



Figure similar

SIMATIC ET 200SP Open Controller, CPU 1515SP PC2 F + HMI 128PT, 8 GB RAM, 128 GB CFast with Windows 10 IoT Enterprise 64-bit, S7-1500 Failsafe Software Controller CPU 1505SP F and WinCC Runtime Advanced pre-installed, with 128 PowerTags license; Interfaces: 1x Slot CFast, 1x slot SD/MMC, 1x connection for ET 200SP bus Adapter PROFINET, 1x 10/100/1000 Mbit/s Ethernet, 2x USB 3.0, 2x USB 2.0, 1x display port, Documentation on CFast Restore image on CFast

General information	
Product type designation	CPU 1515SP PC2 F + HMI 128
HW functional status	from FS04
Firmware version	V20.8
Engineering with	
<ul style="list-style-type: none"> <li>STEP 7 TIA Portal configurable/integrated from version</li> </ul>	V16
Installed software	
<ul style="list-style-type: none"> <li>Visualization</li> <li>Control</li> </ul>	WinCC Runtime Advanced V16 S7-1500 Software Controller CPU 1505SP F
Configuration control	
via dataset	Yes
Control elements	
Mode selector switch	1
Supply voltage	
Type of supply voltage	24 V DC
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Mains buffering	
<ul style="list-style-type: none"> <li>Mains/voltage failure stored energy time</li> </ul>	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
$I^2t$	0.426 A <sup>2</sup> ·s; with starting current inrush
Power	
Active power input, max.	55 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>	
<ul style="list-style-type: none"> <li>integrated (for program)</li> </ul>	1.5 Mbyte
<ul style="list-style-type: none"> <li>integrated (for data)</li> </ul>	5 Mbyte
<ul style="list-style-type: none"> <li>integrated (for CPU function library of CPU Runtime)</li> </ul>	20 Mbyte
<b>Load memory</b>	
<ul style="list-style-type: none"> <li>integrated (on PC mass storage)</li> </ul>	320 Mbyte
<b>Backup</b>	
<ul style="list-style-type: none"> <li>with UPS</li> </ul>	Yes; all memory areas declared retentive
<ul style="list-style-type: none"> <li>with non-volatile memory</li> </ul>	Yes
<b>CPU processing times</b>	
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
<b>CPU-blocks</b>	
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
<b>DB</b>	
<ul style="list-style-type: none"> <li>Number, max.</li> </ul>	5 999; Number range: 1 to 65535
<ul style="list-style-type: none"> <li>Size, max.</li> </ul>	5 Mbyte
<b>FB</b>	
<ul style="list-style-type: none"> <li>Number, max.</li> </ul>	5 998; Number range: 1 to 65535
<ul style="list-style-type: none"> <li>Size, max.</li> </ul>	1 024 kbyte
<b>FC</b>	
<ul style="list-style-type: none"> <li>Number, max.</li> </ul>	5 999; Number range: 1 to 65535
<ul style="list-style-type: none"> <li>Size, max.</li> </ul>	1 024 kbyte
<b>OB</b>	
<ul style="list-style-type: none"> <li>Size, max.</li> </ul>	1 024 kbyte
<ul style="list-style-type: none"> <li>Number of free cycle OBs</li> </ul>	100
<ul style="list-style-type: none"> <li>Number of time alarm OBs</li> </ul>	20
<ul style="list-style-type: none"> <li>Number of delay alarm OBs</li> </ul>	20
<ul style="list-style-type: none"> <li>Number of cyclic interrupt OBs</li> </ul>	20
<ul style="list-style-type: none"> <li>Number of process alarm OBs</li> </ul>	50
<ul style="list-style-type: none"> <li>Number of DPV1 alarm OBs</li> </ul>	3
<ul style="list-style-type: none"> <li>Number of isochronous mode OBs</li> </ul>	1
<ul style="list-style-type: none"> <li>Number of technology synchronous alarm OBs</li> </ul>	2
<ul style="list-style-type: none"> <li>Number of startup OBs</li> </ul>	100
<ul style="list-style-type: none"> <li>Number of asynchronous error OBs</li> </ul>	4
<ul style="list-style-type: none"> <li>Number of synchronous error OBs</li> </ul>	2
<ul style="list-style-type: none"> <li>Number of diagnostic alarm OBs</li> </ul>	1
<b>Nesting depth</b>	
<ul style="list-style-type: none"> <li>per priority class</li> </ul>	24; Up to 8 possible for F-blocks
<b>Counters, timers and their retentivity</b>	
<b>S7 counter</b>	
<ul style="list-style-type: none"> <li>Number</li> </ul>	2 048
<b>Retentivity</b>	
— adjustable	Yes
<b>IEC counter</b>	
<ul style="list-style-type: none"> <li>Number</li> </ul>	Any (only limited by the main memory)
<b>Retentivity</b>	
— adjustable	Yes
<b>S7 times</b>	
<ul style="list-style-type: none"> <li>Number</li> </ul>	2 048
<b>Retentivity</b>	
— adjustable	Yes

