



SIPLUS ET 200SP CPU 1512SP-1 PN -40...+60°C with conformal coating based on 6ES7512-1DK01-0AB0 . CPU 1512SP-1 PN for ET 200SP, Central processing unit with Work memory 200 KB for program and 1 MB for data, first interface: PROFINET IRT with 3-port switch, 48 ns bit performance, SIMATIC Memory Card required, BusAdapter required for port 1 and 2

Figure similar

General information	
Product type designation	CPU 1512SP-1 PN
Product function	
• Isochronous mode	Yes; Only with PROFINET; with minimum OB 6x cycle of 625 µs
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)	0.6 A
Inrush current, max.	4.7 A; Rated value
$I^2t$	0.14 A <sup>2</sup> ·s

### Power

Infeed power to the backplane bus	8.75 W
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### Power loss

Power loss, typ.	5.6 W
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### Memory

Number of slots for SIMATIC memory card	1
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SIMATIC memory card required	Yes
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### Work memory

<ul style="list-style-type: none"> <li>integrated (for program)</li> </ul>	200 kbyte
<ul style="list-style-type: none"> <li>integrated (for data)</li> </ul>	1 Mbyte

### Load memory

<ul style="list-style-type: none"> <li>Plug-in (SIMATIC Memory Card), max.</li> </ul>	32 Gbyte
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### Backup

<ul style="list-style-type: none"> <li>maintenance-free</li> </ul>	Yes
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### CPU processing times

for bit operations, typ.	48 ns
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for word operations, typ.	58 ns
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for fixed point arithmetic, typ.	77 ns
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for floating point arithmetic, typ.	307 ns
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### CPU-blocks

Number of elements (total)	2 000; In addition to blocks such as DBs, FBs and FCs, UDTs, global constants, etc. are also regarded as elements
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### DB

<ul style="list-style-type: none"> <li>Number range</li> </ul>	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"> <li>Size, max.</li> </ul>	1 Mbyte; For DBs with absolute addressing, the max. size is 64 KB

### FB

<ul style="list-style-type: none"> <li>Number range</li> </ul>	0 ... 65 535
<ul style="list-style-type: none"> <li>Size, max.</li> </ul>	200 kbyte

### FC

<ul style="list-style-type: none"> <li>Number range</li> </ul>	0 ... 65 535
<ul style="list-style-type: none"> <li>Size, max.</li> </ul>	200 kbyte

### OB

<ul style="list-style-type: none"> <li>Size, max.</li> </ul>	200 kbyte
<ul style="list-style-type: none"> <li>Number of free cycle OBs</li> </ul>	100
<ul style="list-style-type: none"> <li>Number of time alarm OBs</li> </ul>	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

### Counters, timers and their retentivity

<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

### Data areas and their retentivity

Retentive data area (incl. timers, counters, flags), max.	128 kbyte; Available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 88 KB
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<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>Local data</b>	
• per priority class, max.	64 kbyte; max. 16 KB per block

### Address area

Number of IO modules	2 048; max. number of modules / submodules
<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
<b>per integrated IO subsystem</b>	
— Inputs (volume)	8 kbyte
— Outputs (volume)	8 kbyte
<b>per CM/CP</b>	
— Inputs (volume)	8 kbyte
— Outputs (volume)	8 kbyte
<b>Subprocess images</b>	
• Number of subprocess images, max.	32
<b>Address space per module</b>	
• Address space per module, max.	32 byte; For input and output data respectively
<b>Address space per station</b>	
• Address space per station, max.	1 280 byte; for central inputs and outputs; depending on configuration
<b>Hardware configuration</b>	
Number of distributed IO systems	20
<b>Number of DP masters</b>	
• Via CM	1
<b>Number of IO Controllers</b>	
• integrated	1
• Via CM	0
<b>Rack</b>	
• Modules per rack, max.	64; CPU + 64 modules + server module (mounting width max. 1 m)
• 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
• Backup time	6 wk; At 40 °C ambient temperature, typically
• Deviation per day, max.	10 s; Typ.: 2 s
<b>Operating hours counter</b>	
• Number	16
<b>Clock synchronization</b>	
• supported	Yes
• to DP, master	Yes; Via CM DP module
• to DP, slave	Yes; Via CM DP module

