

\*\*\* SPARE PART\*\*\* SIMATIC S7-300, CPU 313C, COMPACT CPU WITH MPI, 24 DI/16 DO, 4AI, 2AO 1 PT100, 3 FAST COUNTERS (30 KHZ), INTEGRATED 24V DC POWER SUPPLY, 64KBYTE WORKING MEMORY, FRONT CONNECTOR (2 X 40PIN) AND MICRO MEMORY CARD REQUIRED



Figure similar

General information	
Hardware product version	01
Firmware version	V2.6
Engineering with	
<ul style="list-style-type: none"> <li>Programming package</li> </ul>	STEP 7 V5.3 SP2 or higher with HW update
Supply voltage	
Rated value (DC)	
<ul style="list-style-type: none"> <li>24 V DC</li> </ul>	Yes
permissible range, lower limit (DC)	20.4 V
permissible range, upper limit (DC)	28.8 V
external protection for power supply lines (recommendation)	Miniature circuit breaker, type C; min. 2 A; miniature circuit breaker type B, min. 4 A
Load voltage L+	
<ul style="list-style-type: none"> <li>Rated value (DC)</li> <li>permissible range, lower limit (DC)</li> <li>permissible range, upper limit (DC)</li> </ul>	24 V 20.4 V 28.8 V
Digital inputs	

<b>Load voltage L+</b>	
— Rated value (DC)	24 V
— Reverse polarity protection	Yes
<b>Digital outputs</b>	
<b>Load voltage L+</b>	
— Rated value (DC)	24 V
— Reverse polarity protection	No
<b>Analog outputs</b>	
<b>Load voltage L+</b>	
— Rated value (DC)	24 V
— Reverse polarity protection	Yes
<b>Input current</b>	
Current consumption (rated value)	700 mA
Current consumption (in no-load operation), typ.	150 mA
Inrush current, typ.	11 A
$I^2t$	0.7 A <sup>2</sup> ·s
<b>Digital inputs</b>	
• from load voltage L+ (without load), max.	70 mA
<b>Digital outputs</b>	
• from load voltage L+, max.	100 mA
<b>Power loss</b>	
Power loss, typ.	14 W
<b>Memory</b>	
<b>Work memory</b>	
• integrated	64 kbyte
• expandable	No
<b>Load memory</b>	
• Plug-in (MMC)	Yes
• Plug-in (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
<b>CPU processing times</b>	
for bit operations, typ.	0.1 μs
for bit operations, max.	0.2 μs
for word operations, typ.	0.2 μs
for fixed point arithmetic, typ.	2 μs
for floating point arithmetic, typ.	3 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.	511; Number range: 1 to 511
• Size, max.	16 kbyte
<b>FB</b>	
• Number, max.	1 024; Number range: 0 to 2047
• Size, max.	16 kbyte
<b>FC</b>	
• Number, max.	1 024; Number range: 0 to 2047
• Size, max.	16 kbyte
<b>OB</b>	
• Size, max.	16 kbyte
• Number of free cycle OBs	1; OB 1
• Number of time alarm OBs	1; OB 10
• Number of delay alarm OBs	1; OB 20
• Number of cyclic interrupt OBs	1; OB 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	8
• additional within an error OB	4
<b>Counters, timers and their retentivity</b>	
<b>S7 counter</b>	
• Number	256
of which retentive without battery	
— can be set	Yes
— lower limit	0
— upper limit	255
— preset	8
<b>Retentivity</b>	
— adjustable	Yes
— lower limit	0
— upper limit	255
— preset	8
<b>Counting range</b>	
— 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
of which retentive without battery	
— adjustable	Yes
— lower limit	0
— upper limit	255
<b>Retentivity</b>	
— adjustable	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>	
retentive data area in total	all
<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.	511; from DB1 to DB511
• Size, max.	16 kbyte
• Retentivity adjustable	Yes; via non-retain property on DB
• Retentivity preset	Yes
<b>Local data</b>	
• per priority class, max.	510 byte
<b>Address area</b>	
<b>I/O address area</b>	
• Inputs	1 kbyte
• Outputs	1 kbyte
<b>Process image</b>	

