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Data sheet 6ES7677-2WB42-0GB0



SIMATIC ET 200SP Open Controller, CPU 1515SP PC2 TF, 8 GB RAM (basic device 6ES76772DB400AA0), 128 GB CFast with Windows 10 IoT Enterprise 64-bit and S7-1500 Failsafe Software Controller CPU 1505SP TF preinstalled, interfaces: 1x slot CFast, 1x slot SD/MMC, 1x connection for ET 200SP BusAdapter PROFINET, 1x 10/100/1000 Mbps Ethernet, 2x USB 3.0; 2x USB 2.0, 1x DisplayPort, documentation on CFast, restore image on CFast

General information	
Product type designation	CPU 1515SP PC2 TF
HW functional status	from FS04
Firmware version	V21.9
Engineering with	
● STEP 7 TIA Portal configurable/integrated from version	V17
Installed software	
● Visualization	No
● Control	S7-1500 Software Controller CPU 1505SP TF
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
Mains buffering	
● Mains/voltage failure stored energy time	5 ms
Input current	
Current consumption (rated value)	1.5 A; Full processor load, incl. ET 200SP modules and using USB
Current consumption (in no-load operation), typ.	0.5 A
Current consumption, max.	2.9 A
I^2t	0.426 $A^2 \cdot s$; 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.	16 W
Processor	
Processor type	Intel Atom E3940, 1.6 GHz, 4 cores
Memory	
Type of memory	DDR3L
Main memory	8 GB RAM
CFast memory card	Yes; 128 GB flash memory
SIMATIC memory card required	No
Work memory	
● integrated (for program)	1.5 Mbyte
● integrated (for data)	5 Mbyte

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● integrated (for CPU function library of CPU Runtime)	20 Mbyte
Load memory	
● integrated (on PC mass storage)	320 Mbyte
Backup	
● with UPS	Yes; all memory areas declared retentive
● with non-volatile memory	Yes
CPU processing times	
for bit operations, typ.	10 ns
for word operations, typ.	12 ns
for fixed point arithmetic, typ.	16 ns
for floating point arithmetic, typ.	64 ns
CPU-blocks	
Number of elements (total)	6 000; In addition to blocks such as DBs, FBs and FCs, UDTs, global constants, etc. are also regarded as elements
DB	
● Number, max.	5 999; Number range: 1 to 65535
● Size, max.	5 Mbyte
FB	
● Number, max.	5 998; Number range: 1 to 65535
● Size, max.	1 024 kbyte
FC	
● Number, max.	5 999; 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 times	
● Number	2 048
Retentivity	
— adjustable	Yes
IEC timer	
● Number	Any (only limited by the main memory)
Retentivity	
— adjustable	Yes
Data areas and their retentivity	
Retentive data area (incl. timers, counters, flags), max.	410 kbyte; For storage in NVRAM; for storage in mass storage 5 242 020 bytes
Flag	
● Size, max.	16 kbyte
● Number of clock memories	8; 8 clock memory bit, grouped into one clock memory byte

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Data blocks	
● Retentivity adjustable	Yes
● Retentivity preset	No
Local data	
● per priority class, max.	64 kbyte; max. 16 KB per block
Address area	
Number of IO modules	8 192
I/O address area	
● Inputs	32 kbyte; All inputs are in the process image
● Outputs	32 kbyte; All outputs are in the process image
of which per assigned PC interface	
— Inputs (volume)	8 kbyte
— Outputs (volume)	8 kbyte
Subprocess images	
● Number of subprocess images, max.	32
Hardware configuration	
Integrated power supply	Yes
Number of distributed IO systems	20
Number of DP masters	
● Via CM	1
Number of IO Controllers	
● via PC interfaces	1
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
● to DP, master	Yes
● on Ethernet via NTP	Yes
● on Windows clock, slave	Yes
Interfaces	
Number of industrial Ethernet interfaces	2
Number of PROFINET interfaces	1
Number of PROFIBUS interfaces	1
Number of RS 485 interfaces	1; Via CM DP module
Number of USB interfaces	4; 2x USB 2.0, 2x USB 3.0 on front side
Number of SD card slots	1
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; Via BusAdapter BA 2x RJ45
— Transmission rate, max.	100 Mbit/s
— Industrial Ethernet status LED	Yes
● Number of ports	2

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● integrated switch	Yes
● BusAdapter (PROFINET)	Yes; Compatible BusAdapter: BA 2x RJ45, BA 2x FC, BA 2x SCRJ (from FS03, V2.2), BA SCRJ / RJ45 (from FS03, V3.1), BA SCRJ / FC (from FS03, V3.1), BA 2x LC (from FS03, V3.3), BA LC / RJ45 (from FS03, V3.3), BA LC / FC (from FS03, V3.3)
Protocols	
● PROFINET IO Controller	Yes
● PROFINET IO Device	Yes
● SIMATIC communication	Yes
● Open IE communication	Yes
● Web server	Yes
PROFINET IO Controller	
Services	
— Isochronous mode	Yes
— shortest clock pulse	500 µs
— IRT	Yes
— PROFIenergy	Yes
— Prioritized startup	Yes; max. 32 PROFINET devices; if you want to use the "Prioritized startup" functionality in STEP 7 for the PROFINET interface of the CPU, the CPU and the device must be separated by means of a switch (e.g. SCALANCE)
— 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
— 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
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: 375 µs, 625 µs ... 3 875 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
— shortest clock pulse	500 µs
— IRT	Yes
— PROFIenergy	Yes
— Prioritized startup	Yes
— Shared device	Yes
— Number of IO Controllers with shared device, max.	4
— Asset management record	Yes
2. Interface	
Interface type	Integrated Ethernet interface
automatic detection of transmission rate	Yes
Autonegotiation	Yes
Autocrossing	Yes
Interface types	

