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Data sheet 6ES7636-2EC00-0AE3

*** SPARE PART*** SIMATIC C7-636 KEYS, COMPACT UNIT WITH INTEGRATED COMPONENTS: S7-300 CPU315-2 DP AND OP270B, 24 DI, 16 DO, 5 AI, 2 AO; MICRO MEMORY CARD AND CONNECTOR SET REQUIRED

Operator control and monitoring	
Password protection	Yes
Password levels	10
Text elements	Yes
Info texts	Yes
Graphics object	Yes
Process images	Yes
Alarms	Yes; Fault messages, operating messages
Graphics object	
• Character graphics	Yes
• Pixel graphics	Yes
Process images	
• Number of process images	300
• Number of variables per image, max.	200
• Number of variables in message text, max.	8
Operating-/fault messages	
• Number of entries in operational log, max.	Message archive limited by storage medium
• Number of entries in fault message buffer, max.	Message archive limited by storage medium
Recipes	

• Number of recipes, max.	300
• Data records per recipe, max.	500
• Entries per data record, max.	1 000
Display	
Design of display	CSTN, CCFL backlit; 5.7" color (256 colors)
Resolution (pixels)	
• Horizontal image resolution	320 Pixel
• Vertical image resolution	240 Pixel
Backlighting	
• MTBF backlighting (at 25 °C)	40 000 h
Control elements	
Keyboard fonts	
• Membrane keyboard	Yes
• Function keys	
— Number of function keys	24; 18 with LED
— Number of softkeys	14
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.	450 mA; idling
Current consumption, max.	1.3 A
Inrush current, max.	3 A; 3 A for 10 ms, then 2 A for 70 ms
Power loss	
Power loss, typ.	19 W
Memory	
Micro Memory Card	Yes
Work memory	
• integrated	128 kbyte
• expandable	No
Load memory	
• Plug-in (MMC)	Yes
• Plug-in (MMC), max.	8 Mbyte
Backup	

• present	Yes; Guaranteed by MMC (maintenance-free)
• with battery	Yes; Option for the panel
• without battery	Yes; Program and data of the CPU

Battery	
Backup battery	
• Backup battery (optional)	Yes

CPU processing times	
for bit operations, typ.	0.1 µs
for word operations, typ.	0.2 µs
for fixed point arithmetic, typ.	2 µs
for floating point arithmetic, typ.	3 µs

CPU-blocks	
DB	
• Number, max.	1 023; DB 0 reserved
• Size, max.	16 kbyte
FB	
• Number, max.	2 048; see instruction list
• Size, max.	16 kbyte
FC	
• Number, max.	2 048; see instruction list
• Size, max.	16 kbyte
OB	
• Number, max.	see instruction list
• Size, max.	16 kbyte
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	256
Retentivity	
— adjustable	Yes
— preset	Z 0 to Z 7
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; Default: no retentivity
— lower limit	0
— upper limit	256
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	
retentive data area in total (incl. times, counters, flags), max.	all
Flag	
• Number, max.	2 048 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.	1 023
• Size, max.	16 kbyte
Local data	
• per priority class, max.	1 024 byte; max. 510 bytes per block

Address area	
I/O address area	
• Inputs	2 kbyte
• Outputs	2 kbyte
of which distributed	
— Inputs	2 000 byte
— Outputs	2 000 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
— Analog outputs	761
Digital channels	
• Inputs	16 384
— of which central	992
• Outputs	16 384
— of which central	992
Analog channels	
• Inputs	1 024
— of which central	248
• Outputs	1 024
— of which central	248

Hardware configuration	
Number of modules per system, max.	23
Number of DP masters	
• integrated	1
• via CP	1
Number of operable FMs and CPs (recommended)	
• FM	8
• CP, PtP	8
• CP, LAN	10
Expansion modules	
• Number of expansion modules, max.	4; max. 2 flat structure, max. 4 deep structure
Rack	
• Racks, max.	4
• Modules per rack, max.	8; Modules in subrack 0: 4 max.; modules in subracks 1 and 2: 8 max.; modules in subrack 3: 7 max.
• Number of lines, max.	4

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.	12
vertical installation	
— up to 40 °C, max.	18
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.	7 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; 100 m for technological functions
• unshielded, max.	600 m
for technological functions	
— shielded, max.	50 m; at maximum count frequency
— 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 kΩ
Output voltage	
• for signal "1", min.	L+ (-0.8 V)
Output current	
• for signal "1" rated value	0.5 A
• for signal "1" permissible range, min.	5 mA
• for signal "1" permissible range, max.	0.6 A
• for signal "1" permissible range for 0 to 40 °C, max.	0.5 A
• for signal "1" permissible range for 40 to 60 °C, max.	0.5 A; Up to 50 °C
• 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)	
all mounting positions	
— up to 40 °C, max.	3 A
— up to 60 °C, max.	2 A; Up to 50 °C
horizontal installation	
— up to 40 °C, max.	2 A
vertical installation	
— up to 40 °C, max.	3 A
Cable length	
• shielded, max.	1 000 m
• unshielded, max.	600 m
Analog inputs	
Number of analog inputs	4

