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Data sheet 6ES7677-2SD42-0GB0

SIMATIC ET 200SP Open Controller, CPU 1515SP PC3 F consisting of: basic unit (6ES7677-2DD40-0AA0) 8 GB RAM, 1x slot SSD, 3x USB 3.1; 1x DisplayPort; 1 x connection for ET 200SP bus adapter PROFINET IRT, 1 x Ethernet/PROFINET RT can be switched over for OS/CPU, 1 x Ethernet, max. 1000 Mbps; SSD (6ES7678-2BS00-2AA0) preinstalled: Windows 10 IoT Enterprise LTSC 2021 64-bit and S7-1500 Software Controller CPU 1505SP F V40.0; license package: (6ES7678-2BS10-2AA0) OS and CPU

General information	
Product type designation	CPU 1515SP PC3 F
Firmware version	V40.0
Product function	
● I&M data	Yes; I&M0 to I&M3
● Isochronous mode	Yes; only with PROFINET; with minimum OB 6x cycle of 500 µs
● SysLog	Yes
Engineering with	
● STEP 7 TIA Portal configurable/integrated from version	V20 or higher
Installed software	
● Visualization	No
● Control	S7-1500 Software Controller CPU 1505SP F
Configuration control	
via dataset	Yes
Control elements	
Mode selector switch	1
Supply voltage	
Rated value (DC)	24 V
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Input current	
Current consumption (rated value)	0.9 A; Full processor load, incl. ET 200SP modules and using USB
Current consumption (in no-load operation), typ.	0.6 A
Current consumption, max.	2.4 A
I^2t	0.3 $A^2 \cdot s$; with starting current inrush
Power	
Active power input, max.	43 W; incl. ET 200SP modules and using USB
Infeed power to the backplane bus	8.75 W
Power loss	
Power loss, typ.	15 W
Processor	
Processor type	Intel Atom x6416RE, 1,7 Ghz, 4 Cores
Storage	
Type of memory	DDR4L
Main memory	8 GB RAM
CFast memory card	No
SIMATIC memory card required	No; Use of the PC mass storage
Work memory	
● integrated (for program)	4.5 Mbyte
● integrated (for data)	10 Mbyte
● integrated (for CPU function library of CPU Runtime)	20 Mbyte
Load memory	
● integrated (on PC mass storage)	320 Mbyte
Backup	

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● with UPS	Yes; all memory areas declared retentive
● with non-volatile memory	Yes
CPU-blocks	
Number of elements (total)	8 000; In addition to blocks such as DBs, FBs and FCs, UDTs, global constants, etc. are also regarded as elements
DB	
● Number, max.	7 999; Number range: 1 to 65535
● Size, max.	10 Mbyte; For DBs with absolute addressing, the max. size is 64 KB
FB	
● Number, max.	7 998; Number range: 1 to 65535
● Size, max.	1 024 kbyte
FC	
● Number, max.	7 999; Number range: 1 to 65535
● Size, max.	1 024 kbyte
OB	
● Size, max.	1 024 kbyte
● Number of free cycle OBs	100
● Number of time alarm OBs	20
● Number of delay alarm OBs	20
● Number of cyclic interrupt OBs	20
● Number of process alarm OBs	50
● Number of DPV1 alarm OBs	3
● Number of isochronous mode OBs	1
● Number of technology synchronous alarm OBs	2
● Number of startup OBs	100
● Number of asynchronous error OBs	4
● Number of synchronous error OBs	2
● Number of diagnostic alarm OBs	1
Nesting depth	
● per priority class	24; Up to 8 possible for F-blocks
Counters, timers and their retentivity	
S7 counter	
● Number	2 048
Retentivity	
— adjustable	Yes
IEC counter	
● Number	Any (only limited by the main memory)
Retentivity	
— adjustable	Yes
S7 timer	
● Number	2 048
Retentivity	
— adjustable	Yes
IEC timer	
● Number	Any (only limited by the main memory)
Retentivity	
— can be set	Yes
Data areas and their retentivity	
Retentive data area (incl. timers, counters, flags), max.	410 kbyte
Extended retentive data area (incl. timers, counters, flags), max.	5 Mbyte; When using PC mass storage for retentive data
Flag	
● Size, max.	16 kbyte
● Number of clock memories	8; 8 clock memory bit, grouped into one clock memory byte
Data blocks	
● Retentivity adjustable	Yes
● Retentivity preset	No
Local data	
● per priority class, max.	64 kbyte; max. 16 KB per block
Address area	

