

SIMATIC ET 200SP Open Controller, CPU 1515SP PC2 F + HMI 2048PT, 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 2048 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



Figure similar

General information	
Product type designation	CPU 1515SP PC2 F + HMI 2048
HW functional status	from FS04
Firmware version	V20.8
Engineering with	
<ul style="list-style-type: none"> STEP 7 TIA Portal configurable/integrated as of version 	V16
Installed software	
<ul style="list-style-type: none"> Visualization Control 	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

- 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^2t	0.426 A ² ·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
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Processor

Processor type	Intel Atom E3940, 1.6 GHz, 4 cores
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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
- 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	
• Number, 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	
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
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
• 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

- 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; 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 μ s
- IRT Yes
- MRP Yes
- MRPD Yes

— PROFINET	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 X205)
— 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: 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
— shortest clock pulse	500 µs
— IRT	Yes
— MRP	Yes
— MRPD	Yes
— PROFINET	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	
• 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
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

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.	2 048 byte
• 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
• 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
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

<ul style="list-style-type: none"> — per probe • Positioning axis <ul style="list-style-type: none"> — Number of positioning axes at motion control cycle of 4 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) 	<p>40; per probe</p> <p>15</p> <p>30</p>
Controller <ul style="list-style-type: none"> • PID_Compact • PID_3Step • PID-Temp 	<p>Yes; Universal PID controller with integrated optimization</p> <p>Yes; PID controller with integrated optimization for valves</p> <p>Yes; PID controller with integrated optimization for temperature</p>
Counting and measuring <ul style="list-style-type: none"> • High-speed counter 	<p>Yes</p>

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"> • Performance level according to ISO 13849-1 • SIL acc. to IEC 61508 	<p>PLe</p> <p>SIL 3</p>
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Probability of failure (for service life of 20 years and repair time of 100 hours)

<ul style="list-style-type: none"> — Low demand mode: PFDavg in accordance with SIL3 — High demand/continuous mode: PFH in accordance with SIL3 	<p>< 2.00E-05</p> <p>< 1.00E-09 1/h</p>
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Ambient conditions

Ambient temperature during operation

<ul style="list-style-type: none"> • min. • max. • horizontal installation, min. • horizontal installation, max. • vertical installation, min. • vertical installation, max. 	<p>-20 °C</p> <p>Up to 60 °C with max. 32 ET 200SP modules; up to 55 °C with max. 64 ET 200SP modules</p> <p>-20 °C</p> <p>60 °C</p> <p>-20 °C</p> <p>50 °C; With max. 32 ET 200SP modules</p>
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Ambient temperature during storage/transportation

<ul style="list-style-type: none"> • min. • max. 	<p>-40 °C</p> <p>70 °C</p>
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Vibrations

<ul style="list-style-type: none"> • Operation, tested according to IEC 60068-2-6 • Transport, tested acc. to IEC 60068-2-6 	<p>Yes</p> <p>Yes</p>
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Shock testing

- tested according to IEC 60068-2-6
- tested according to IEC 60068-2-27
- tested according to IEC 60068-2-29
- Storage/transport, tested acc. to IEC 60068-2-27

Yes
Yes
Yes
Yes

Operating systems

pre-installed operating system

Windows 10 IoT Enterprise 2016 LTSC, 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
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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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last modified: 05/13/2020