• For voltage/current measurement	4
• For resistance/resistance thermometer measurement	1
integrated channels (AI)	4; + 1 AI
permissible input voltage for current input (destruction limit), max.	2.5 V; max. 2.5 V permanent; max. 24 V for short time
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	
• Voltage	Yes
• Current	Yes
• Resistance thermometer	Yes
• Resistance	Yes
Input ranges (rated values), voltages	
• 0 to +10 V	Yes
• -10 V to +10 V	Yes
• Input resistance (-10 V to +10 V)	100 kΩ
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 MΩ
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 MΩ
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 kΩ
• with voltage outputs, capacitive load, max.	0.1 µF
• 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	Measurement principle momentary value encoding (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	1 ms
• for inductive load	0.5 ms

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

Errors/accuracies	
Linearity error (relative to input range), (+/-)	0.06 %
Temperature error (relative to input range), (+/-)	0.006 %/K
Crosstalk between the inputs, min.	50 dB; at Ucm = 0 V
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 %
• Current, relative to input range, (+/-)	0.7 %
• Resistance, relative to input range, (+/-)	3 %
• 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 x (f1 +/- 1 %), f1 = interference frequency	
• Series mode interference (peak value of interference < rated value of input range), min.	30 dB
• Common mode interference, min.	40 dB

Interfaces	
Number of printer interfaces	1; serial
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
MPI	
• Number of connections	16
• 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	Yes; Via CP and loadable FB
— 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	16
Functionality	
• MPI	No
• PROFIBUS DP master	Yes
• PROFIBUS DP slave	Yes
DP master	
• Number of connections, max.	16; For PG/OP communication
• Transmission rate, max.	12 Mbit/s
• Number of DP slaves, max.	125
Services	
— PG/OP communication	Yes
— Routing	Yes
— Global data communication	No
— S7 basic communication	No
— S7 communication	No

— S7 communication, as client	No
— S7 communication, as server	No
— Equidistance	Yes
— SYNC/FREEZE	Yes
— Activation/deactivation of DP slaves	Yes
— Direct data exchange (slave-to-slave communication)	Yes
Address area	
— Inputs, max.	244 byte
— Outputs, max.	244 byte
DP slave	
• Number of connections	16
• Transmission rate, max.	12 Mbit/s
• Address area, max.	32
• User data per address area, max.	32 byte
Services	
— PG/OP communication	Yes
— Routing	Yes
— Global data communication	No
— S7 basic communication	No
— S7 communication	No
— Direct data exchange (slave-to-slave communication)	Yes
Transfer memory	
— Inputs	244 byte
— Outputs	244 byte

Communication functions	
Global data communication	
• 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
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 byte; With PUT/GET

• User data per job (of which consistent), max.	64 byte
S5 compatible communication	
• supported	Yes; via CP and loadable FC
Standard communication (FMS)	
• supported	No
Number of connections	
• overall	16
• usable for PG communication	15
— reserved for PG communication	1
— adjustable for PG communication, min.	1
— adjustable for PG communication, max.	15
• usable for OP communication	15
— reserved for OP communication	1
— adjustable for OP communication, min.	1
— adjustable for OP communication, max.	15
• usable for S7 basic communication	12
— reserved for S7 basic communication	12
— adjustable for S7 basic communication, min.	0
— adjustable for S7 basic communication, max.	12

S7 message functions	
Number of login stations for message functions, max.	16
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
— adjustable	No

Interrupts/diagnostics/status information	
Alarms	Yes; No interrupts when used as standard I/O; when using the technological functions, see the manual S7-300 Programmable Controller, CPU31xC Technological Functions
Diagnostic functions	No; No interrupts when used as standard I/O; when using the technological functions, see the manual S7-300 Programmable Controller, CPU31xC Technological Functions

Integrated Functions	
Number of counters	4; 4 channels in total
Counting frequency (counter) max.	60 kHz
Frequency measurement	Yes
Number of frequency meters	4; 4 channels in total
controlled positioning	Yes
integrated function blocks (closed-loop control)	Yes
PID controller	Yes
Number of pulse outputs	4; 4 channels in total
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
• between the channels	No
• between the channels and backplane bus	Yes
Potential separation analog outputs	
• Potential separation analog outputs	Yes
• 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	500 V DC

