



Figure similar

SIMATIC ET 200SP Open Controller, CPU 1515SP PC2 F, 8 GB RAM (basic device 6ES7677-2DB40-0AA0), 128 GB CFast with Windows 10 IoT Enterprise LTSC 2021 64-bit and S7-1500 Failsafe Software Controller CPU 1505SP F V3x 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 F
Firmware version	V30.1
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	V19
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
Mains buffering	
• Mains/voltage failure stored energy time	5 ms
Input current	
Current consumption (rated value)	1.8 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 <sup>2</sup> t	0.426 A <sup>2</sup> ·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
<b>Work memory</b>	
• integrated (for program)	3 Mbyte
• integrated (for data)	7.5 Mbyte
• integrated (for CPU function library of CPU Runtime)	20 Mbyte
<b>Load memory</b>	
• integrated (on PC mass storage)	320 Mbyte
<b>Backup</b>	
• with UPS	Yes; all memory areas declared retentive
• with non-volatile memory	Yes
<b>CPU-blocks</b>	
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
<b>DB</b>	
• Number, max.	7 999; Number range: 1 to 65535
• Size, max.	5 Mbyte
<b>FB</b>	
• Number, max.	7 998; Number range: 1 to 65535
• Size, max.	1 024 kbyte
<b>FC</b>	
• Number, max.	7 999; Number range: 1 to 65535
• Size, max.	1 024 kbyte
<b>OB</b>	
• 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
<b>Nesting depth</b>	
• per priority class	24; Up to 8 possible for F-blocks
<b>Counters, timers and their retentivity</b>	
<b>S7 counter</b>	
• Number	2 048
Retentivity	
— adjustable	Yes
<b>IEC counter</b>	
• Number	Any (only limited by the main memory)
Retentivity	
— adjustable	Yes
<b>S7 times</b>	
• Number	2 048
Retentivity	
— adjustable	Yes
<b>IEC timer</b>	
• Number	Any (only limited by the main memory)
Retentivity	
— adjustable	Yes
<b>Data areas and their retentivity</b>	
Retentive data area (incl. timers, counters, flags), max.	410 kbyte; For storage in NVRAM; for storage in mass storage 5 242 020 bytes
<b>Flag</b>	
• Size, max.	16 kbyte
• Number of clock memories	8; 8 clock memory bit, grouped into one clock memory byte
<b>Data blocks</b>	

<ul style="list-style-type: none"> <li>• Retentivity adjustable</li> <li>• Retentivity preset</li> </ul>	<p>Yes</p> <p>No</p>
<b>Local data</b>	
<ul style="list-style-type: none"> <li>• per priority class, max.</li> </ul>	64 kbyte; max. 16 KB per block
<b>Address area</b>	
Number of IO modules	8 192
<b>I/O address area</b>	
<ul style="list-style-type: none"> <li>• Inputs</li> <li>• Outputs</li> </ul>	<p>32 kbyte; All inputs are in the process image</p> <p>32 kbyte; All outputs are in the process image</p>
<b>Subprocess images</b>	
<ul style="list-style-type: none"> <li>• Number of subprocess images, max.</li> </ul>	32
<b>Hardware configuration</b>	
Integrated power supply	Yes
Number of distributed IO systems	20
<b>Number of DP masters</b>	
<ul style="list-style-type: none"> <li>• Via CM</li> </ul>	1
<b>Number of IO Controllers</b>	
<ul style="list-style-type: none"> <li>• via PC interfaces</li> </ul>	1
<b>Rack</b>	
<ul style="list-style-type: none"> <li>• Modules per rack, max.</li> <li>• Quantity of operable ET 200SP modules, max.</li> <li>• Quantity of operable ET 200AL modules, max.</li> <li>• Number of lines, max.</li> </ul>	<p>82; CPU + 64 modules + server module (mounting width max. 1 m) + 16 ET 200AL modules</p> <p>64</p> <p>16</p> <p>1</p>
<b>PtP CM</b>	
<ul style="list-style-type: none"> <li>• Number of PtP CMs</li> </ul>	the number of connectable PtP CMs is only limited by the number of available slots
<b>Time of day</b>	
<b>Clock</b>	
<ul style="list-style-type: none"> <li>• Type</li> <li>• Hardware clock (real-time)</li> <li>• Backup time</li> <li>• Deviation per day, max.</li> </ul>	<p>Hardware clock</p> <p>Yes; Resolution: 1 s</p> <p>6 wk; At 40 °C ambient temperature, typically</p> <p>10 s; Typ.: 2 s</p>
<b>Clock synchronization</b>	
<ul style="list-style-type: none"> <li>• supported</li> <li>• to DP, master</li> <li>• on Ethernet via NTP</li> <li>• on Windows clock, device</li> </ul>	<p>Yes</p> <p>Yes; Via CM DP module</p> <p>Yes</p> <p>Yes</p>
<b>Interfaces</b>	
Number of industrial Ethernet interfaces	2
Number of PROFINET interfaces	1
Number of PROFIBUS interfaces	1; Via CM DP module
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
<b>Video interfaces</b>	
<ul style="list-style-type: none"> <li>• Graphics interface</li> </ul>	1x DisplayPort
<b>1. Interface</b>	
Interface type	PROFINET
automatic detection of transmission rate	Yes
Autonegotiation	Yes
Autocrossing	Yes
Number of connections	88
<b>Interface types</b>	
<ul style="list-style-type: none"> <li>• RJ 45 (Ethernet) <ul style="list-style-type: none"> <li>— Transmission rate, max.</li> <li>— Industrial Ethernet status LED</li> </ul> </li> <li>• Number of ports</li> <li>• integrated switch</li> <li>• BusAdapter (PROFINET)</li> </ul>	<p>Yes; Via BusAdapter BA 2x RJ45</p> <p>100 Mbit/s</p> <p>Yes</p> <p>2</p> <p>Yes</p> <p>Yes; compatible BusAdapters: BA 2x RJ45, BA 2x M12, BA 2x FC, BA 2x LC, BA LC/RJ45, BA LC/FC, BA 2x SCRJ, BA SCRJ/RJ45, BA SCRJ/FC</p>

