

Data sheet

6ES7635-2EC02-0AE3

*** SPARE PART*** SIMATIC C7-635 KEYS, COMPACT UNIT
WITH INTEGRATED COMPONENTS: S7-300 CPU314C-2 DP AND
OP170B, 24 DI, 16 DO, 5 AI, 2 AO; MICRO MEMORY CARD AND
CONNECTOR SET REQUIRED



Supply voltage

Rated value (DC)	
• 24 V DC	Yes
permissible range, lower limit (DC)	20.4 V
permissible range, upper limit (DC)	28.8 V
Load voltage L+	
• Rated value (DC)	24 V
• permissible range, lower limit (DC)	20.4 V
• permissible range, upper limit (DC)	28.8 V

Input current

Current consumption, typ.	150 mA; idling
Digital inputs	
• from load voltage L+ (without load), max.	70 mA
Digital outputs	
• from load voltage L+, max.	100 mA

Power loss

Power loss, typ.	14 W
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Memory	
Work memory	
• integrated	96 kbyte; For program and data
• expandable	No
Load memory	
• Plug-in (MMC)	Yes
• Plug-in (MMC), max.	8 Mbyte
Backup	
• present	Yes; Guaranteed by MMC (maintenance-free)
• without battery	Yes; Program and data
CPU processing times	
for bit operations, typ.	0.1 μ s
for bit operations, max.	0.2 μ s
for word operations, typ.	0.2 μ s
for fixed point arithmetic, typ.	2 μ s
for floating point arithmetic, typ.	3 μ s
CPU-blocks	
DB	
• Number, max.	511; Number range: 1 to 511
• Size, max.	16 kbyte
FB	
• Number, max.	1 024; Number range: 0 to 2047
• Size, max.	16 kbyte
FC	
• Number, max.	1 024; Number range: 0 to 2047
• Size, max.	16 kbyte
OB	
• Number, max.	see instruction list
• 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	5; OB 80, 82, 85, 86, 87
Nesting depth	
• per priority class	8
• additional within an error OB	4
Counters, timers and their retentivity	
S7 counter	

• Number	256
of which retentive without battery	
— can be set	Yes
— lower limit	0
— upper limit	255
Retentivity	
— adjustable	Yes
— preset	8
Counting range	
— lower limit	0
— upper limit	999
IEC counter	
• present	Yes
• Type	SFB
• Number	Unlimited (limited only by RAM capacity)
S7 times	
• Number	256
of which retentive without battery	
— adjustable	Yes
— lower limit	0
— upper limit	255
Retentivity	
— adjustable	Yes
— preset	No retentivity
Time range	
— lower limit	10 ms
— upper limit	9 990 s
IEC timer	
• present	Yes
• Type	SFB
• Number	Unlimited (limited only by RAM capacity)
Data areas and their retentivity	
Flag	
• 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
Data blocks	
• Number, max.	511
• Size, max.	16 kbyte
Local data	

• per priority class, max.	510 byte
Address area	
I/O address area	
• Inputs	1 kbyte
• Outputs	1 kbyte
of which distributed	
— Inputs	1 000 byte
— Outputs	1 008 byte
Process image	
• Inputs	128 byte
• Outputs	128 byte
Default addresses of the integrated channels	
— Digital inputs	124.0 to 126.7
— Digital outputs	124.0 to 125.7
— Analog inputs	752 to 761
— Analog outputs	752 to 755
Digital channels	
• Inputs	8 192
— of which central	1 016
• Outputs	8 192
— of which central	1 008
Analog channels	
• Inputs	512
— of which central	253
• Outputs	512
— of which central	250
Hardware configuration	
Number of DP masters	
• integrated	1
• via CP	4
Number of operable FMs and CPs (recommended)	
• FM	8
• CP, PtP	8
• CP, LAN	10
Rack	
• Racks, max.	4
• Modules per rack, max.	8; In rack 3 max. 7
Time of day	
Clock	
• Hardware clock (real-time)	Yes

• retentive and synchronizable	Yes
• Backup time	6 wk; At 40 °C ambient temperature
• Deviation per day, max.	10 s
Operating hours counter	
• Number	1
• Number/Number range	0
• Range of values	0 to 2 ³¹ 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
Digital inputs	
Number of digital inputs	24
• of which inputs usable for technological functions	16
Input characteristic curve in accordance with IEC 61131, type 1	Yes
Number of simultaneously controllable inputs	
horizontal installation	
— up to 40 °C, max.	24
— up to 60 °C, max.	12
vertical installation	
— up to 40 °C, max.	12
Input voltage	
• Rated value (DC)	24 V
• for signal "0"	-3 to +5V
• for signal "1"	+15 to +30V
Input current	
• for signal "1", typ.	9 mA
Input delay (for rated value of input voltage)	
for standard inputs	
— parameterizable	Yes; 0.1 / 0.3 / 3 / 15 ms
— Rated value	3 ms
for counter/technological functions	
— at "0" to "1", max.	8 µs
Cable length	
• shielded, max.	1 000 m; 50 m for technological functions
• unshielded, max.	600 m; For technological functions: No
for technological functions	

