



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	
• Plug-in (SIMATIC Memory Card), max.	32 Gbyte
Backup	
• 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	
• 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
• Size, max.	1 Mbyte; For DBs with absolute addressing, the max. size is 64 KB
FB	
• Number range	0 ... 65 535
• Size, max.	300 kbyte
FC	
• Number range	0 ... 65 535
• Size, max.	300 kbyte
OB	
• Size, max.	300 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; With minimum OB 3x cycle of 250 μ s
• 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.	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	

<ul style="list-style-type: none"> • Retentivity adjustable • Retentivity preset 	<p>Yes</p> <p>No</p>
Local data	
<ul style="list-style-type: none"> • 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	
<ul style="list-style-type: none"> • Inputs • Outputs 	<p>32 kbyte; All inputs are in the process image</p> <p>32 kbyte; All outputs are in the process image</p>
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	
<ul style="list-style-type: none"> • Number of subprocess images, max. 	32
Address space per module	
<ul style="list-style-type: none"> • Address space per module, max. 	288 byte; For input and output data respectively
Address space per station	
<ul style="list-style-type: none"> • 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	
<ul style="list-style-type: none"> • Via CM 	1
Number of IO Controllers	
<ul style="list-style-type: none"> • integrated • Via CM 	<p>1</p> <p>0</p>
Rack	
<ul style="list-style-type: none"> • Modules per rack, max. • Quantity of operable ET 200SP modules, max. • Quantity of operable ET 200AL modules, max. • Number of lines, max. 	<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>
PtP CM	
<ul style="list-style-type: none"> • Number of PtP CMs 	the number of connectable PtP CMs is only limited by the number of available slots
Time of day	
Clock	
<ul style="list-style-type: none"> • Type • Backup time • Deviation per day, max. 	<p>Hardware clock</p> <p>6 wk; At 40 °C ambient temperature, typically</p> <p>10 s; Typ.: 2 s</p>
Operating hours counter	
<ul style="list-style-type: none"> • Number 	16
Clock synchronization	
<ul style="list-style-type: none"> • supported • to DP, master • on DP, device • in AS, master • in AS, device • on Ethernet via NTP 	<p>Yes</p> <p>Yes; Via CM DP module</p> <p>Yes; Via CM DP module</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>
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 	<p>Yes; X1 P3; opt. X1 P1 and X1 P2 via BusAdapter BA 2x RJ45</p> <p>3; 1. Integr. + 2. via BusAdapter</p>

<ul style="list-style-type: none"> integrated switch BusAdapter (PROFINET) 	<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 PROFenergy 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 PROFenergy 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 	48; Of which 4 each reserved for ES and HMI 125; In total, up to 512 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
Services	
— Equidistance	No
— Isochronous mode	No
— activation/deactivation of DP devices	Yes
Interface types	
RJ 45 (Ethernet)	
<ul style="list-style-type: none"> • 100 Mbps • Autonegotiation • Autocrossing • Industrial Ethernet status LED 	Yes Yes Yes Yes
RS 485	
• Transmission rate, max.	12 Mbit/s
Protocols	
PROFIsafe	Yes; V2.4 / V2.6
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 	128; via integrated interfaces of the CPU and connected CPs / CMs 10 88 32 16
Redundancy mode	
• H-Sync forwarding	Yes
Media redundancy	
— 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
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. 	Yes; encryption with TLS V1.3 pre-selected Yes Yes Yes Yes See online help (S7 communication, user data size)
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 • SNMP • DCP • LLDP • Encryption 	Yes 64 kbyte Yes Yes 64 kbyte Yes 2 kbyte; 1 472 bytes for UDP broadcast Yes; max. 78 multicast circuits Yes Yes Yes Yes Yes Yes Yes; Optional
Web server	
<ul style="list-style-type: none"> • HTTP • HTTPS • web API <ul style="list-style-type: none"> — Number of sessions, max. 	Yes; Standard and user pages Yes; Standard and user pages 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 of 8 ms (typical value)	14
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]	22.3 kg

eq]		
— 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	
product functions / security / header		
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 / 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 and centralized	
• Number of users	100	
• Number of groups	100	
• Number of roles	50	
programming / cycle time monitoring / header		
• 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	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](#)



[FM](#)

[CCC-Ex](#)

For use in hazardous locations

Functional Safety



[Miscellaneous](#)

[CCC-Ex](#)



[Type Examination Certificate](#)

Maritime application



[NK / Nippon Kaiji Kyokai](#)



Maritime application

other

Environment



[CCS \(China Classification Society\)](#)



[PROFINET](#)



last modified:

12/8/2024