<b>IEC timer</b>	
• Number	Any (only limited by the main memory)
<b>Retentivity</b>	
— 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>	
• Retentivity adjustable	Yes
• Retentivity preset	No
<b>Local data</b>	
• per priority class, max.	64 kbyte; max. 16 KB per block
<b>Address area</b>	
Number of IO modules	8 192
<b>I/O address area</b>	
• Inputs	32 kbyte; All inputs are in the process image
• Outputs	32 kbyte; All outputs are in the process image
<b>Subprocess images</b>	
• Number of subprocess images, max.	32
<b>Hardware configuration</b>	
Integrated power supply	Yes
Number of distributed IO systems	20
<b>Number of DP masters</b>	
• Via CM	1
<b>Number of IO Controllers</b>	
• via PC interfaces	1
<b>Rack</b>	
• 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
<b>PtP CM</b>	
• Number of PtP CMs	the number of connectable PtP CMs is only limited by the number of available slots
<b>Time of day</b>	
<b>Clock</b>	
• 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
<b>Clock synchronization</b>	
• supported	Yes
• to DP, master	Yes
• on Ethernet via NTP	Yes
• on Windows clock, slave	Yes
<b>Interfaces</b>	
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
<b>Video interfaces</b>	
• Graphics interface	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 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)</p>
<b>Protocols</b>	
<ul style="list-style-type: none"> <li>● PROFINET IO Controller</li> <li>● PROFINET IO Device</li> <li>● SIMATIC communication</li> <li>● Open IE communication</li> <li>● Web server</li> </ul>	<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>
<b>PROFINET IO Controller</b>	
<b>Services</b>	
<ul style="list-style-type: none"> <li>— Isochronous mode</li> <li>— shortest clock pulse</li> <li>— IRT</li> <li>— PROFIenergy</li> <li>— Prioritized startup</li>   <li>— Number of connectable IO Devices, max.</li> <li>— Of which IO devices with IRT, max.</li> <li>— of which in line, max.</li> <li>— Number of connectable IO Devices for RT, max.</li> <li>— of which in line, max.</li> <li>— Number of IO Devices that can be simultaneously activated/deactivated, max.</li> <li>— IO Devices changing during operation (partner ports), supported</li> <li>— Number of IO Devices per tool, max.</li> <li>— Updating times</li> </ul>	<p>Yes</p> <p>500 µs</p> <p>Yes</p> <p>Yes</p> <p>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 X205)</p> <p>128</p> <p>64</p> <p>64</p> <p>128</p> <p>128</p> <p>8</p> <p>Yes</p> <p>8</p> <p>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</p>
<b>Update time for IRT</b>	
<ul style="list-style-type: none"> <li>— for send cycle of 500 µs</li> <li>— for send cycle of 1 ms</li> <li>— for send cycle of 2 ms</li> <li>— for send cycle of 4 ms</li> <li>— With IRT and parameterization of "odd" send cycles</li> </ul>	<p>500 µs to 8 ms</p> <p>1 ms to 16 ms</p> <p>2 ms to 32 ms</p> <p>4 ms to 64 ms</p> <p>Update time = set "odd" send clock (any multiple of 125 µs: 625 µs ... 3 875 µs) minimum cycle time start from 500 µs</p>
<b>Update time for RT</b>	
<ul style="list-style-type: none"> <li>— for send cycle of 500 µs</li> <li>— for send cycle of 1 ms</li> <li>— for send cycle of 2 ms</li> <li>— for send cycle of 4 ms</li> </ul>	<p>500 µs to 256 ms</p> <p>1 ms to 512 ms</p> <p>2 ms to 512 ms</p> <p>4 ms to 512 ms</p>
<b>Address area</b>	
<ul style="list-style-type: none"> <li>— Inputs, max.</li> <li>— Outputs, max.</li> </ul>	<p>8 kbyte</p> <p>8 kbyte</p>
<b>PROFINET IO Device</b>	

<b>Services</b>	
— Isochronous mode	No
— shortest clock pulse	500 µs
— IRT	Yes
— PROFlenergy	Yes
— Prioritized startup	Yes
— Shared device	Yes
— Number of IO Controllers with shared device, max.	4
— Asset management record	Yes
<b>2. Interface</b>	
Interface type	Integrated Ethernet interface
automatic detection of transmission rate	Yes
Autonegotiation	Yes
Autocrossing	Yes
<b>Interface types</b>	
• RJ 45 (Ethernet)	Yes; Integrated
— Transmission rate, max.	1 000 Mbit/s
— Industrial Ethernet status LED	No
• Number of ports	1
<b>3. Interface</b>	
Interface type	PROFIBUS with CM DP
Number of connections via this interface	44
<b>Interface types</b>	
• RS 485	Yes
<b>Protocols</b>	
• PROFIBUS DP master	Yes
• PROFIBUS DP slave	Yes
• SIMATIC communication	Yes
<b>PROFIBUS DP master</b>	
• Number of DP slaves, max.	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>	
<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>	
— MRP	Yes
— MRPD	Yes
— Switchover time on line break, typ.	200 ms
— Number of stations in the ring, max.	50
<b>SIMATIC communication</b>	
• 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
<b>Open IE communication</b>	