- in AS, master
- in AS, slave
- on Ethernet via NTP

Yes
Yes
Yes

### Interfaces

Number of PROFINET interfaces	1
Number of PROFIBUS interfaces	1; Via CM DP module
Optical interface	Yes; Via BusAdapter BA 2x SCRJ

### 1. Interface

#### Interface types

- Number of ports: 3; 1. integr. + 2. via BusAdapter
- integrated switch: Yes
- RJ 45 (Ethernet): Yes; X1
- BusAdapter (PROFINET): Yes; Applicable BusAdapter: BA 2x RJ45, BA 2x FC, BA 2x SCRJ, BA SCRJ / RJ45, BA SCRJ / FC

#### Protocols

- PROFINET IO Controller: Yes
- PROFINET IO Device: Yes
- SIMATIC communication: Yes
- Open IE communication: Yes
- Web server: Yes
- Media redundancy: Yes

### PROFINET IO Controller

#### Services

- PG/OP communication: Yes
- S7 routing: Yes
- Isochronous mode: Yes
- Direct data exchange: Yes; Requirement: IRT and isochronous mode (MRPD optional)
- IRT: Yes
- MRP: Yes; as MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50
- MRPD: Yes; Requirement: IRT
- PROFINergy: Yes
- Prioritized startup: Yes; Max. 32 PROFINET devices
- Number of connectable IO Devices, max.: 128; In total, up to 253 distributed I/O devices can be connected via PROFIBUS or PROFINET
- Of which IO devices with IRT, 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; in total across all interfaces
- 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 250  $\mu$ s

250  $\mu$ s to 4 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 500  $\mu$ s of the isochronous OB is decisive

— for send cycle of 500  $\mu$ s

500  $\mu$ s to 8 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 625  $\mu$ s of the isochronous OB is decisive

— 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 250  $\mu$ s

250  $\mu$ s to 128 ms

— 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

— PG/OP communication

Yes

— S7 routing

Yes

— Isochronous mode

No

— IRT

Yes

— MRP

Yes

— MRPD

Yes

— PROFINergy

Yes

— Shared device

Yes

— Number of IO Controllers with shared device, max.

4

## 2. Interface

### Interface types

• Number of ports

1

• RS 485

Yes; Via CM DP module

### Protocols

• PROFIBUS DP master

Yes

• PROFIBUS DP slave

Yes

• SIMATIC communication

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	
Number of connections	
• Number of connections, max.	88
• Number of connections reserved for ES/HMI/web	10
• Number of connections via integrated interfaces	88
• Number of S7 routing paths	16
Redundancy mode	
Media redundancy	
— MRP	Yes; as MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50
— Switchover time on line break, typ.	200 ms
— Number of stations in the ring, max.	50
SIMATIC communication	
• 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.	1 472 byte
• DHCP	No
• SNMP	Yes
• DCP	Yes
• LLDP	Yes
Web server	
• HTTP	Yes; Standard and user-defined pages
• HTTPS	Yes; Standard and user-defined pages
PROFIBUS DP master	

• Number of connections, max.	48
<b>Services</b>	
— PG/OP communication	Yes
— S7 routing	Yes
— Data record routing	Yes
— Isochronous mode	No
— Equidistance	No
— Number of DP slaves	125
— Activation/deactivation of DP slaves	Yes
<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.	5 000
Number of simultaneously active program alarms	
• Number of program alarms	300
• Number of alarms for system diagnostics	100
• Number of alarms for motion technology objects	80
<b>Test commissioning functions</b>	
Joint commission (Team Engineering)	Yes; Parallel online access possible for up to 3 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, DBs, distributed I/Os, timers, counters
• Number of variables, max.	
— of which status variables, max.	200; per job
— of which control variables, max.	200; per job
<b>Forcing</b>	
• Forcing	Yes
• Forcing, variables	Peripheral inputs/outputs
• Number of variables, max.	200
<b>Diagnostic buffer</b>	
• present	Yes
• Number of entries, max.	1 000
— of which powerfail-proof	500
<b>Traces</b>	
• Number of configurable Traces	4; Up to 512 KB of data per trace are possible



