



Figure similar

SIMATIC DP, CPU 1510SP F-1 PN for ET 200SP, central processing unit with 300 KB work memory for program and 1 MB for data, 1st interface: PROFINET IRT with 3-port switch, 6 ns bit performance, SIMATIC Memory Card required, BusAdapter required for port 1 and 2

General information	
Product type designation	CPU 1510SP F-1 PN
HW functional status	FS04
Firmware version	V4.0
<ul style="list-style-type: none"> FW update possible 	Yes
Product function	
<ul style="list-style-type: none"> I&M data 	Yes; I&M0 to I&M3
<ul style="list-style-type: none"> Module swapping during operation (hot swapping) 	Yes; Multi-hot swapping
<ul style="list-style-type: none"> Isochronous mode 	Yes; only with PROFINET; with minimum OB 6x cycle of 500 µs
<ul style="list-style-type: none"> SysLog 	Yes
Engineering with	
<ul style="list-style-type: none"> STEP 7 TIA Portal configurable/integrated from version 	V20 (FW V4.0) / V18 (FW V3.0) or higher; configurable with older TIA Portal versions as 6ES7510-1SJ01-0AB0
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	
<ul style="list-style-type: none"> Mains/voltage failure stored energy time 	10 ms
Input current	
Current consumption (rated value)	0.48 A
Current consumption, max.	0.7 A
Inrush current, max.	1.34 A; Rated value
I^2t	0.3 A ² s
Power	
Infeed power to the backplane bus	8.05 W
Power loss	
Power loss, typ.	3.5 W
Memory	
Number of slots for SIMATIC memory card	1
SIMATIC memory card required	Yes
Work memory	
<ul style="list-style-type: none"> integrated (for program) 	300 kbyte

<ul style="list-style-type: none"> integrated (for data) 	1 Mbyte
Load memory	
<ul style="list-style-type: none"> Plug-in (SIMATIC Memory Card), max. 	32 Gbyte
Backup	
<ul style="list-style-type: none"> maintenance-free 	Yes
CPU processing times	
for bit operations, typ.	6 ns
for word operations, typ.	7 ns
for fixed point arithmetic, typ.	9 ns
for floating point arithmetic, typ.	37 ns
CPU-blocks	
Number of elements (total)	4 000; Blocks (OB, FB, FC, DB) and UDTs
DB	
<ul style="list-style-type: none"> Number range 	1 ... 60 999; subdivided into: number range that can be used by the user: 1 ... 59 999, and number range of DBs created via SFC 86: 60 000 ... 60 999
<ul style="list-style-type: none"> Size, max. 	1 Mbyte; For DBs with absolute addressing, the max. size is 64 KB
FB	
<ul style="list-style-type: none"> Number range 	0 ... 65 535
<ul style="list-style-type: none"> Size, max. 	300 kbyte
FC	
<ul style="list-style-type: none"> Number range 	0 ... 65 535
<ul style="list-style-type: none"> Size, max. 	300 kbyte
OB	
<ul style="list-style-type: none"> Size, max. 	300 kbyte
<ul style="list-style-type: none"> Number of free cycle OBs 	100
<ul style="list-style-type: none"> Number of time alarm OBs 	20
<ul style="list-style-type: none"> Number of delay alarm OBs 	20
<ul style="list-style-type: none"> Number of cyclic interrupt OBs 	20; With minimum OB 3x cycle of 250 µs
<ul style="list-style-type: none"> Number of process alarm OBs 	50
<ul style="list-style-type: none"> Number of DPV1 alarm OBs 	3
<ul style="list-style-type: none"> Number of isochronous mode OBs 	1
<ul style="list-style-type: none"> Number of technology synchronous alarm OBs 	2
<ul style="list-style-type: none"> Number of startup OBs 	100
<ul style="list-style-type: none"> Number of asynchronous error OBs 	4
<ul style="list-style-type: none"> Number of synchronous error OBs 	2
<ul style="list-style-type: none"> Number of diagnostic alarm OBs 	1
Nesting depth	
<ul style="list-style-type: none"> per priority class 	24; Up to 8 possible for F-blocks
Counters, timers and their retentivity	
S7 counter	
<ul style="list-style-type: none"> Number 	2 048
Retentivity	
— adjustable	Yes
IEC counter	
<ul style="list-style-type: none"> Number 	Any (only limited by the main memory)
Retentivity	
— adjustable	Yes
S7 times	
<ul style="list-style-type: none"> Number 	2 048
Retentivity	
— adjustable	Yes
IEC timer	
<ul style="list-style-type: none"> Number 	Any (only limited by the main memory)
Retentivity	
— adjustable	Yes
Data areas and their retentivity	
Retentive data area (incl. timers, counters, flags), max.	256 kbyte; in total; available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 216 KB
Flag	

