

SIMATIC ET 200SP Open Controllers, CPU 1515SP PC F. 4 GB RAM, 30 GB CFAST with WES 7 P 64 bit pre-installed, mit S7-1500 Fail-safe SWC CPU 1505SP F pre-installed Interfaces: 1x slot CFAST, 1x slot SD/MMC, 1x connection for ET 200SP bus adapter PROFINET 1x 10/100/1000 Mbit/s Ethernet, 3x USB, 1x DVI-I graphics card connection, Documentation on DVD, Restore DVD



General information	
Product type designation	CPU 1515SP PC F
HW functional status	FS02
Firmware version	V2.1
Engineering with	
<ul style="list-style-type: none"> <li>STEP 7 TIA Portal configurable/integrated as of version</li> </ul>	V14 SP1
Installed software	
<ul style="list-style-type: none"> <li>Visualization</li> <li>Control</li> </ul>	No 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
<b>Mains buffering</b>	
• Mains/voltage failure stored energy time	5 ms
<b>Input current</b>	
Current consumption (rated value)	1.5 A; Full processor load, incl. ET 200SP modules and using USB
Current consumption (in no-load operation), typ.	0.6 A
Inrush current, max.	4.7 A; Rated value
<b>Power</b>	
Active power input, max.	36 W; incl. ET 200SP modules and using USB
Infeed power to the backplane bus	8.75 W
<b>Power loss</b>	
Power loss, typ.	15 W; without ET 200SP modules and without using USB
<b>Processor</b>	
Processor type	Dual-Core 1 GHz, AMD G Series APU T40E
<b>Memory</b>	
Type of memory	DDR3-SDRAM
Main memory	4 GB RAM
CFast memory card	Yes; 30 GB flash memory
SIMATIC memory card required	No
<b>Work memory</b>	
• integrated (for program)	1.5 Mbyte
• integrated (for data)	5 Mbyte
• integrated (for CPU function library of CPU Runtime)	10 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 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>	
• Number, max.	5 999; Number range: 1 to 65535

• Size, max.	5 Mbyte
<b>FB</b>	
• Number, max.	5 998; Number range: 1 to 65535
• Size, max.	512 kbyte
<b>FC</b>	
• Number, max.	5 999; Number range: 1 to 65535
• Size, max.	512 kbyte
<b>OB</b>	
• Size, max.	512 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
<b>Retentivity</b>	
— adjustable	Yes
<b>IEC counter</b>	
• Number	Any (only limited by the main memory)
<b>Retentivity</b>	
— adjustable	Yes
<b>S7 times</b>	
• Number	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>	
• Number, 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>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
of which per assigned PC interface	
— Inputs (volume)	8 kbyte
— Outputs (volume)	8 kbyte
<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>Rack</b>	
• Modules per rack, max.	64; CPU 1515SP PC + 64 modules + server module
• 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
• 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	3; 3x USB 2.0 on the front, 500 mA each - of which 2x 500 mA and 1x 100 mA simultaneously
Number of SD card slots	1
<b>Video interfaces</b>	
• Graphics interface	1x DVI-I

## 1. Interface

Interface type	PROFINET
automatic detection of transmission rate	Yes
Autonegotiation	Yes
Autocrossing	Yes
Number of connections	88

<b>Interface types</b>	
• Number of ports	2
• integrated switch	Yes
• RJ 45 (Ethernet)	Yes; Via BusAdapter BA 2x RJ45
— Transmission rate, max.	100 Mbit/s
— Industrial Ethernet status LED	Yes
• BusAdapter (PROFINET)	Yes; Applicable BusAdapter: BA 2x RJ45, BA 2x FC

<b>Protocols</b>	
• PROFINET IO Controller	Yes
• PROFINET IO Device	Yes
• SIMATIC communication	Yes
• Open IE communication	Yes
• Web server	Yes