• Inputs	128 byte
• Outputs	128 byte
<b>Default addresses of the integrated channels</b>	
— Digital inputs	124.0 to 126.7
— Digital outputs	124.0 to 125.7
— Analog inputs	752 to 761
— Analog outputs	752 to 755
<b>Digital channels</b>	
• Inputs	1 016
— of which central	1 016
• Outputs	1 008
— of which central	1 008
<b>Analog channels</b>	
• Inputs	253
— of which central	253
• Outputs	250
— of which central	250
<b>Hardware configuration</b>	
Number of expansion units, max.	3
<b>Number of DP masters</b>	
• integrated	none
• via CP	4
<b>Number of operable FMs and CPs (recommended)</b>	
• FM	8
• CP, PtP	8
• CP, LAN	6
<b>Rack</b>	
• Racks, max.	4
• Modules per rack, max.	8; In rack 3 max. 7
<b>Time of day</b>	
<b>Clock</b>	
• Hardware clock (real-time)	Yes
• retentive and synchronizable	Yes
• Backup time	6 wk; At 40 °C ambient temperature
• Deviation per day, max.	10 s
<b>Operating hours counter</b>	
• 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

<b>Clock synchronization</b>	
• supported	Yes
• to MPI, master	Yes
• to MPI, slave	Yes
• in AS, master	Yes
<b>Digital inputs</b>	
Number of digital inputs	24
• of which inputs usable for technological functions	12
integrated channels (DI)	24
Input characteristic curve in accordance with IEC 61131, type 1	Yes
<b>Number of simultaneously controllable inputs</b>	
<b>horizontal installation</b>	
— up to 40 °C, max.	24
— up to 60 °C, max.	12
<b>vertical installation</b>	
— up to 40 °C, max.	12
<b>Input voltage</b>	
• Rated value (DC)	24 V
• for signal "0"	-3 to +5V
• for signal "1"	+15 to +30V
<b>Input current</b>	
• for signal "1", typ.	9 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
— Rated value	3 ms
<b>for counter/technological functions</b>	
— at "0" to "1", max.	16 µs
<b>Cable length</b>	
• shielded, max.	1 000 m; 100 m for technological functions
• unshielded, max.	600 m; For technological functions: No
<b>for technological functions</b>	
— shielded, max.	100 m
— unshielded, max.	not allowed
<b>Digital outputs</b>	
Number of digital outputs	16
• of which high-speed outputs	4
integrated channels (DO)	16
Short-circuit protection	Yes; Clocked electronically

• Response threshold, typ.	1 A
Limitation of inductive shutdown voltage to	L+ (-48 V)
Controlling a digital input	Yes
<b>Switching capacity of the outputs</b>	
• on lamp load, max.	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 two outputs</b>	
• for uprating	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>Total current of the outputs (per group)</b>	
<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>	
<b>Number of analog inputs</b>	
• For voltage/current measurement	4
• For resistance/resistance thermometer measurement	1
integrated channels (AI)	4+1
permissible input voltage for current input (destruction limit), max.	5 V; Permanent

permissible input voltage for voltage input (destruction limit), max.	30 V; Permanent
permissible input current for voltage input (destruction limit), max.	0.5 mA; Permanent
permissible input current for current input (destruction limit), max.	50 mA; Permanent
Technical unit for temperature measurement adjustable	Yes; Degrees Celsius / degrees Fahrenheit / Kelvin
<b>Input ranges</b>	
• Current	Yes
• Resistance thermometer	Yes; Pt 100 / 10 MΩ
• Resistance	Yes
<b>Input ranges (rated values), voltages</b>	
• 0 to +10 V	Yes
• Input resistance (0 to 10 V)	100 kΩ
<b>Input ranges (rated values), currents</b>	
• 0 to 20 mA	Yes
• Input resistance (0 to 20 mA)	100 Ω
• -20 mA to +20 mA	Yes
• Input resistance (-20 mA to +20 mA)	100 Ω
• 4 mA to 20 mA	Yes
• Input resistance (4 mA to 20 mA)	100 Ω
<b>Input ranges (rated values), resistance thermometer</b>	
• Pt 100	Yes
• Input resistance (Pt 100)	10 MΩ
<b>Input ranges (rated values), resistors</b>	
• No-load voltage, typ.	2.5 V
• Measuring current, typ.	1.8 to 3.3 mA
• 0 to 600 ohms	Yes
• Input resistance (0 to 600 ohms)	10 MΩ
<b>Thermocouple (TC)</b>	
Temperature compensation	
— parameterizable	No
<b>Characteristic linearization</b>	
• parameterizable	Yes; by software
— for resistance thermometer	Pt 100
<b>Cable length</b>	
• shielded, max.	100 m
<b>Analog outputs</b>	
Number of analog outputs	2
integrated channels (AO)	2
Voltage output, short-circuit protection	Yes