• Size, 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	2 048; max. number of modules / submodules
I/O address area	
• Inputs	32 kbyte; All inputs are in the process image
• Outputs	32 kbyte; All outputs are in the process image
per integrated IO subsystem	
— Inputs (volume)	8 kbyte
— Outputs (volume)	8 kbyte
per CM/CP	
— Inputs (volume)	8 kbyte
— Outputs (volume)	8 kbyte
Subprocess images	
• Number of subprocess images, max.	32
Address space per module	
• Address space per module, max.	288 byte; For input and output data respectively
Address space per station	
• Address space per station, max.	2 560 byte; for central inputs and outputs; depending on configuration; 2 048 bytes for ET 200SP modules + 512 bytes for ET 200AL modules
Hardware configuration	
Number of distributed IO systems	32; A distributed I/O system is characterized not only by the integration of distributed I/O via PROFINET or PROFIBUS communication modules, but also by the connection of I/O via AS-i master modules or links (e.g. IE/PB-Link)
Number of DP masters	
• Via CM	1
Number of IO Controllers	
• integrated	1
• Via CM	0
Rack	
• Modules per rack, max.	82; CPU + 64 modules + server module (mounting width max. 1 m) + 16 ET 200AL modules
• 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
• Backup time	6 wk; At 40 °C ambient temperature, typically
• Deviation per day, max.	10 s; Typ.: 2 s
Operating hours counter	
• Number	16
Clock synchronization	
• supported	Yes
• to DP, master	Yes; Via CM DP module
• on DP, device	Yes; Via CM DP module
• in AS, master	Yes
• in AS, device	Yes
• on Ethernet via NTP	Yes
Interfaces	
Number of PROFINET interfaces	1
Number of PROFIBUS interfaces	1; Via CM DP module

Optical interface	Yes; Via SIMATIC BusAdapter
1. Interface	
Interface types	
<ul style="list-style-type: none"> • RJ 45 (Ethernet) • Number of ports • integrated switch • BusAdapter (PROFINET) 	<p>Yes; X1 P3; opt. X1 P1 and X1 P2 via BusAdapter BA 2x RJ45</p> <p>3; 1. integr. + 2. via BusAdapter</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	
<ul style="list-style-type: none"> • IP protocol • PROFINET IO Controller • PROFINET IO Device • SIMATIC communication • Open IE communication • Web server • Media redundancy 	<p>Yes; IPv4</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes; Optionally also encrypted</p> <p>Yes</p> <p>Yes</p>
PROFINET IO Controller	
Services	
<ul style="list-style-type: none"> — Isochronous mode — Direct data exchange — IRT — PROFlenergy — Prioritized startup — Number of connectable IO Devices, max. — Of which IO devices with IRT, max. — Number of connectable IO Devices for RT, max. — of which in line, max. — Number of IO Devices that can be simultaneously activated/deactivated, max. — Number of IO Devices per tool, max. — Updating times — PROFINET Security Class 	<p>Yes</p> <p>Yes; Requirement: IRT and isochronous mode (MRPD optional)</p> <p>Yes</p> <p>Yes; per user program</p> <p>Yes; Max. 32 PROFINET devices</p> <p>128; In total, up to 512 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET</p> <p>64</p> <p>128</p> <p>128</p> <p>8; in total across all interfaces</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> <p>1</p>
Update time for IRT	
<ul style="list-style-type: none"> — for send cycle of 250 µs — for send cycle of 500 µs — for send cycle of 1 ms — for send cycle of 2 ms — for send cycle of 4 ms — With IRT and parameterization of "odd" send cycles 	<p>250 µs to 4 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 500 µs of the isochronous OB is decisive</p> <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: 375 µs, 625 µs ... 3 875 µs)</p>
Update time for RT	
<ul style="list-style-type: none"> — for send cycle of 250 µs — for send cycle of 500 µs — for send cycle of 1 ms — for send cycle of 2 ms — for send cycle of 4 ms 	<p>250 µs to 128 ms</p> <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>
PROFINET IO Device	
Services	
<ul style="list-style-type: none"> — Isochronous mode — IRT — PROFlenergy — Shared device — Number of IO Controllers with shared device, max. — activation/deactivation of I-devices — Asset management record — PROFINET Security Class 	<p>No</p> <p>Yes</p> <p>Yes; per user program</p> <p>Yes</p> <p>4</p> <p>Yes; per user program</p> <p>Yes; per user program</p> <p>SNMP Configuration and DCP Read Only</p>
2. Interface	