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
— Direct data exchange	Yes; Requirement: IRT and isochronous mode (MRPD optional)
— shortest clock pulse	500 µs
— IRT	Yes
— PROFINergy	Yes
— 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
— 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
— PROFINergy	Yes; per user program
— Prioritized startup	Yes
— 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	Integrated Ethernet interface
automatic detection of transmission rate	Yes
Autonegotiation	Yes
Autocrossing	Yes
Interface types	

- RJ 45 (Ethernet)
  - 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
<b>Interface types</b>	
● RS 485	Yes
<b>Protocols</b>	
● PROFIBUS DP master	Yes
● PROFIBUS DP device	Yes
● SIMATIC communication	Yes
<b>PROFIBUS DP master</b>	
● max. number of DP devices	125
<b>Services</b>	
— Equidistance	No
— Isochronous mode	No
<b>Address area</b>	
— Inputs, max.	8 kbyte
— Outputs, max.	8 kbyte
<b>Interface types</b>	
<b>RS 485</b>	
● Transmission rate, max.	12 Mbit/s
<b>Protocols</b>	
PROFIsafe	Yes
<b>Number of connections</b>	
● Number of connections, max.	88
● Number of connections reserved for ES/HMI/web	10
● Number of S7 routing paths	16
<b>Redundancy mode</b>	
<b>Media redundancy</b>	
— 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
<b>SIMATIC communication</b>	
● 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.	64 kbyte; BSEND/BRCV: 64 KB; PUT/GET: 960 bytes
<b>Open IE communication</b>	
● TCP/IP	Yes
— Data length, max.	64 kbyte
● 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. 5 multicast circuits
● DHCP	Yes
● DNS	Yes
● SNMP	Yes
● DCP	Yes
● LLDP	Yes
● Encryption	Yes; Optional
<b>Web server</b>	
● HTTP	Yes; Standard and user pages

<ul style="list-style-type: none"> <li>● HTTPS</li> <li>● web API <ul style="list-style-type: none"> <li>— Number of sessions, max.</li> <li>— number of simultaneous HTTP calls, max.</li> <li>— HTTP request body, max.</li> </ul> </li> </ul>	<p>Yes; Standard and user pages</p> <p>50</p> <p>4</p> <p>131 072 byte</p>
<b>OPC UA</b>	
<ul style="list-style-type: none"> <li>● Runtime license required</li> <li>● OPC UA Client <ul style="list-style-type: none"> <li>— Application authentication</li> <li>— Security policies</li> <li>— User authentication</li> <li>— Number of connections, max.</li> <li>— Number of nodes of the client interfaces, recommended max.</li> <li>— Number of elements for one call of OPC-UA_NodeGetHandleList/OPC-UA_ReadList/OPC-UA_WriteList, max.</li> <li>— Number of elements for one call of OPC-UA_NameSpaceGetIndexList, max.</li> <li>— Number of elements for one call of OPC-UA_MethodGetHandleList, max.</li> <li>— Number of simultaneous calls of the client instructions for session management, per connection, max.</li> <li>— Number of simultaneous calls of the client instructions for data access, per connection, max.</li> <li>— Number of registerable nodes, max.</li> <li>— Number of registerable method calls of OPC-UA_MethodCall, max.</li> <li>— Number of inputs/outputs when calling OPC-UA_MethodCall, max.</li> </ul> </li> <li>● OPC UA Server <ul style="list-style-type: none"> <li>— Application authentication</li> <li>— Security policies</li> <li>— User authentication</li> <li>— GDS support (certificate management)</li> <li>— Number of sessions, max.</li> <li>— Number of accessible variables, max.</li> <li>— Number of registerable nodes, max.</li> <li>— Number of subscriptions per session, max.</li> <li>— Sampling interval, min.</li> <li>— Publishing interval, min.</li> <li>— Number of server methods, max.</li> <li>— Number of inputs/outputs per server method, max.</li> <li>— Number of monitored items, recommended max.</li> <li>— Number of server interfaces, max.</li> <li>— Number of nodes for user-defined server interfaces, max.</li> </ul> </li> <li>● Alarms and Conditions <ul style="list-style-type: none"> <li>— Number of program alarms</li> <li>— Number of alarms for system diagnostics</li> </ul> </li> </ul>	<p>Yes; "Small" license required</p> <p>Yes; Data access (read, write), method call</p> <p>Yes</p> <p>Yes; Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256</p> <p>Yes; "anonymous" or by user name &amp; password</p> <p>10</p> <p>2 000</p> <p>300</p> <p>20</p> <p>100</p> <p>1</p> <p>5</p> <p>5 000</p> <p>100</p> <p>20</p> <p>Yes; Data access (read, write, subscribe), method call, custom address space</p> <p>Yes</p> <p>Yes; Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256</p> <p>Yes</p> <p>Yes</p> <p>48</p> <p>100 000</p> <p>20 000</p> <p>50</p> <p>100 ms</p> <p>200 ms</p> <p>50</p> <p>20</p> <p>2 000; for 1 s sampling interval and 1 s send interval</p> <p>10</p> <p>5 000</p> <p>Yes</p> <p>200</p> <p>100</p>
<b>Further protocols</b>	
<ul style="list-style-type: none"> <li>● MODBUS</li> </ul>	Yes; MODBUS TCP
<b>S7 message functions</b>	
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
<ul style="list-style-type: none"> <li>● Number of program alarms</li> <li>● Number of alarms for system diagnostics</li> <li>● Number of alarms for motion technology objects</li> </ul>	<p>1 000</p> <p>200</p> <p>160</p>
<b>Test commissioning functions</b>	

