



Figure similar

SIPLUS ET 200SP CPU 1510SP F-1 PN based on 6ES7510-1SK03-0AB0 with conformal coating -40...+60 °C . central processing unit with work memory 300 KB for program and 1 MB for data, 1st interface: PROFINET IRT with 3-port switch, 25 ns bit performance, SIMATIC Memory Card required, BusAdapter required for port 1 and 2

General information	
Product type designation	CPU 1510SP F-1 PN
Firmware version	
• FW update possible	Yes
based on	6ES7510-1SK03-0AB0
Product function	
• I&M data	Yes; I&M0 to I&M3
• Module swapping during operation (hot swapping)	Yes; Multi-hot swapping
• Isochronous mode	Yes; only with PROFINET; with minimum OB 6x cycle of 500 µs
• SysLog	Yes
Engineering with	
• STEP 7 TIA Portal configurable/integrated from version	see entry ID: 109746275
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	
• 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 ² t	0.3 A ² ·s
Power	
Infeed power to the backplane bus	8.05 W
Power loss	
Power loss, typ.	3.5 W
Storage	
Number of slots for SIMATIC memory card	1
SIMATIC memory card required	Yes
Work memory	
• integrated (for program)	300 kbyte
• 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 µs
• 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	
— can be set	Yes
IEC counter	
• Number	Any (only limited by the main memory)
Retentivity	
— can be set	Yes
S7 timer	
• Number	2 048
Retentivity	
— adjustable	Yes
IEC timer	
• Number	Any (only limited by the main memory)
Retentivity	
— can be set	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 BusAdapter

1. Interface

Interface types	
• RJ 45 (Ethernet) • Number of ports • integrated switch • BusAdapter (PROFINET)	Yes; X1 P3; opt. X1 P1 and X1 P2 via BusAdapter BA 2x RJ45 3; 1. integr. + 2. via BusAdapter Yes Yes
Protocols	
• IP protocol • PROFINET IO Controller • PROFINET IO Device • SIMATIC communication • Open IE communication • Web server • Media redundancy	Yes; IPv4 Yes Yes Yes Yes; Optionally also encrypted Yes Yes
PROFINET IO Controller	
Services	
— Isochronous mode — Direct data exchange — IRT — Dynamic Frame Packing (DFP) — PROFINergy — 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	Yes Yes; Requirement: IRT and isochronous mode (MRPD optional) Yes Yes Yes; per user program Yes; Max. 32 PROFINET devices 128; In total, up to 512 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET 64 128 128 8; in total across all interfaces 8 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 1
Update time for IRT	
— 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	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 500 µs to 8 ms 1 ms to 16 ms 2 ms to 32 ms 4 ms to 64 ms Update time = set "odd" send clock (any multiple of 125 µs: 375 µs, 625 µs ... 3 875 µs)
Update time for RT	
— 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	250 µs to 128 ms 500 µs to 256 ms 1 ms to 512 ms 2 ms to 512 ms 4 ms to 512 ms
PROFINET IO Device	
Services	
— Isochronous mode — IRT — Dynamic Frame Packing (DFP) — PROFINergy — Prioritized startup — Shared device — Number of IO Controllers with shared device, max. — activation/deactivation of I-devices — Asset management record — PROFINET Security Class	No Yes No Yes; per user program Yes Yes 4 Yes; per user program Yes; per user program SNMP Configuration and DCP Read Only

2. Interface	
Interface types	
• RS 485	Yes; Via CM DP module
• Number of ports	1
Protocols	
• PROFIBUS DP master	Yes
• PROFIBUS DP device	Yes
• SIMATIC communication	Yes
PROFIBUS DP master	
• Number of connections, max.	48; Of which 4 each reserved for ES and HMI
• max. number of DP devices	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)	
• 100 Mbps	Yes
• Autonegotiation	Yes
• Autocrossing	Yes
• Industrial Ethernet status LED	Yes
RS 485	
• Transmission rate, max.	12 Mbit/s
Protocols	
PROFIsafe	Yes; V2.4 / V2.6
Number of connections	
• Number of connections, max.	128; via integrated interfaces of the CPU and connected CPs / CMs
• Number of connections reserved for ES/HMI/web	10
• Number of connections via integrated interfaces	88
• Number of connections per CP/CM	32
• Number of S7 routing paths	16
Redundancy mode	
• PROFINET system redundancy (S2)	No
• PROFINET system redundancy (R1)	No
• 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	
• PG/OP communication	Yes; encryption with TLS V1.3 pre-selected
• S7 routing	Yes
• Data record routing	Yes
• S7 communication, as server	Yes
• S7 communication, as client	Yes
• User data per job, max.	See online help (S7 communication, user data size)
Open IE communication	
• TCP/IP	Yes
— Data length, max.	64 kbyte
— several passive connections per port, supported	Yes
• ISO-on-TCP (RFC1006)	Yes
— Data length, max.	64 kbyte
• UDP	Yes
— Data length, max.	2 kbyte; 1 472 bytes for UDP broadcast