— shielded, max.	50 m
— unshielded, max.	not allowed

Digital outputs

Number of digital outputs	16
• of which high-speed outputs	4
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
Switching capacity of the outputs	
• on lamp load, max.	5 W
Load resistance range	
• lower limit	48 Ω
• upper limit	4 k Ω
Output voltage	
• for signal "1", min.	L+ (-0.8 V)
Output current	
• 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
Parallel switching of two outputs	
• for uprating	No
• for redundant control of a load	Yes
Switching frequency	
• 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
Total current of the outputs (per group)	
horizontal installation	
— up to 40 °C, max.	3 A
vertical installation	
— up to 40 °C, max.	2 A
Cable length	
• shielded, max.	1 000 m
• unshielded, max.	600 m

Analog inputs

Number of analog inputs	
• 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.	2.5 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
Input ranges	
• Current	Yes
• Resistance thermometer	Yes
• Resistance	Yes
Input ranges (rated values), voltages	
• 0 to +10 V	Yes
• Input resistance (0 to 10 V)	100 k Ω
• -10 V to +10 V	Yes
• Input resistance (-10 V to +10 V)	100 k Ω
Input ranges (rated values), currents	
• 0 to 20 mA	Yes
• Input resistance (0 to 20 mA)	50 Ω
• -20 mA to +20 mA	Yes
• Input resistance (-20 mA to +20 mA)	50 Ω
• 4 mA to 20 mA	Yes
• Input resistance (4 mA to 20 mA)	50 Ω
Input ranges (rated values), resistance thermometer	
• Pt 100	Yes
• Input resistance (Pt 100)	10 M Ω
Input ranges (rated values), resistors	
• 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 M Ω
Thermocouple (TC)	
Temperature compensation	
— parameterizable	No
Characteristic linearization	
• parameterizable	Yes; by software
— for resistance thermometer	Pt 100

Cable length	
• shielded, max.	100 m
Analog outputs	
Number of analog outputs	2
Voltage output, short-circuit protection	Yes
Voltage output, short-circuit current, max.	55 mA
Current output, no-load voltage, max.	17 V
Output ranges, voltage	
• 0 to 10 V	Yes
• -10 V to +10 V	Yes
Output ranges, current	
• 0 to 20 mA	Yes
• -20 mA to +20 mA	Yes
• 4 mA to 20 mA	Yes
Connection of actuators	
• 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
Load impedance (in rated range of output)	
• with voltage outputs, min.	1 k Ω
• with voltage outputs, capacitive load, max.	0.1 μ F
• with current outputs, max.	300 Ω
• with current outputs, inductive load, max.	0.1 mH
Destruction limits against externally applied voltages and currents	
• Voltages at the outputs towards MANA	16 V; Permanent
• Current, max.	50 mA; Permanent
Cable length	
• shielded, max.	200 m
Analog value generation	
Measurement principle	Actual value encryption (successive approximation)
Integration and conversion time/resolution per channel	
• Resolution with overrange (bit including sign), max.	12 bit
• Integration time, parameterizable	Yes; 2,5 / 16,6 / 20 ms
• permissible input frequency, max.	400 Hz
• Conversion time (per channel)	1 ms
• Time constant of the input filter	0.38 ms
• Basic execution time of the module (all channels released)	1 ms
Settling time	
• 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 %
Interference voltage suppression for $f = n \times (f_1 \pm 1 \%)$, f_1 = interference frequency	
• Series mode interference (peak value of interference < rated value of input range), min.	30 dB
• Common mode interference, min.	40 dB

Interfaces	
MPI	
• Cable length, max.	50 m; without repeater

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	12
• Transmission rate, max.	187.5 kbit/s
Services	
— PG/OP communication	Yes
— Routing	Yes
— Global data communication	Yes
— S7 basic communication	Yes
— S7 communication	Yes
— S7 communication, as client	No
— S7 communication, as server	Yes

2. Interface	
Interface type	Integrated RS 485 interface
Physics	RS 485
Isolated	Yes
Power supply to interface (15 to 30 V DC), max.	200 mA
Number of connection resources	12
Functionality	
• MPI	No
• PROFIBUS DP master	Yes
• PROFIBUS DP slave	Yes
• Point-to-point connection	No
DP master	