Voltage output, short-circuit current, max.	55 mA
Current output, no-load voltage, max.	17 V
<b>Output ranges, voltage</b>	
• 0 to 10 V	Yes
• -10 V to +10 V	Yes
<b>Output ranges, current</b>	
• 0 to 20 mA	Yes
• -20 mA to +20 mA	Yes
• 4 mA to 20 mA	Yes
<b>Connection of actuators</b>	
• for voltage output two-wire connection	Yes; Without compensation of the line resistances
• for voltage output four-wire connection	No
• for current output two-wire connection	Yes
<b>Load impedance (in rated range of output)</b>	
• with voltage outputs, min.	1 k $\Omega$
• with voltage outputs, capacitive load, max.	0.1 $\mu$ F
• with current outputs, max.	300 $\Omega$
• with current outputs, inductive load, max.	0.1 mH
<b>Destruction limits against externally applied voltages and currents</b>	
• Voltages at the outputs towards MANA	16 V; Permanent
• Current, max.	50 mA; Permanent
<b>Cable length</b>	
• shielded, max.	200 m
<b>Analog value generation for the inputs</b>	
Measurement principle	Actual value encryption (successive approximation)
<b>Integration and conversion time/resolution per channel</b>	
• Resolution with overrange (bit including sign), max.	12 bit
• Integration time, parameterizable	Yes; 2,5 / 16,6 / 20 ms
• Interference voltage suppression for interference frequency f1 in Hz	400 / 60 / 50 Hz
• permissible input frequency, max.	400 Hz
• Time constant of the input filter	0.38 ms
• Basic execution time of the module (all channels released)	1 ms
<b>Analog value generation for the outputs</b>	
<b>Integration and conversion time/resolution per channel</b>	
• Resolution with overrange (bit including sign), max.	12 bit
• Conversion time (per channel)	1 ms
<b>Settling time</b>	
• for resistive load	0.6 ms

- for capacitive load
- for inductive load

1 ms  
0.5 ms

## Encoder

### Connection of signal encoders

- |   |   |
|---|---|
| • for voltage measurement                               | Yes   |
| • for current measurement as 2-wire transducer          | Yes; with external supply                         |
| • for current measurement as 4-wire transducer          | Yes   |
| • for resistance measurement with two-wire connection   | Yes; Without compensation of the line resistances |
| • for resistance measurement with three-wire connection | No  |
| • for resistance measurement with four-wire connection  | No  |

### Connectable encoders

- |   |        |
|---|--------|
| • 2-wire sensor                                       | Yes    |
| — permissible quiescent current (2-wire sensor), max. | 1.5 mA |

## Errors/accuracies

Temperature error (relative to input range), (+/-)	0.006 %/K
Crosstalk between the inputs, min.	60 dB
Repeat accuracy in steady state at 25 °C (relative to input range), (+/-)	0.06 %
Output ripple (relative to output range, bandwidth 0 to 50 kHz), (+/-)	0.1 %
Linearity error (relative to output range), (+/-)	0.15 %
Temperature error (relative to output range), (+/-)	0.01 %/K
Crosstalk between the outputs, min.	60 dB
Repeat accuracy in steady state at 25 °C (relative to output range), (+/-)	0.06 %

### Operational error limit in overall temperature range

- |  |     |
|--|-----|
| • Voltage, relative to input range, (+/-)    | 1 % |
| • Current, relative to input range, (+/-)    | 1 % |
| • Resistance, relative to input range, (+/-) | 5 % |
| • Voltage, relative to output range, (+/-)   | 1 % |
| • Current, relative to output range, (+/-)   | 1 % |