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Number of IO modules	8 192; max. number of modules / submodules
I/O address area	
● Inputs	32 kbyte; All inputs are in the process image
● Outputs	32 kbyte; All outputs are in the process image
Subprocess images	
● Number of subprocess images, max.	32
Hardware configuration	
Number of distributed IO systems	20
Number of IO Controllers	
● via PC interfaces	2
Rack	
● Modules per rack, max.	64; CPU 1515SP PC + 64 modules + server module
● Quantity of operable ET 200SP modules, max.	64
● Quantity of operable ET 200AL modules, max.	16
● Number of lines, max.	1
PtP CM	
● Number of PtP CMs	the number of connectable PtP CMs is only limited by the number of available slots
Time of day	
Clock	
● Type	Hardware clock
● Hardware clock (real-time)	Yes; Resolution: 1 s
● Backup time	6 wk; At 40 °C ambient temperature, typically
● Deviation per day, max.	10 s; Typ.: 2 s
Clock synchronization	
● supported	Yes
● on Ethernet via NTP	Yes
● on Windows clock, device	Yes
Interfaces	
Number of industrial Ethernet interfaces	3
Number of PROFINET interfaces	2
Number of PROFIBUS interfaces	0
Number of RS 485 interfaces	0
Number of USB interfaces	3; 3x USB 3.1 Gen1 type A
Video interfaces	
● Graphics interface	1x DisplayPort
1. Interface	
Interface type	PROFINET
automatic detection of transmission rate	Yes
Autonegotiation	Yes
Autocrossing	Yes
Number of connections	88
Interface types	
● RJ 45 (Ethernet)	Yes; X1 P1 and X1 P2 via BusAdapter BA 2x RJ45
— Transmission rate, max.	100 Mbit/s
● Number of ports	2; via BusAdapter
● integrated switch	Yes
● BusAdapter (PROFINET)	Yes; compatible BusAdapters: BA 2x RJ45, BA 2x M12, BA 2x FC
Protocols	
● IP protocol	Yes; IPv4
● PROFINET IO Controller	Yes
● PROFINET IO Device	Yes
● SIMATIC communication	Yes
● Open IE communication	Yes; Optionally also encrypted
● Web server	Yes
● Media redundancy	Yes
PROFINET IO Controller	
Services	
— Isochronous mode	Yes

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— Direct data exchange	Yes; Requirement: IRT and isochronous mode (MRPD optional)
— shortest clock pulse	500 µs
— IRT	Yes
— PROFIenergy	Yes; per user program
— Prioritized startup	Yes; Max. 32 PROFINET devices
— Number of connectable IO Devices, max.	128
— Of which IO devices with IRT, max.	64
— of which in line, max.	64
— Number of connectable IO Devices for RT, max.	128
— of which in line, max.	128
— Number of IO Devices that can be simultaneously activated/deactivated, max.	8; in total across all interfaces
— IO Devices changing during operation (partner ports), supported	Yes
— Number of IO Devices per tool, max.	8
— Updating times	The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data
— PROFINET Security Class	1
Update time for IRT	
— for send cycle of 500 µs	500 µs to 8 ms
— for send cycle of 1 ms	1 ms to 16 ms
— for send cycle of 2 ms	2 ms to 32 ms
— for send cycle of 4 ms	4 ms to 64 ms
— With IRT and parameterization of "odd" send cycles	Update time = set "odd" send clock (any multiple of 125 µs: 625 µs ... 3 875 µs) minimum cycle time start from 500 µs
Update time for RT	
— for send cycle of 500 µs	500 µs to 256 ms
— for send cycle of 1 ms	1 ms to 512 ms
— for send cycle of 2 ms	2 ms to 512 ms
— for send cycle of 4 ms	4 ms to 512 ms
Address area	
— Inputs, max.	8 kbyte
— Outputs, max.	8 kbyte
PROFINET IO Device	
Services	
— Isochronous mode	No
— IRT	Yes
— PROFIenergy	Yes; per user program
— Shared device	Yes
— Number of IO Controllers with shared device, max.	4
— activation/deactivation of I-devices	Yes; per user program
— Asset management record	Yes; per user program
— PROFINET Security Class	SNMP Configuration and DCP Read Only
2. Interface	
Interface type	Onboard PROFINET / IE interface X10
automatic detection of transmission rate	Yes
Autonegotiation	Yes
Autocrossing	Yes
Interface types	
● RJ 45 (Ethernet)	Yes; Integrated
— Transmission rate, max.	1 000 Mbit/s; 100 Mbit/s, if PROFINET IO-Controller configured
● Number of ports	1
Protocols	
● IP protocol	Yes; IPv4
● PROFINET IO Controller	Yes
● PROFINET IO Device	Yes
● SIMATIC communication	Yes
● Open IE communication	Yes; Optionally also encrypted
● Web server	Yes