• Number of connections, max.	12; For PG/OP communication
• Transmission rate, max.	12 Mbit/s
• Number of DP slaves, max.	32
Services	
— PG/OP communication	Yes
— Routing	Yes
— Global data communication	No
— S7 basic communication	Yes
— S7 communication	Yes
— S7 communication, as client	No
— S7 communication, as server	Yes
— Equidistance	Yes
— SYNC/FREEZE	Yes
— Activation/deactivation of DP slaves	Yes
— Direct data exchange (slave-to-slave communication)	Yes
— DPV1	Yes
Address area	
— Inputs, max.	1 kbyte
— Outputs, max.	1 kbyte
User data per DP slave	
— Inputs, max.	244 byte
— Outputs, max.	244 byte
DP slave	
• Number of connections	12
• GSD file	The latest GSD file is available at: http://www.siemens.com/profibus-gsd
• Transmission rate, max.	12 kbit/s
• Address area, max.	32
• User data per address area, max.	32 byte
Services	
— PG/OP communication	Yes
— Routing	Yes; Only with active interface
— Global data communication	No
— S7 basic communication	Yes
— S7 communication	Yes
— Direct data exchange (slave-to-slave communication)	Yes
— DPV1	No
Transfer memory	
— Inputs	244 byte
— Outputs	244 byte

Communication functions

Global data communication

- | | |
|---|---------|
| • 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 |

S7 basic communication

- | | |
|---|--|
| • 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) |

S7 communication

- | | |
|---|-----------------------------|
| • as server | Yes |
| • as client | Yes; Via CP and loadable FB |
| • User data per job, max. | 180 kbyte; With PUT/GET |
| • User data per job (of which consistent), max. | 64 byte |

S5 compatible communication

- | | |
|-------------|-----------------------------|
| • supported | Yes; via CP and loadable FC |
|-------------|-----------------------------|

Number of connections

- | | |
|---|---------|
| • overall | 12 |
| • usable for PG communication | 11 |
| — reserved for PG communication | 1 |
| — adjustable for PG communication, min. | 1 |
| — adjustable for PG communication, max. | 11 |
| • usable for OP communication | 11 |
| — reserved for OP communication | 1 |
| — adjustable for OP communication, min. | 1 |
| — adjustable for OP communication, max. | 11 |
| • usable for S7 basic communication | 8 |
| — reserved for S7 basic communication | 8 |
| — adjustable for S7 basic communication, min. | 0 |
| — adjustable for S7 basic communication, max. | 8 |
| • usable for routing | 4; max. |

S7 message functions

- | | |
|--|--|
| Number of login stations for message functions, max. | 12; Depending on the configured connections for PG/OP and S7 basic communication |
| Process diagnostic messages | Yes |
| simultaneously active Alarm-S blocks, max. | 40 |

Test commissioning functions	
Status block	Yes
Single step	Yes
Number of breakpoints	2
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
Diagnostic buffer	
• present	Yes
• Number of entries, max.	100
Integrated Functions	
Number of counters	4; See "Technological Functions" manual
Counting frequency (counter) max.	60 kHz
Frequency measurement	Yes
Number of frequency meters	4; up to 60 kHz (see "Technological Functions" manual)
controlled positioning	Yes
integrated function blocks (closed-loop control)	PID controller (see "Technological Functions" manual)
PID controller	Yes
Number of pulse outputs	4; Pulse width modulation up to 2.5 kHz (see "Technological Functions" Manual)
Limit frequency (pulse)	2.5 kHz
Potential separation	
Potential separation digital inputs	
• Potential separation digital inputs	Yes
• between the channels	No
• between the channels and backplane bus	Yes
Potential separation digital outputs	
• Potential separation digital outputs	Yes
• between the channels	Yes
• between the channels, in groups of	8
• between the channels and backplane bus	Yes
Potential separation analog inputs	
• 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
- between the channels and backplane bus

No
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	500 V DC
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Configuration

Configuration software

- STEP 7
- Yes; V5.2 SP1 with HW update

Programming

- Command set
 - Nesting levels
 - System functions (SFC)
 - System function blocks (SFB)
- see instruction list
8
see instruction list
see instruction list

Programming language

— LAD	Yes
— FBD	Yes
— STL	Yes
— SCL	Yes
— CFC	Yes
— GRAPH	Yes
— HiGraph®	Yes

Know-how protection

- User program protection/password protection
- Yes

Dimensions

Width	260 mm
Height	273.8 mm
Depth	80 mm
Mounting cutout, width	231 mm
Mounting cutout, height	257 mm

Weights

Weight, approx.	1 500 g
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