Joint commission (Team Engineering)	Yes; Parallel online access possible for up to 10 engineering systems
Status block	Yes; up to 8 simultaneously
Single step	Yes
Number of breakpoints	8
Profiling	No
<b>Status/control</b>	
<ul style="list-style-type: none"> <li>• Status/control variable</li> <li>• Variables</li> <li>• Number of variables, max. <ul style="list-style-type: none"> <li>— of which status variables, max.</li> <li>— of which control variables, max.</li> </ul> </li> </ul>	Yes Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job 200; per job
<b>Forcing</b>	
<ul style="list-style-type: none"> <li>• Forcing</li> <li>• Forcing, variables</li> <li>• Number of variables, max.</li> </ul>	Yes Peripheral inputs/outputs 200
<b>Diagnostic buffer</b>	
<ul style="list-style-type: none"> <li>• present</li> <li>• Number of entries, max. <ul style="list-style-type: none"> <li>— of which powerfail-proof</li> </ul> </li> </ul>	Yes 1 000 300
<b>Traces</b>	
<ul style="list-style-type: none"> <li>• Number of configurable Traces</li> <li>• Memory size per trace, max.</li> </ul>	4 512 kbyte
<b>Interrupts/diagnostics/status information</b>	
<b>Diagnostics indication LED</b>	
<ul style="list-style-type: none"> <li>• RUN/STOP LED</li> <li>• ERROR LED</li> <li>• MAINT LED</li> </ul>	Yes Yes Yes
<b>Supported technology objects</b>	
Motion Control <ul style="list-style-type: none"> <li>• Number of available Motion Control resources for technology objects</li> <li>• Required Motion Control resources <ul style="list-style-type: none"> <li>— per speed-controlled axis</li> <li>— per positioning axis</li> <li>— per synchronous axis</li> <li>— per external encoder</li> <li>— per output cam</li> <li>— per cam track</li> <li>— per probe</li> </ul> </li> <li>• Positioning axis <ul style="list-style-type: none"> <li>— Number of positioning axes at motion control cycle of 4 ms (typical value)</li> <li>— Number of positioning axes at motion control cycle of 8 ms (typical value)</li> </ul> </li> </ul>	Yes; Note: The number of technology objects affects the cycle time of the PLC program; selection guide via the TIA Selection Tool or SIZER 2 400 40 80 160 80 20 160 40 30 30
Controller <ul style="list-style-type: none"> <li>• PID_Compact</li> <li>• PID_3Step</li> <li>• PID-Temp</li> </ul>	Yes; Universal PID controller with integrated optimization Yes; PID controller with integrated optimization for valves Yes; PID controller with integrated optimization for temperature
Counting and measuring <ul style="list-style-type: none"> <li>• High-speed counter</li> </ul>	Yes
<b>Standards, approvals, certificates</b>	
CE mark	Yes
CSA approval	Yes
cULus	Yes
FM approval	Yes
RCM (formerly C-TICK)	Yes
<b>Highest safety class achievable in safety mode</b>	
<ul style="list-style-type: none"> <li>• Performance level according to ISO 13849-1</li> <li>• SIL acc. to IEC 61508</li> </ul>	PLe SIL 3
Probability of failure (for service life of 20 years and repair time of 100 hours)	
— Low demand mode: PFDavg in accordance with	< 2.00E-05

SIL3	
— 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 2021 LTSC

#### 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 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
• Number of users	100

programming / cycle time monitoring / header	
• lower limit	adjustable minimum cycle time
• upper limit	adjustable maximum cycle time

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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