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● RJ 45 (Ethernet)	Yes; Integrated
— Transmission rate, max.	1 000 Mbit/s
— Industrial Ethernet status LED	No
● Number of ports	1
3. Interface	
Interface type	PROFIBUS with CM DP
Number of connections	44
Interface types	
● RS 485	Yes
Protocols	
● PROFIBUS DP master	Yes
● PROFIBUS DP slave	Yes
● SIMATIC communication	Yes
PROFIBUS DP master	
● Number of DP slaves, max.	125
Services	
— Equidistance	No
— Isochronous mode	No
Address area	
— Inputs, max.	8 kbyte
— Outputs, max.	8 kbyte
Interface types	
RS 485	
● Transmission rate, max.	12 Mbit/s
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	
Media redundancy	
— Switchover time on line break, typ.	200 ms
— Number of stations in the ring, max.	50
SIMATIC communication	
● PG/OP communication	Yes
● S7 routing	Yes
● S7 communication, as server	Yes
● S7 communication, as client	Yes
● User data per job, max.	64 kbyte; BSEND/BRCV: 64 KB; PUT/GET: 960 bytes
Open IE communication	
● TCP/IP	Yes
— Data length, max.	64 kbyte
● ISO-on-TCP (RFC1006)	Yes
— Data length, max.	64 kbyte
● UDP	Yes
— Data length, max.	1 472 kbyte
● SNMP	Yes
● DCP	Yes
● LLDP	Yes
Web server	
● HTTP	Yes; Via Windows and PROFINET interface
● HTTPS	Yes; Via Windows and PROFINET interface
OPC UA	
● Runtime license required	Yes; "Small" license required
● OPC UA Client	Yes; From SW CPU 1505SP V2.6
— Application authentication	No
● OPC UA Server	Yes; Data access (read, write, subscribe), runtime license required
— Application authentication	Yes; Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
— Security policies	Yes; Available security policies: None, Basic128Rsa15, Basic256Rsa15,

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	Basic256Sha256
— User authentication	Yes; "anonymous" or by user name & password
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
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 8 engineering systems
Status block	Yes; up to 8 simultaneously
Single step	No
Number of breakpoints	8
Status/control	
● Status/control variable	Yes
● Variables	Inputs, outputs, memory bits, DB, times, counters
● Number of variables, max.	
— of which status variables, max.	200
— of which control variables, max.	200
Forcing	
● Forcing	Yes
● Forcing, variables	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
Supported technology objects	
Motion Control	Yes
● Number of available Motion Control resources for technology objects	2 400
● Required Motion Control resources	
— per speed-controlled axis	40; per axis
— per positioning axis	80; per axis
— per synchronous axis	160; per axis
— per external encoder	80; per external encoder
— per output cam	20; per cam
— per cam track	160; per cam track
— per probe	40; per probe
● Number of available Extended Motion Control resources for technology objects	120
● Required Extended Motion Control resources	
— per cam (1 000 points and 50 segments)	2
— for each set of kinematics	30
— Per leading axis proxy	3
● Positioning axis	
— Number of positioning axes at motion control cycle of 4 ms (typical value)	30
— Number of positioning axes at motion control cycle of 8 ms (typical value)	30

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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	Yes
cULus	Yes
FM approval	Yes
RCM (formerly C-TICK)	Yes
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	
● min.	-20 °C
● horizontal installation, min.	-20 °C
● horizontal installation, max.	60 °C; from 55°C: with max. 32 ET 200SP modules; 4x 0.3 A USB load; CFast memory card max. 10% load; SD card not used
● vertical installation, min.	-20 °C
● vertical installation, max.	50 °C; from 45°C: with max. 32 ET 200SP modules; 4x 0.3 A USB load; CFast memory card and SD card; max. 10% load
Ambient temperature during storage/transportation	
● min.	-40 °C
● max.	70 °C
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 2019 LTSC, 64 bit, MUI
configuration / header	
configuration / programming / header	
Programming language	
— LAD	Yes; incl. failsafe
— FBD	Yes; incl. failsafe
— STL	Yes
— SCL	Yes
— CFC	No
— GRAPH	Yes
Know-how protection	
● User program protection/password protection	Yes
● Copy protection	Yes
● Block protection	Yes
Access protection	
● Protection level: Write protection	Yes
● Protection level: Read/write protection	Yes
● Protection level: Complete protection	Yes
programming / cycle time monitoring / header	
● lower limit	adjustable minimum cycle time
● upper limit	adjustable maximum cycle time

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Open Development interfaces	
● Size of ODK SO file, max.	5.8 Mbyte
Peripherals/Options	
SD card	Optionally for additional mass storage
Dimensions	
Width	160 mm
Height	117 mm
Depth	75 mm
Weights	
Weight, approx.	0.83 kg

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