## 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
<ul style="list-style-type: none"> <li>• Speed-controlled axis                             <ul style="list-style-type: none"> <li>— Number of speed-controlled axes, max.</li> </ul> </li> </ul>	6; Requirement: There must be no other motion technology objects created; note: The number of axes affects the cycle time of the PLC program; selection guide via the TIA Selection Tool
<ul style="list-style-type: none"> <li>• Positioning axis                             <ul style="list-style-type: none"> <li>— Number of positioning axes, max.</li> </ul> </li> </ul>	6; Requirement: There must be no other motion technology objects created; note: The number of axes affects the cycle time of the PLC program; selection guide via the TIA Selection Tool
<ul style="list-style-type: none"> <li>• Synchronized axes (relative gear synchronization)                             <ul style="list-style-type: none"> <li>— Number of axes, max.</li> </ul> </li> </ul>	3; Requirement: There must be no other motion technology objects created; note: The number of axes affects the cycle time of the PLC program; selection guide via the TIA Selection Tool
<ul style="list-style-type: none"> <li>• External encoders                             <ul style="list-style-type: none"> <li>— Number of external encoders, max.</li> </ul> </li> </ul>	6; Requirement: There must be no other motion technology objects created; note: The number of axes affects the cycle time of the PLC program; selection guide via the TIA Selection Tool
Controller	
<ul style="list-style-type: none"> <li>• PID_Compact</li> </ul>	Yes; Universal PID controller with integrated optimization
<ul style="list-style-type: none"> <li>• PID_3Step</li> </ul>	Yes; PID controller with integrated optimization for valves
<ul style="list-style-type: none"> <li>• PID-Temp</li> </ul>	Yes; PID controller with integrated optimization for temperature
Counting and measuring	
<ul style="list-style-type: none"> <li>• High-speed counter</li> </ul>	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

<ul style="list-style-type: none"> <li>• Ambient air temperature-barometric pressure-altitude</li> </ul>	<p>Tmin ... Tmax at 1 140 hPa ... 795 hPa (-1 000 m ... +2 000 m) // Tmin ... (Tmax - 10 K) at 795 hPa ... 658 hPa (+2 000 m ... +3 500 m) // Tmin ... (Tmax - 20 K) at 658 hPa ... 540 hPa (+3 500 m ... +5 000 m)</p>
<b>Relative humidity</b>	
<ul style="list-style-type: none"> <li>• With condensation, tested in accordance with IEC 60068-2-38, max.</li> </ul>	100 %; RH incl. condensation / frost (no commissioning in bedewed state), horizontal installation
<b>Resistance</b>	
<b>Coolants and lubricants</b>	
— Resistant to commercially available coolants and lubricants	Yes; Incl. diesel and oil droplets in the air
<b>Use in stationary industrial systems</b>	
— 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 according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!
— to mechanically active substances according to EN 60721-3-3	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!
— Against mechanical environmental conditions acc. to EN 60721-3-3	Yes; Class 3M8 using the SIPLUS Mounting Kit ET 200SP (6AG1193-6AA00-0AA0)
<b>Use on ships/at sea</b>	
— to biologically active substances according to EN 60721-3-6	Yes; Class 6B2 mold and fungal spores (excluding fauna); Class 6B3 on request
— 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)
<b>Usage in industrial process technology</b>	
— 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)
<b>Remark</b>	
— 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!
<b>Conformal coating</b>	
<ul style="list-style-type: none"> <li>• Coatings for printed circuit board assemblies acc. to EN 61086</li> </ul>	Yes; Class 2 for high reliability
<ul style="list-style-type: none"> <li>• Protection against fouling acc. to EN 60664-3</li> </ul>	Yes; Type 1 protection

- Military testing according to MIL-I-46058C, Amendment 7
- Qualification and Performance of Electrical Insulating Compound for Printed Board Assemblies according to IPC-CC-830A

Yes; Discoloration of coating possible during service life

Yes; Conformal coating, Class A

## Configuration

### Programming

#### Programming language

— LAD	Yes
— FBD	Yes
— STL	Yes
— SCL	Yes
— 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

## Dimensions

Width	100 mm
Height	117 mm
Depth	75 mm

## Weights

Weight, approx.	310 g
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**last modified:** 05/26/2020