <sup>2</sup> ·s

### Digital inputs

- from load voltage L+ (without load), max. 80 mA

### Digital outputs

- from load voltage L+, max. 50 mA

### Power losses

Power loss, typ.	9 W
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### Memory

<b>Work memory</b>	
• Integrated	128 kbyte
• expandable	No
• Size of retentive memory for retentive data blocks	64 kbyte
<b>Load memory</b>	
• pluggable (MMC)	Yes
• pluggable (MMC), max.	8 Mbyte
• Data management on MMC (after last programming), min.	10 y
<b>Backup</b>	
• present	Yes; Guaranteed by MMC (maintenance-free)
• without battery	Yes; Program and data

### CPU processing times

for bit operations, typ.	0.07 μs
for word operations, typ.	0.15 μs
for fixed point arithmetic, typ.	0.2 μs
for floating point arithmetic, typ.	0.72 μs

### CPU-blocks

Number of blocks (total)	1 024; (DBs, FCs, FBs); the maximum number of loadable blocks can be reduced by the MMC used.
<b>DB</b>	
• Number, max.	1 024; Number range: 1 to 16000
• Size, max.	64 kbyte
<b>FB</b>	
• Number, max.	1 024; Number range: 0 to 7999
• Size, max.	64 kbyte
<b>FC</b>	

• Number, max.	1 024; Number range: 0 to 7999
• Size, max.	64 kbyte
<b>OB</b>	
• Description	see instruction list
• Size, max.	64 kbyte
• Number of free cycle OBs	1; OB 1
• Number of time alarm OBs	1; OB 10
• Number of delay alarm OBs	2; OB 20, 21
• Number of time interrupt OBs	4; OB 32, 33, 34, 35
• Number of process alarm OBs	1; OB 40
• Number of startup OBs	1; OB 100
• Number of asynchronous error OBs	4; OB 80, 82, 85, 87
• Number of synchronous error OBs	2; OB 121, 122
<b>Nesting depth</b>	
• per priority class	16
• additional within an error OB	4
<b>Counters, timers and their retentivity</b>	
<b>S7 counter</b>	
• Number	256
<b>Retentivity</b>	
— can be set	Yes
— lower limit	0
— upper limit	255
— preset	Z 0 to Z 7
<b>Counting range</b>	
— can be set	Yes
— lower limit	0
— upper limit	999
<b>IEC counter</b>	
• present	Yes
• Type	SFB
• Number	Unlimited (limited only by RAM capacity)
<b>S7 times</b>	
• Number	256
<b>Retentivity</b>	
— can be set	Yes
— lower limit	0
— upper limit	255
— preset	No retentivity
<b>Time range</b>	
— lower limit	10 ms

— upper limit	9 990 s
<b>IEC timer</b>	
• present	Yes
• Type	SFB
• Number	Unlimited (limited only by RAM capacity)
<b>Data areas and their retentivity</b>	
Total retentive data area	All, max. 64 KB
<b>Flag</b>	
• Number, max.	256 byte
• Retentivity available	Yes; MB 0 to MB 255
• Retentivity preset	MB 0 to MB 15
• Number of clock memories	8; 1 memory byte
<b>Data blocks</b>	
• Number, max.	1 024; Number range: 1 to 16000
• Size, max.	64 kbyte
• Retentivity adjustable	Yes; via non-retain property on DB
• Retentivity preset	Yes
<b>Local data</b>	
• per priority class, max.	32 kbyte; Max. 2048 bytes per block
<b>Address area</b>	
<b>I/O address area</b>	
• Inputs	1 024 byte
• Outputs	1 024 byte
<b>of which, distributed</b>	
— Inputs	none
— Outputs	none
<b>Process image</b>	
• Inputs	1 024 byte
• Outputs	1 024 byte
• Inputs, adjustable	1 024 byte
• Outputs, adjustable	1 024 byte
• Inputs, default	128 byte
• Outputs, default	128 byte
<b>Default addresses of the integrated channels</b>	
— Digital inputs	124.0 to 125.7
— Digital outputs	124.0 to 125.7
<b>Digital channels</b>	
• Inputs	1 008
— Inputs, of which central	1 008
• Outputs	1 008
— Outputs, of which central	1 008