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● Media redundancy	No
PROFINET IO Controller	
Services	
— Isochronous mode	No
— Direct data exchange	No
— IRT	No
— PROFIenergy	Yes; per user program
— Prioritized startup	No
— Number of connectable IO Devices, max.	32
— Number of connectable IO Devices for RT, max.	32
— of which in line, max.	32
— Number of IO Devices that can be simultaneously activated/deactivated, max.	8; in total across all interfaces
— Number of IO Devices per tool, max.	8
— Updating times	The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data
— PROFINET Security Class	1
Update time for RT	
— for send cycle of 1 ms	1 ms to 512 ms
PROFINET IO Device	
Services	
— Isochronous mode	No
— IRT	No
— PROFIenergy	Yes; per user program
— Prioritized startup	No
— Shared device	Yes
— Number of IO Controllers with shared device, max.	4
— activation/deactivation of I-devices	Yes; per user program
— Asset management record	Yes; per user program
— PROFINET Security Class	SNMP Configuration and DCP Read Only
3. Interface	
Interface type	Integrated Ethernet interface
Interface types	
● RJ 45 (Ethernet)	Yes; X20
— Transmission rate, max.	1 000 Mbit/s
● Number of ports	1
Protocols	
PROFIsafe	Yes
Number of connections	
● Number of connections, max.	88
● Number of connections reserved for ES/HMI/web	10
● Number of S7 routing paths	16
Redundancy mode	
● H-Sync forwarding	Yes
Media redundancy	
— Media redundancy	Yes; only via BusAdapter
— MRP	Yes; MRP Automanager according to IEC 62439-2 Edition 2.0, MRP Manager; MRP Client
— MRP interconnection, supported	Yes; as MRP ring node according to IEC 62439-2 Edition 3.0
— MRPD	Yes; Requirement: IRT
— Switchover time on line break, typ.	200 ms; For MRP, bumpless for MRPD
— Number of stations in the ring, max.	50
SIMATIC communication	
● PG/OP communication	Yes; encryption with TLS V1.3 pre-selected
● S7 routing	Yes
● S7 communication, as server	Yes
● S7 communication, as client	Yes
● User data per job, max.	See online help (S7 communication, user data size)
Open IE communication	