— UDP multicast • DHCP • DNS • SNMP • DCP • LLDP • encryption	Yes; max. 78 multicast circuits Yes Yes Yes Yes Yes Yes; Optional
Web server	
• HTTP • HTTPS • web API — Number of sessions, max. — number of simultaneous HTTP calls, max. — HTTP request body, max.	Yes; Standard and user pages Yes; Standard and user pages 50 4 131 072 byte
OPC UA	
• Runtime license required • OPC UA Client — Application authentication — Security policies — User authentication — Number of connections, max. — Number of nodes of the client interfaces, recommended max. — Number of elements for one call of OPC-UA_NodeGetHandleList/OPC-UA_ReadList/OPC-UA_WriteList, max. — Number of elements for one call of OPC-UA_NameSpaceGetIndexList, max. — Number of elements for one call of OPC-UA_MethodGetHandleList, max. — Number of simultaneous calls of the client instructions for session management, per connection, max. — Number of simultaneous calls of the client instructions for data access, per connection, max. — Number of registerable nodes, max. — Number of registerable method calls of OPC-UA_MethodCall, max. — Number of inputs/outputs when calling OPC-UA_MethodCall, max. • OPC UA Server — Application authentication — Security policies — User authentication — GDS support (certificate management) — Number of sessions, max. — Number of accessible variables, max. — Number of registerable nodes, max. — Number of subscriptions per session, max. — Sampling interval, min. — Publishing interval, min. — Number of server methods, max. — Number of inputs/outputs per server method, max. — Number of monitored items, recommended max. — Number of server interfaces, max. — Number of nodes for user-defined server interfaces, max. • Alarms and Conditions — Number of program alarms	Yes; "Small" license required Yes; Data Access (registered Read/Write), Method Call Yes Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256 "anonymous" or by user name & password 4 1 000 300 20 100 1 5 5 000 100 20 Yes; data access (read, write, subscribe), method call, alarms & condition (A&C), custom address space, role-based access control Yes available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256, Aes128Sha256RsaOaep, Aes256Sha256RsaPss "anonymous" or by user name & password Yes 32 50 000 10 000 50 100 ms 200 ms 20; max. 20 concurrently running jobs each for asynchronous instructions OPC-UA_ServerMethodPre and OPC-UA_ServerMethodPost 20 4 000; for 1 s sampling interval and 1 s send interval 10 of each "Server interfaces" / "Companion specification" type and 20 of the type "Reference namespace" 15 000 Yes 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 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.	-40 °C; = Tmin (incl. condensation/frost)
• horizontal installation, max.	60 °C; = Tmax
• vertical installation, min.	-40 °C; = Tmin
• vertical installation, max.	50 °C; = Tmax
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
Relative humidity	
• With condensation, tested in accordance with IEC 60068-2-38, max.	100 %; RH incl. condensation / frost (no commissioning in bedewed state), horizontal installation
Resistance	
Coolants and lubricants	
— Resistant to commercially available coolants and lubricants	Yes; Incl. diesel and oil droplets in the air
Use in stationary industrial systems	
— to biologically active substances according to EN 60721-3-3	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna); Class 3B3 on request
— to chemically active substances according to EN 60721-3-3	Yes; Class 3C4 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *
— to mechanically active substances according to EN 60721-3-3	Yes; Class 3S4 incl. sand, dust, *
— Against mechanical environmental conditions acc. to EN 60721-3-3	Yes; Class 3M8 using the SIPLUS Mounting Kit ET 200SP (6AG1193-6AA00-0AA0//6AG1193-6AB00-0AA0)
Use on ships/at sea	
— to biologically active substances according to EN 60721-3-6	Yes; Class 6B2 mold, fungal and dry rot spores (excluding fauna)
— to chemically active substances according to EN 60721-3-6	Yes; Class 6C3 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *

— to mechanically active substances according to EN 60721-3-6	Yes; Class 6S3 incl. sand, dust; *		
— Against mechanical environmental conditions acc. to EN 60721-3-6	Yes; class 6M4 using the SIPLUS Mounting Kit ET 200SP (6AG1193-6AA00-0AA0/6AG1193-6AB00-0AA0)		
Usage in industrial process technology			
— Against chemically active substances acc. to EN 60654-4	Yes; Class 3 (excluding trichlorethylene)		
— Environmental conditions for process, measuring and control systems acc. to ANSI/ISA-71.04	Yes; Level GX group A/B (excluding trichlorethylene; harmful gas concentrations up to the limits of EN 60721-3-3 class 3C4 permissible); level LC3 (salt spray) and level LB3 (oil)		
Remark			
— Note regarding classification of environmental conditions acc. to EN 60721, EN 60654-4 and ANSI/ISA-71.04	* The supplied plug covers must remain in place over the unused interfaces during operation!		
Conformal coating			
• Coatings for printed circuit board assemblies acc. to EN 61086	Yes; Class 2 for high reliability		
• Protection against fouling acc. to EN 60664-3	Yes; Type 1 protection		
• Military testing according to MIL-I-46058C, Amendment 7	Yes; Discoloration of coating possible during service life		
• Qualification and Performance of Electrical Insulating Compound for Printed Board Assemblies according to IPC-CC-830A	Yes; Conformal coating, Class A		
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](#)


[China RoHS](#)



General Product Approval	EMV	For use in hazardous locations
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[TUEV](#)
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[CCC-Ex](#)

For use in hazardous locations	Functional Safety	Maritime application	Environment
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