<b>PROFINET IO Controller</b>	
<b>Services</b>	
— Isochronous mode	Yes
— shortest clock pulse	500 µs
— IRT	Yes
— MRP	Yes
— MRPD	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

#### Update time for IRT

— for send cycle of 500 $\mu$ s	500 $\mu$ s 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 $\mu$ s: 375 $\mu$ s, 625 $\mu$ s ... 3 875 $\mu$ s)

#### Update time for RT

— for send cycle of 500 $\mu$ s	500 $\mu$ s 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

#### PROFINET IO Device

##### Services

— Isochronous mode	No
— IRT	Yes
— MRP	Yes
— MRPD	Yes
— Prioritized startup	Yes
— Shared device	Yes
— Number of IO Controllers with shared device, max.	4

## 2. Interface

Interface type	Integrated Ethernet interface
automatic detection of transmission rate	Yes
Autonegotiation	Yes
Autocrossing	Yes

##### Interface types

• Number of ports	1
• RJ 45 (Ethernet)	Yes; Integrated
— Transmission rate, max.	1 000 Mbit/s
— Industrial Ethernet status LED	No

## 3. Interface

Interface type	PROFIBUS with CM DP
Number of connections via this interface	44

##### Interface types

• 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>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>	
— 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
<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.	1 472 kbyte
• SNMP	Yes
• DCP	Yes
• LLDP	Yes
<b>Web server</b>	
• HTTP	Yes; Via Windows and PROFINET interface

• HTTPS	Yes; Only via PROFINET interface
<b>OPC UA</b>	
• OPC UA client	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, Basic256Sha256
— User authentication	Yes; "anonymous" or by user name & password
<b>Further protocols</b>	
• MODBUS	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	
• Number of program alarms	1 000
• Number of alarms for system diagnostics	200
• Number of alarms for motion technology objects	160
<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
<b>Status/control</b>	
• 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
<b>Forcing</b>	
• Forcing	Yes
• Forcing, variables	Inputs, outputs
• Number of variables, max.	200
<b>Diagnostic buffer</b>	
• present	Yes
• Number of entries, max.	1 000
— of which powerfail-proof	300
<b>Traces</b>	
• Number of configurable Traces	4



• Memory size per trace, max.	512 kbyte
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### 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
• Positioning axis	
— Number of positioning axes at motion control cycle of 4 ms (typical value)	5
— Number of positioning axes at motion control cycle of 8 ms (typical value)	12

#### 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
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### Standards, approvals, certificates

CE mark	Yes
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CSA approval	Yes
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cULus	Yes
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FM approval	Yes
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RCM (formerly C-TICK)	Yes
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#### 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
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— High demand/continuous mode: PFH in accordance with SIL3

< 1.00E-09 1/h

## Ambient conditions

### Ambient temperature during operation

- |                                 |                                                                                                                                                            |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| • min.                          | 0 °C                                                                                                                                                       |
| • max.                          | Up to 60 °C with max. 32 ET 200SP modules and 3x 100 mA USB load; up to 55 °C with max. 64 ET 200SP modules and 2x max. 500 mA and 1x max. 100 mA USB load |
| • horizontal installation, min. | 0 °C                                                                                                                                                       |
| • horizontal installation, max. | 60 °C                                                                                                                                                      |
| • vertical installation, min.   | 0 °C                                                                                                                                                       |
| • vertical installation, max.   | 50 °C; With max. 32 ET 200SP modules and 3x 100 mA USB 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 Embedded Standard 7 P 64-bit

## 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
<b>Cycle time monitoring</b>	
• lower limit	adjustable minimum cycle time
• upper limit	adjustable maximum cycle time
<b>Open Development interfaces</b>	
• Size of ODK SO file, max.	3.8 Mbyte
<b>Peripherals/Options</b>	
SD card	Optionally for additional mass storage
<b>Dimensions</b>	
Width	160 mm
Height	117 mm
Depth	75 mm
<b>Weights</b>	
Weight, approx.	0.83 kg
<b>last modified:</b>	05/13/2020