Analog channels	
• Inputs	248
— Inputs, of which central	248
• Outputs	248
— Outputs, of which central	248
Hardware configuration	
Expansion devices, max.	3
Number of DP masters	
• Integrated	none
• Via CP	4
Number of operable FMs and CPs (recommended)	
• FM	8
• CP, point-to-point	8
• CP, LAN	6
Rack	
• Racks, max.	4
• Modules per rack, max.	8; In rack 3 max. 7
Time of day	
Clock	
• Hardware clock (real-time clock)	Yes
• battery-backed and synchronizable	Yes
• Deviation per day, max.	10 s; Typ.: 2 s
• Backup time	6 wk; At 40 °C ambient temperature
• Behavior of the clock following POWER-ON	Clock continues running after POWER OFF
• Behavior of the clock following expiry of backup period	Clock continues to run with the time at which the power failure occurred
Operating hours counter	
• Number	1
• Number/Number range	0
• Range of values	0 to 2 <sup>31</sup> hours (when using SFC 101)
• Granularity	1 hour
• retentive	Yes; Must be restarted at each restart
Clock synchronization	
• supported	Yes
• to MPI, master	Yes
• to MPI, slave	Yes
• in AS, master	Yes
• in AS, slave	No
Digital inputs	
Number of digital inputs	16

<ul style="list-style-type: none"> <li>• of which, inputs usable for technological functions</li> </ul>	12
integrated channels (DI)	16
Input characteristic curve in accordance with IEC 61131, type 1	Yes
<b>horizontal installation</b>	
— up to 40 °C, max.	16
— up to 60 °C, max.	8
<b>vertical installation</b>	
— up to 40 °C, max.	8
<b>Input voltage</b>	
<ul style="list-style-type: none"> <li>• Rated value (DC)</li> </ul>	24 V
<ul style="list-style-type: none"> <li>• for signal "0"</li> </ul>	-3 to +5V
<b>Input current</b>	
<ul style="list-style-type: none"> <li>• for signal "1", typ.</li> </ul>	8 mA
<b>Input delay (for rated value of input voltage)</b>	
<b>for standard inputs</b>	
— Parameterizable	Yes; 0.1 / 0.3 / 3 / 15 ms (You can reconfigure the input delay of the standard inputs during program runtime. Please note that under certain circumstances your newly set filter time may not be effective until the next filter cycle.)
— nominal	3 ms
<b>for counter/technological functions</b>	
— at "0" to "1", max.	16 µs; Minimum pulse width/minimum pause between pulses at maximum counting frequency
<b>Cable length</b>	
<ul style="list-style-type: none"> <li>• shielded, max.</li> </ul>	1 000 m; 100 m for technological functions
<ul style="list-style-type: none"> <li>• Unshielded, max.</li> </ul>	600 m; For technological functions: No
<b>Technological functions</b>	
— shielded, max.	100 m; at maximum count frequency
— Unshielded, max.	not allowed
<b>Digital outputs</b>	
Number of digital outputs	16
<ul style="list-style-type: none"> <li>• of which high-speed outputs</li> </ul>	4; Notice: You cannot connect the fast outputs of your CPU in parallel
integrated channels (DO)	16
short-circuit protection	Yes; Clocked electronically
<ul style="list-style-type: none"> <li>• Response threshold, typ.</li> </ul>	1 A
Limitation of inductive shutdown voltage to	L+ (-48 V)
Controlling a digital input	Yes
<b>Switching capacity of the outputs</b>	
<ul style="list-style-type: none"> <li>• on lamp load, max.</li> </ul>	5 W
<b>Load resistance range</b>	