### Basic error limit (operational limit at 25 °C)

- |  |                                   |
|--|-----------------------------------|
| • Voltage, relative to input range, (+/-)                | 0.7 %; Linearity error +/- 0.06 % |
| • Current, relative to input range, (+/-)                | 0.7 %; Linearity error +/- 0.06 % |
| • Resistance, relative to input range, (+/-)             | 3 %; Linearity error +/- 0.2%     |
| • Resistance thermometer, relative to input range, (+/-) | 3 %                               |
| • Voltage, relative to output range, (+/-)               | 0.7 %                             |

• Current, relative to output range, (+/-)	0.7 %
<b>Interference voltage suppression for <math>f = n \times (f_1 \pm 1 \%)</math>, <math>f_1</math> = interference frequency</b>	
• Series mode interference (peak value of interference < rated value of input range), min.	30 dB
• Common mode interference, min.	40 dB

## Interfaces

Number of industrial Ethernet interfaces	0
Number of RS 485 interfaces	1; MPI
Number of RS 422 interfaces	0

## MPI

• Cable length, max.	50 m; without repeater
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## 1. Interface

Interface type	Integrated RS 485 interface
Physics	RS 485
Isolated	No
Power supply to interface (15 to 30 V DC), max.	200 mA

## Functionality

• MPI	Yes
• PROFIBUS DP master	No
• PROFIBUS DP slave	No
• Point-to-point connection	No

## MPI

• Number of connections	8
• Transmission rate, max.	187.5 kbit/s

## Services

— PG/OP communication	Yes
— Routing	No
— Global data communication	Yes
— S7 basic communication	Yes
— S7 communication	Yes
— S7 communication, as client	No
— S7 communication, as server	Yes

## Communication functions

PG/OP communication	Yes
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## Global data communication

• supported	Yes
• Number of GD loops, max.	4
• Number of GD packets, max.	4
• Number of GD packets, transmitter, max.	4
• Number of GD packets, receiver, max.	4
• Size of GD packets, max.	22 byte

• Size of GD packet (of which consistent), max.	22 byte
<b>S7 basic communication</b>	
• supported	Yes
• 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.	64 byte
<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
• usable for routing	No
<b>S7 message functions</b>	
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.	20
<b>Test commissioning functions</b>	
Status block	Yes
Single step	Yes
Number of breakpoints	2
<b>Status/control</b>	
• 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
<b>Forcing</b>	
• Forcing	Yes
• Forcing, variables	Inputs, outputs
• Number of variables, max.	10
<b>Diagnostic buffer</b>	
• present	Yes
• Number of entries, max.	100
<b>Interrupts/diagnostics/status information</b>	
<b>Diagnostics indication LED</b>	
• Status indicator digital input (green)	Yes
• Status indicator digital output (green)	Yes
<b>Integrated Functions</b>	
Number of counters	3; 3 channels (see "Technological Functions" manual)
Counting frequency (counter) max.	30 kHz
Frequency measurement	Yes
Number of frequency meters	3; 3 channels up to max. 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; 3 channels pulse width modulation up to max. 2.5 kHz (see "Technological Functions" manual)
Limit frequency (pulse)	2.5 kHz
<b>Potential separation</b>	
<b>Potential separation digital inputs</b>	
• Potential separation digital inputs	Yes
• between the channels	No
• between the channels and backplane bus	Yes
<b>Potential separation digital outputs</b>	
• Potential separation digital outputs	Yes
• between the channels	Yes
• between the channels, in groups of	8
• between the channels and backplane bus	Yes
<b>Potential separation analog inputs</b>	
• Potential separation analog inputs	Yes; common for analog I/O
• between the channels	No
• between the channels and backplane bus	Yes

Potential separation analog outputs	
• Potential separation analog outputs	Yes; common for analog I/O
• between the channels	No
• between the channels and backplane bus	Yes
Permissible potential difference	
between different circuits	75 V DC/60 V AC
Between the inputs and MANA (UCM)	8 V DC
between MANA and M internally (UISO)	75 V DC/60 V AC
Isolation	
Isolation tested with	600 V DC
Configuration	
Configuration software	
• STEP 7	Yes; V5.3 SP2 with HW update
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	Yes
— SCL	Yes
— GRAPH	Yes
— HiGraph®	Yes
Know-how protection	
• User program protection/password protection	Yes
Dimensions	
Width	120 mm
Height	125 mm
Depth	130 mm
Weights	
Weight, approx.	660 g
<b>last modified:</b>	03/23/2017