Interface types	
<ul style="list-style-type: none"> ● RS 485 ● Number of ports 	<p>Yes; Via CM DP module</p> <p>1</p>
Protocols	
<ul style="list-style-type: none"> ● PROFIBUS DP master ● PROFIBUS DP device ● SIMATIC communication 	<p>Yes</p> <p>Yes</p> <p>Yes</p>
PROFIBUS DP master	
<ul style="list-style-type: none"> ● Number of connections, max. ● max. number of DP devices 	<p>48; Of which 4 each reserved for ES and HMI</p> <p>125; In total, up to 512 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET</p>
Services	
<ul style="list-style-type: none"> — Equidistance — Isochronous mode — activation/deactivation of DP devices 	<p>No</p> <p>No</p> <p>Yes</p>
Interface types	
RJ 45 (Ethernet)	
<ul style="list-style-type: none"> ● 100 Mbps ● Autonegotiation ● Autocrossing ● Industrial Ethernet status LED 	<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>
RS 485	
<ul style="list-style-type: none"> ● Transmission rate, max. 	<p>12 Mbit/s</p>
Protocols	
<p>PROFIsafe</p>	<p>Yes; V2.4 / V2.6</p>
Number of connections	
<ul style="list-style-type: none"> ● Number of connections, max. ● Number of connections reserved for ES/HMI/web ● Number of connections via integrated interfaces ● Number of connections per CP/CM ● Number of S7 routing paths 	<p>128; via integrated interfaces of the CPU and connected CPs / CMs</p> <p>10</p> <p>88</p> <p>32</p> <p>16</p>
Redundancy mode	
<ul style="list-style-type: none"> ● H-Sync forwarding 	<p>Yes</p>
Media redundancy	
<ul style="list-style-type: none"> — Media redundancy — MRP — MRP interconnection, supported — MRPD — Switchover time on line break, typ. — Number of stations in the ring, max. 	<p>Yes; only via BusAdapter</p> <p>Yes; MRP Automanager according to IEC 62439-2 Edition 2.0, MRP Manager; MRP Client</p> <p>Yes; as MRP ring node according to IEC 62439-2 Edition 3.0</p> <p>Yes; Requirement: IRT</p> <p>200 ms; For MRP, bumpless for MRPD</p> <p>50</p>
SIMATIC communication	
<ul style="list-style-type: none"> ● PG/OP communication ● S7 routing ● Data record routing ● S7 communication, as server ● S7 communication, as client ● User data per job, max. 	<p>Yes; encryption with TLS V1.3 pre-selected</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>See online help (S7 communication, user data size)</p>
Open IE communication	
<ul style="list-style-type: none"> ● TCP/IP <ul style="list-style-type: none"> — Data length, max. — several passive connections per port, supported ● ISO-on-TCP (RFC1006) <ul style="list-style-type: none"> — Data length, max. ● UDP <ul style="list-style-type: none"> — Data length, max. — UDP multicast ● DHCP ● DNS 	<p>Yes</p> <p>64 kbyte</p> <p>Yes</p> <p>Yes</p> <p>64 kbyte</p> <p>Yes</p> <p>2 kbyte; 1 472 bytes for UDP broadcast</p> <p>Yes; max. 78 multicast circuits</p> <p>Yes</p> <p>Yes</p>

• SNMP	Yes
• DCP	Yes
• LLDP	Yes
• Encryption	Yes; Optional
Web server	
• HTTP	Yes; Standard and user pages
• HTTPS	Yes; Standard and user pages
• web API	
— Number of sessions, max.	50
— number of simultaneous HTTP calls, max.	4
— HTTP request body, max.	131 072 byte
OPC UA	
• Runtime license required	Yes; "Small" license required
• OPC UA Client	Yes; Data Access (registered Read/Write), Method Call
— Application authentication	Yes
— Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
— User authentication	"anonymous" or by user name & password
— Number of connections, max.	4
— Number of nodes of the client interfaces, recommended max.	1 000
— Number of elements for one call of OPC-UA_NodeGetHandleList/OPC-UA_ReadList/OPC-UA_WriteList, max.	300
— Number of elements for one call of OPC-UA_NameSpaceGetIndexList, max.	20
— Number of elements for one call of OPC-UA_MethodGetHandleList, max.	100
— Number of simultaneous calls of the client instructions for session management, per connection, max.	1
— Number of simultaneous calls of the client instructions for data access, per connection, max.	5
— Number of registerable nodes, max.	5 000
— Number of registerable method calls of OPC-UA_MethodCall, max.	100
— Number of inputs/outputs when calling OPC-UA_MethodCall, max.	20
• OPC UA Server	Yes; data access (read, write, subscribe), method call, alarms & condition (A&C), custom address space, role-based access control
— Application authentication	Yes
— Security policies	available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256, Aes128Sha256RsaOaep, Aes256Sha256RsaPss
— User authentication	"anonymous" or by user name & password
— GDS support (certificate management)	Yes
— Number of sessions, max.	32
— Number of accessible variables, max.	50 000
— Number of registerable nodes, max.	10 000
— Number of subscriptions per session, max.	50
— Sampling interval, min.	100 ms
— Publishing interval, min.	200 ms
— Number of server methods, max.	20; max. 20 concurrently running jobs each for asynchronous instructions OPC-UA_ServerMethodPre and OPC-UA_ServerMethodPost
— Number of inputs/outputs per server method, max.	20
— Number of monitored items, recommended max.	4 000; for 1 s sampling interval and 1 s send interval
— Number of server interfaces, max.	10 of each "Server interfaces" / "Companion specification" type and 20 of the type "Reference namespace"
— Number of nodes for user-defined server interfaces, max.	15 000
• Alarms and Conditions	Yes
— Number of program alarms	100
— Number of alarms for system diagnostics	50
Further protocols	
• MODBUS	Yes; MODBUS TCP