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● TCP/IP	Yes
— Data length, max.	64 kbyte
— several passive connections per port, supported	Yes
● ISO-on-TCP (RFC1006)	Yes
— Data length, max.	64 kbyte
● UDP	Yes
— Data length, max.	2 kbyte; 1 472 bytes for UDP broadcast
— UDP multicast	Yes; max. 78 multicast circuits
● DHCP	Yes
● DNS	Yes
● SNMP	Yes
● DCP	Yes
● LLDP	Yes
● Encryption	Yes; Optional
Web server	
● HTTP	Yes; Standard and user pages
● HTTPS	Yes; Standard and user pages
● web API	Yes
— Number of sessions, max.	100
— number of simultaneous HTTP calls, max.	4
— HTTP request body, max.	131 072 byte
OPC UA	
● Runtime license required	Yes; "Medium" license required
● OPC UA Client	Yes; Data Access (registered Read/Write), Method Call
— Application authentication	Yes
— Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
— User authentication	"anonymous" or by user name & password
— Number of connections, max.	10
— Number of nodes of the client interfaces, recommended max.	2 000
— Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/OPC_U max.	300
— Number of elements for one call of OPC_UA_NameSpaceGetIndexList, max.	20
— Number of elements for one call of OPC_UA_MethodGetHandleList, max.	100
— Number of simultaneous calls of the client instructions for session management, per connection, max.	1
— Number of simultaneous calls of the client instructions for data access, per connection, max.	5
— Number of registerable nodes, max.	5 000
— Number of registerable method calls of OPC_UA_MethodCall, max.	100
— Number of inputs/outputs when calling OPC_UA_MethodCall, max.	20
● OPC UA Server	Yes; data access (read, write, subscribe), method call, alarms & condition (A&C), custom address space, role-based access control
— Application authentication	Yes
— Security policies	available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256, Aes128Sha256RsaOaep, Aes256Sha256RsaPss
— User authentication	"anonymous" or by user name & password
— GDS support (certificate management)	Yes
— Number of sessions, max.	48
— Number of accessible variables, max.	100 000
— Number of registerable nodes, max.	20 000
— Number of subscriptions per session, max.	50
— Sampling interval, min.	100 ms
— Publishing interval, min.	100 ms
— Number of server methods, max.	50; max. 20 concurrently running jobs each for asynchronous instructions OPC_UA_ServerMethodPre and OPC_UA_ServerMethodPost

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— Number of inputs/outputs per server method, max.	20
— Number of monitored items, recommended max.	4 000; for 1 s sampling interval and 1 s send interval
— Number of server interfaces, max.	10 of each "Server interfaces" / "Companion specification" type and 20 of the type "Reference namespace"
— Number of nodes for user-defined server interfaces, max.	30 000
● Alarms and Conditions	Yes
— Number of program alarms	200
— Number of alarms for system diagnostics	100
Further protocols	
● MODBUS	Yes; MODBUS TCP
S7 message functions	
Number of login stations for message functions, max.	32
Program alarms	Yes
Number of configurable program messages, max.	10 000; Program messages are generated by the "Program_Alarm" block, ProDiag or GRAPH
Number of simultaneously active program alarms	1 000
● Number of program alarms	1 000
● Number of alarms for system diagnostics	200
● Number of alarms for motion technology objects	160
Test commissioning functions	
Joint commission (Team Engineering)	Yes; Parallel online access possible for up to 10 engineering systems
Status block	Yes; Up to 8 simultaneously (in total across all ES clients)
Single step	Yes
Number of breakpoints	8
Profiling	Yes
Status/control	
● Status/control variable	Yes
● Variables	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters
● Number of variables, max.	
— of which status variables, max.	200; per job
— of which control variables, max.	200; per job
Forcing	
● Forcing	Yes
● Forcing, variables	Peripheral inputs/outputs
● Number of variables, max.	200
Diagnostic buffer	
● present	Yes
● Number of entries, max.	1 000
— of which powerfail-proof	300
Traces	
● Number of configurable Traces	4
● Memory size per trace, max.	512 kbyte
Interrupts/diagnostics/status information	
Diagnostics indication LED	
● RUN/STOP LED	Yes
● ERROR LED	Yes
● MAINT LED	Yes
● Monitoring of the supply voltage (PWR-LED)	Yes
● Connection display LINK TX/RX	Yes
Supported technology objects	
Motion Control	Yes; Note: The number of technology objects affects the cycle time of the PLC program; selection guide via the TIA Selection Tool
● Number of available Motion Control resources for technology objects	6 000
● Required Motion Control resources	
— per speed-controlled axis	40
— per positioning axis	80
— per synchronous axis	160
— per external encoder	80