• lower limit	48 Ω
• upper limit	4 kΩ
<b>Output voltage</b>	
• for signal "1", min.	L+ (-0.8 V)
<b>Output current</b>	
• for signal "1" rated value	500 mA
• for signal "1" permissible range, min.	5 mA
• for signal "1" permissible range, max.	0.6 A
• for signal "1" minimum load current	5 mA
• for signal "0" residual current, max.	0.5 mA
<b>Parallel switching of 2 outputs</b>	
• for increased power	No
• for redundant control of a load	Yes
<b>Switching frequency</b>	
• with resistive load, max.	100 Hz
• with inductive load, max.	0.5 Hz
• on lamp load, max.	100 Hz
• of the pulse outputs, with resistive load, max.	2.5 kHz
<b>horizontal installation</b>	
— up to 40 °C, max.	3 A
— up to 60 °C, max.	2 A
<b>vertical installation</b>	
— up to 40 °C, max.	2 A
<b>Cable length</b>	
• shielded, max.	1 000 m
• Unshielded, max.	600 m
<b>Analog inputs</b>	
Number of analog inputs	0
Integrated channels (AI)	0
<b>Analog outputs</b>	
Number of analog outputs	0
Integrated channels (AO)	0
<b>Connectable encoders</b>	
• 2-wire sensor	Yes
— Permissible quiescent current (2-wire sensor), max.	1.5 mA
<b>Interfaces</b>	
Number of USB interfaces	0
Number of 20 mA interfaces (TTY)	0
Number of RS 232 interfaces	0
Number of RS 422 interfaces	1; RS 422/485 combined

Number of parallel interfaces	0
Number of other interfaces	0
<b>Point-to-point</b>	
• Cable length, max.	1 200 m
<b>Integrated protocol driver</b>	
— 3964 (R)	Yes
— ASCII	Yes
— RK512	No
<b>Transmission speed, RS 422/485</b>	
— with 3964 (R) protocol, max.	19.2 kbit/s; 38.4 kbit/s half duplex; 19.2 kbit/s full duplex
— with ASCII protocol, max.	19.2 kbit/s; 38.4 kbit/s half duplex; 19.2 kbit/s full duplex

<b>1st interface</b>	
Interface type	Integrated RS 485 interface
Physics	RS 485
Isolated	No
Power supply to interface (15 to 30 V DC), max.	200 mA
<b>Functionality</b>	
• MPI	Yes
• DP master	No
• DP slave	No
• Point-to-point connection	No
<b>MPI</b>	
• Transmission rate, max.	187.5 kbit/s
<b>Services</b>	
— PG/OP communication	Yes
— Routing	No
— Global data communication	Yes
— S7 basic communication	Yes
— S7 communication	Yes; Only server, configured on one side
— S7 communication, as client	No; but via CP and loadable FB
— S7 communication, as server	Yes

<b>2nd interface</b>	
Interface type	Integrated RS 422/ 485 interface
Physics	RS 422/RS 485 (X.27)
Isolated	Yes
Power supply to interface (15 to 30 V DC), max.	No
<b>Functionality</b>	
• MPI	No
• DP master	No
• DP slave	No
• PROFINET IO Controller	No



• PROFINET IO Device	No
• PROFINET CBA	No
<b>Point-to-point connection</b>	
• Transmission rate, max.	19.2 kbit/s; 38.4 kbit/s half duplex; 19.2 kbit/s full duplex
• Cable length, max.	1 200 m
• interface from the user program controllable	Yes
• Interface can trigger alarm/interrupt in the user program	Yes; Message on break - identification
• Protocol driver	3964 (R); ASCII
<b>Communication functions</b>	
PG/OP communication	Yes
Data record routing	No
<b>Global data communication</b>	
• supported	Yes
• Number of GD loops, max.	8
• Number of GD packets, max.	8
• Number of GD packets, transmitter, max.	8
• Number of GD packets, receiver, max.	8
• Size of GD packets, max.	22 byte
• Size of GD packet (of which consistent), max.	22 byte
<b>S7 basic communication</b>	
• supported	Yes; Server
• User data per job, max.	76 byte
• User data per job (of which consistent), max.	76 byte; 76 bytes (with X_SEND or X_RCV); 64 bytes (with X_PUT or X_GET as server)
<b>S7 communication</b>	
• supported	Yes
• as server	Yes
• As client	Yes; Via CP and loadable FB
• User data per job, max.	180 byte; With PUT/GET
• User data per job (of which consistent), max.	240 byte; as server
<b>S5-compatible communication</b>	
• supported	Yes; via CP and loadable FC
<b>Number of connections</b>	
• overall	8
• usable for PG communication	7
— reserved for PG communication	1
— Adjustable for PG communication, min.	1
— Adjustable for PG communication, max.	7
• usable for OP communication	7
— reserved for OP communication	1
— adjustable for OP communication, min.	1