EMC	
Interference immunity against discharge of static electricity	
• Interference immunity against discharge of static electricity acc. to IEC 61000-4-2	Yes; ±6 kV contact discharge acc. to IEC 61000-4-2, ESD; ±8 kV air discharge acc. to IEC 61000-4-2, ESD
Interference immunity against high-frequency electromagnetic fields	
• Interference immunity against high-frequency radiation acc. to IEC 61000-4-3	Yes; 10 V/m, with 80% amplitude modulation at 1 kHz, 80 MHz to 1 GHz (to IEC 61000-4-3); 10 V/m, pulse-modulated 50% duty cycle at 900 MHz and 1.89 GHz (to IEC61000-4-3)
Interference immunity to cable-borne interference	
• Interference immunity on supply lines acc. to IEC 61000-4-4	Yes; ±2 kV acc. to IEC 61000-4-4, burst; surge measurements with additional protective elements
• Interference immunity on signal cables acc. to IEC 61000-4-4	Yes
Interference immunity against voltage surge	
• on the supply lines acc. to IEC 61000-4-5	Yes; ±1 kV acc. to IEC 61000-4-5, µs pulse/line to line; ±2 kV acc. to IEC 61000-4-5, µs pulse/line to ground
Interference immunity against conducted variable disturbance induced by high-frequency fields	
• Interference immunity against high-frequency radiation acc. to IEC 61000-4-6	Yes; 10 V/m, with 80% amplitude modulation at 1 kHz
Emission of radio interference acc. to EN 55 011	
• Limit class A, for use in industrial areas	Yes
Degree and class of protection	
Degree of protection acc. to EN 60529	
• IP20	Yes; Housing
• IP65	Yes; Front
Standards, approvals, certificates	
CSA approval	Yes
UL approval	Yes
FM approval	Yes
Ambient conditions	
Environmental conditions	Not suitable for open-air use
Ambient temperature during operation	
• 45 degree installation, min.	0 °C
• 45 degree installation, max.	45 °C
• horizontal installation, min.	0 °C
• horizontal installation, max.	40 °C
• vertical installation, min.	0 °C
• vertical installation, max.	50 °C
Air pressure acc. to IEC 60068-2-13	
• Operation, min.	795 hPa
• Operation, max.	1 080 hPa
• Storage/transport, min.	660 hPa

• Storage/transport, max.	1 080 hPa
• permissible range, lower limit	795 hPa
• permissible range, upper limit	1 080 hPa
Relative humidity	
• Operation, min.	5 %
• Operation, max.	85 %; at <40 °C (no condensation)
• Storage/transport, max.	85 %; at <40 °C (no condensation)
Vibrations	
• Operation, tested according to IEC 60068-2-6	Yes; Operation 10 Hz to 58 Hz, amplitude 0.075 mm; 58 Hz to 150 Hz, acceleration 9.8 m/s²
• Transport, tested acc. to IEC 60068-2-6	Yes; 5 to 9 Hz: Amplitude 3.5 mm; 9 to 500 Hz: Acceleration 9.8 m/s2
Shock test	
• tested according to IEC 60068-2-29	Yes; checked according to IEC 60068-2-29; operation: Half-sine: 150 m/s² (15 g), 11 ms, 18 shocks; storage/transport: 250 m/s² (25 g), 6 ms, 1 000 shocks
Shock testing	
• Operation, tested according to IEC 60068-2-29	Yes; Half-sine: 150 m/s2 (15 g), 11 ms, 18 shocks
• Storage/transport, tested acc. to IEC 60068-2-29	Yes; 250 m/s² (25 g), 6 ms, 1 000 shocks
Operating systems	
pre-installed operating system	
• Windows CE	Yes
Configuration	
Configuration software	
• STEP 7	Yes; V5.2 SP1 HSP or higher
• ProTool	Yes; as of V6.0 SP2 with Setup C7-636
• ProTool/Lite	Yes; Version 6.0 SP2 or higher and Setup C7-636
• ProTool/Pro	Yes; Version 6.0 SP2 or higher and Setup C7-636
• WinCC flexible Compact	Yes
• WinCC flexible Standard	Yes
• WinCC flexible Advanced	Yes
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

— CFC	Yes
— GRAPH	Yes
— HiGraph®	Yes
Know-how protection	
• User program protection/password protection	Yes
Languages	
Online languages	
• Number of online/runtime languages	5
Dimensions	
Width	260 mm
Height	274 mm
Depth	80 mm
Mounting cutout, width	231 mm; Tolerance: +1 mm
Mounting cutout, height	257 mm; Tolerance: +1 mm
Weights	
Weight, approx.	1 750 g

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