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— per output cam	20
— per cam track	160
— per probe	40
● Positioning axis	
— Number of positioning axes at motion control cycle of 4 ms (typical value)	35
— Number of positioning axes at motion control cycle of 8 ms (typical value)	75
Controller	
● PID_Compact	Yes; Universal PID controller with integrated optimization
● PID_3Step	Yes; PID controller with integrated optimization for valves
● PID-Temp	Yes; PID controller with integrated optimization for temperature
Counting and measuring	
● High-speed counter	Yes
Standards, approvals, certificates	
CE mark	Yes
CSA approval	No
cULus	Yes
FM approval	No
RCM (formerly C-TICK)	No
Highest safety class achievable in safety mode	
● Performance level according to ISO 13849-1	PLe
● SIL acc. to IEC 61508	SIL 3
Probability of failure (for service life of 20 years and repair time of 100 hours)	
— Low demand mode: PFDavg in accordance with SIL3	< 2.00E-05
— High demand/continuous mode: PFH in accordance with SIL3	< 1.00E-09 1/h
Ambient conditions	
Ambient temperature during operation	
● horizontal installation, min.	-30 °C; No condensation
● horizontal installation, max.	55 °C; from 50 °C with max. 32 ET 200SP modules and 3x 300 mA USB load, M.2 SATA card max. 10 % load, no 3D graphics, no power supply of additional devices via power plug
● vertical installation, min.	-30 °C; No condensation
● vertical installation, max.	45 °C; from 40 °C with max. 32 ET 200SP modules and 3x 300 mA USB load, M.2 SATA card max. 10 % load, no 3D graphics, no power supply of additional devices via power plug
Ambient temperature during storage/transportation	
● min.	-40 °C
● max.	70 °C
Altitude during operation relating to sea level	
● Installation altitude above sea level, max.	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
Vibrations	
● Operation, tested according to IEC 60068-2-6	Yes
● Transport, tested acc. to IEC 60068-2-6	Yes
Shock testing	
● tested according to IEC 60068-2-6	Yes
● tested according to IEC 60068-2-27	Yes
● tested according to IEC 60068-2-29	Yes
● Storage/transport, tested acc. to IEC 60068-2-27	Yes
Operating systems	
pre-installed operating system	Windows 10 IoT Enterprise 2021 LTSC
Configuration	
Programming	
Programming language	
— LAD	Yes; incl. failsafe
— FBD	Yes; incl. failsafe
— STL	Yes
— SCL	Yes
— CFC	Yes; either CFC or failsafe functionality

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— GRAPH	Yes
Know-how protection	
● User program protection/password protection	Yes
● Copy protection	Yes
● Block protection	Yes
Access protection	
● protection of confidential configuration data	Yes
● Protection level: Write protection	Yes
● Protection level: Read/write protection	Yes
● Protection level: Write protection for Failsafe	Yes
● Protection level: Complete protection	Yes
● User administration	Yes; device-wide and centralized
● Number of users	100
● Number of groups	100
● Number of roles	50
Cycle time monitoring	
● lower limit	adjustable minimum cycle time
● upper limit	adjustable maximum cycle time
Open Development interfaces	
● Size of ODK SO file, max.	5.8 Mbyte
Dimensions	
Width	160 mm
Height	117 mm
Depth	75 mm
Weights	
Weight, approx.	0.83 kg

Classifications

	Version	Classification
eClass	16	27-24-26-07
eClass	14	27-24-26-07
eClass	12	27-24-26-07
eClass	9.1	27-24-26-07
eClass	9	27-24-26-07
eClass	8	27-24-26-07
eClass	7.1	27-24-26-07
eClass	6	27-24-26-07
ETIM	10	EC001603
ETIM	9	EC001603
ETIM	8	EC001603
ETIM	7	EC001603

Approvals / Certificates

General Product Approval

Miscellaneous | Manufacturer Declaration | RCM | China RoHS | CE EG-Konf. | UKCA

Functional Saftey	Environment
TUEV	EPD

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