- adjustable for OP communication, max. 7
- usable for S7 basic communication 4
- Reserved for S7 basic communication 0
- adjustable for S7 basic communication, min. 0
- adjustable for S7 basic communication, max. 4

### S7 message functions

Number of login stations for message functions, max.	8; Depending on the configured connections for PG/OP and S7 basic communication
Process diagnostic messages	Yes
simultaneously active Alarm-S blocks, max.	300

### Test commissioning functions

Status block	Yes; Up to 2 simultaneously
Single step	Yes
Number of breakpoints	4

#### Status/control

- Status/control variable Yes
- Variables Inputs, outputs, memory bits, DB, times, counters
- Number of variables, max. 30
  - of which status variables, max. 30
  - of which control variables, max. 14

#### Forcing

- Forcing Yes
- Force, variables Inputs, outputs
- Number of variables, max. 10

#### Diagnostic buffer

- present Yes
- Number of entries, max. 500
  - can be set No
  - Of which powerfail-proof 100; Only the last 100 entries are retained
- Number of entries readable in RUN, max. 499
  - can be set Yes; From 10 to 499
  - preset 10

#### Service data

- Can be read out Yes

#### Diagnostics indication LED

- Status indicator digital output (green) Yes
- Status indicator digital input (green) Yes

### Integrated Functions

Number of counters	3; See "Technological Functions" manual
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Counter frequency (counter) max.	30 kHz
Frequency measurement	Yes
Number of frequency meters	3; up to 30 kHz (see "Technological Functions" manual)
controlled positioning	No
Integrated function blocks (closed-loop control)	Yes; PID controller (see "Technological Functions" manual)
PID controller	Yes
Number of pulse outputs	3; Pulse width modulation up to 2.5 kHz (see "Technological Functions" Manual)
Limit frequency (pulse)	2.5 kHz

### Galvanic isolation

Galvanic isolation digital inputs	
• Galvanic isolation digital inputs	Yes
• between the channels	No
• between the channels and the backplane bus	Yes
Galvanic isolation digital outputs	
• Galvanic isolation digital outputs	Yes
• between the channels	Yes
• between the channels, in groups of	8
• between the channels and the backplane bus	Yes

### Permissible potential difference

between different circuits	75V DC/60V AC
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### Isolation

Isolation checked with	600 V DC
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### Ambient conditions

Ambient temperature in operation	
• Min.	0 °C
• max.	60 °C

### Configuration

Configuration software	
• STEP 7	Yes; STEP 7 V5.5 + SP1 or higher or STEP 7 V5.3 + SP2 or higher with HSP 203
• STEP 7 Lite	No
programming	
• Command set	see instruction list
• Nesting levels	8
• System functions (SFC)	see instruction list
• System function blocks (SFB)	see instruction list
Programming language	
— LAD	Yes
— FBD	Yes

- STL
- SCL
- CFC
- GRAPH
- HiGraph®

Yes  
Yes  
Yes  
Yes  
Yes

#### Know-how protection

- User program protection/password protection
- Block encryption

Yes  
Yes; With S7 block Privacy

#### Dimensions

Width	80 mm
Height	125 mm
Depth	130 mm

#### Weights

Weight, approx. 500 g

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