S7 message functions

Number of login stations for message functions, max.	32
number of subscriptions, max.	250
number of tags/attributes for subscriptions, max.	2 000
Program alarms	Yes
Number of configurable program messages, max.	5 000; Program messages are generated by the "Program_Alarm" block, ProDiag or GRAPH
Number of loadable program messages in RUN, max.	5 000
Number of simultaneously active program alarms	
• Number of program alarms	600
• Number of alarms for system diagnostics	100
• Number of alarms for motion technology objects	160

Test commissioning functions

Joint commission (Team Engineering)	Yes; Parallel online access possible for up to 5 engineering systems
Status block	Yes; Up to 8 simultaneously (in total across all ES clients)
Single step	Yes
Number of breakpoints	8
Profiling	Yes

Status/control

• Status/control variable	Yes; without fail-safe
• Variables	inputs/outputs, bit memories, DBs, peripheral I/Os (without fail-safe), times, counters
• Number of variables, max.	
— of which status variables, max.	200; per job
— of which control variables, max.	200; per job

Forcing

• Forcing	Yes; without fail-safe
• Forcing, variables	peripheral inputs/outputs (without fail-safe)
• Number of variables, max.	200

Diagnostic buffer

• present	Yes
• Number of entries, max.	1 000
— of which powerfail-proof	500

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
• Monitoring of the supply voltage (PWR-LED)	Yes
• Connection display LINK TX/RX	Yes

Supported technology objects

Motion Control	Yes; Note: The number of technology objects affects the cycle time of the PLC program; selection guide via the TIA Selection Tool
• Number of available Motion Control resources for technology objects	1 120
• Required Motion Control resources	
— per speed-controlled axis	40
— per positioning axis	80
— per synchronous axis	160
— per external encoder	80
— per output cam	20
— per cam track	160
— per probe	40
• Positioning axis	
— Number of positioning axes at motion control cycle of 4 ms (typical value)	11
— Number of positioning axes at motion control cycle	14

of 8 ms (typical value)	
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	
Ecological footprint	
• environmental product declaration	Yes
Global warming potential	
— global warming potential, (total) [CO2 eq]	83.2 kg
— global warming potential, (during production) [CO2 eq]	22.3 kg
— global warming potential, (during operation) [CO2 eq]	61.8 kg
— global warming potential, (after end of life cycle) [CO2 eq]	-0.949 kg
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
Security	
PROFINET Security Class	1
signed firmware update	Yes
Secure Boot	Yes
safely removing data	Yes
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-30 °C; No condensation
• horizontal installation, max.	60 °C
• vertical installation, min.	-30 °C; No condensation
• vertical installation, max.	50 °C
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
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 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 and centralized
• Number of users	100

• Number of groups	100
• Number of roles	50
Cycle time monitoring	
• lower limit	adjustable minimum cycle time
• upper limit	adjustable maximum cycle time

Dimensions	
Width	100 mm
Height	117 mm
Depth	75 mm

Weights	
Weight, approx.	265 g

Classifications			
		Version	Classification
	eClass	14	27-24-26-07
	eClass	12	27-24-26-07
	eClass	9.1	27-24-26-07
	eClass	9	27-24-26-07
	eClass	8	27-24-26-07
	eClass	7.1	27-24-26-07
	eClass	6	27-24-26-07
	ETIM	10	EC001603
	ETIM	9	EC001603
	ETIM	8	EC001603
	ETIM	7	EC001603
	IDEA	4	3565
	UNSPSC	15	32-15-17-05



Approvals / Certificates



General Product Approval

[Manufacturer Declaration](#)


[Miscellaneous](#)

[Miscellaneous](#)

General Product Approval	For use in hazardous locations
 KC TUEV	 FM CCC-Ex

For use in hazardous locations	Functional Safety
  Miscellaneous CCC-Ex Type Examination Certificate TUEV	

Functional Safety	Maritime application
Type Examination Certificate     NK / Nippon Kaiji Kyokai	

Maritime application	other
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[CCS \(China Classification Society\)](#)



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Environment



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