<ul style="list-style-type: none"> <li>• TCP/IP <ul style="list-style-type: none"> <li>— Data length, max.</li> </ul> </li> <li>• ISO-on-TCP (RFC1006) <ul style="list-style-type: none"> <li>— Data length, max.</li> </ul> </li> <li>• UDP <ul style="list-style-type: none"> <li>— Data length, max.</li> </ul> </li> <li>• SNMP</li> <li>• DCP</li> <li>• LLDP</li> </ul>	<p>Yes</p> <p>64 kbyte</p> <p>Yes</p> <p>64 kbyte</p> <p>Yes</p> <p>2 048 byte</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>
<b>Web server</b>	
<ul style="list-style-type: none"> <li>• HTTP</li> <li>• HTTPS</li> </ul>	<p>Yes; Via Windows and PROFINET interface</p> <p>Yes; Via Windows and PROFINET interface</p>
<b>OPC UA</b>	
<ul style="list-style-type: none"> <li>• Runtime license required</li> <li>• OPC UA Client</li> <li>• OPC UA Server <ul style="list-style-type: none"> <li>— Application authentication</li> <li>— Security policies</li> <li>— User authentication</li> </ul> </li> </ul>	<p>Yes; "Small" license required</p> <p>Yes; From SW CPU 1505SP V2.6</p> <p>Yes; Data access (read, write, subscribe), runtime license required</p> <p>Yes; Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256</p> <p>Yes; Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256</p> <p>Yes; "anonymous" or by user name &amp; password</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 8 engineering systems
Status block	Yes; up to 8 simultaneously
Single step	No
Number of breakpoints	8
<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>	<p>Yes</p> <p>Inputs, outputs, memory bits, DB, times, counters</p> <p>200</p> <p>200</p>
<b>Forcing</b>	
<ul style="list-style-type: none"> <li>• Forcing</li> <li>• Forcing, variables</li> <li>• Number of variables, max.</li> </ul>	<p>Yes</p> <p>Inputs, outputs</p> <p>200</p>
<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>	<p>Yes</p> <p>1 000</p> <p>300</p>
<b>Traces</b>	
<ul style="list-style-type: none"> <li>• Number of configurable Traces</li> <li>• Memory size per trace, max.</li> </ul>	<p>4</p> <p>512 kbyte</p>
<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>	<p>Yes</p> <p>Yes</p> <p>Yes</p>

Supported technology objects	
Motion Control	Yes
<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>	2 400  40; per axis 80; per axis 160; per axis 80; per external encoder 20; per cam 160; per cam track 40; per probe  15 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
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	
<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)	
<ul style="list-style-type: none"> <li>— Low demand mode: PFDavg in accordance with SIL3</li> <li>— High demand/continuous mode: PFH in accordance with SIL3</li> </ul>	< 2.00E-05 < 1.00E-09 1/h
Ambient conditions	
Ambient temperature during operation	
<ul style="list-style-type: none"> <li>• min.</li> <li>• max.</li> <li>• horizontal installation, min.</li> <li>• horizontal installation, max.</li> <li>• vertical installation, min.</li> <li>• vertical installation, max.</li> </ul>	-20 °C Up to 60 °C with max. 32 ET 200SP modules; up to 55 °C with max. 64 ET 200SP modules -20 °C 60 °C -20 °C 50 °C; With max. 32 ET 200SP modules
Ambient temperature during storage/transportation	
<ul style="list-style-type: none"> <li>• min.</li> <li>• max.</li> </ul>	-40 °C 70 °C
Vibrations	
<ul style="list-style-type: none"> <li>• Operation, tested according to IEC 60068-2-6</li> <li>• Transport, tested acc. to IEC 60068-2-6</li> </ul>	Yes Yes
Shock testing	
<ul style="list-style-type: none"> <li>• tested according to IEC 60068-2-6</li> <li>• tested according to IEC 60068-2-27</li> <li>• tested according to IEC 60068-2-29</li> <li>• Storage/transport, tested acc. to IEC 60068-2-27</li> </ul>	Yes Yes Yes Yes
Operating systems	
pre-installed operating system	Windows 10 IoT Enterprise 2016 LTSP, 64bit, MUI

Configuration	
Programming	
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
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
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
<b>last modified:</b>	3/2/2021 