



SIMATIC DP, CPU 1512SP-1 PN for ET 200SP, Central processing unit with Work memory 200 KB for program and 1 MB for data, 1st interface: PROFINET IRT with 3-port switch, 48 ns bit performance, SIMATIC Memory Card required, BusAdapter required for Port 1 and 2

General information	
Product type designation	CPU 1512SP-1 PN
HW functional status	FS05
Firmware version	V2.9
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 625 μ s
Engineering with	
<ul style="list-style-type: none"> STEP 7 TIA Portal configurable/integrated from version 	V17 (FW V2.9) / V13 SP1 Update 4 (FW V1.8) or higher
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 	5 ms
Input current	
Current consumption (rated value)	0.6 A
Current consumption, max.	0.9 A
Inrush current, max.	4.7 A; Rated value
I^2t	0.14 A ² ·s
Power	
Infeed power to the backplane bus	8.75 W
Power loss	
Power loss, typ.	5.6 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) 	200 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	
• maintenance-free	Yes
CPU processing times	
for bit operations, typ.	48 ns
for word operations, typ.	58 ns
for fixed point arithmetic, typ.	77 ns
for floating point arithmetic, typ.	307 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.	200 kbyte
FC	
• Number range	0 ... 65 535
• Size, max.	200 kbyte
OB	
• Size, max.	200 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 500 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
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.	128 kbyte; Available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 88 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>80; 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 • to DP, slave • in AS, master • in AS, slave • 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 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; 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,

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; MRP Automanager according to IEC 62439-2 Edition 2.0

PROFINET IO Controller

Services

- PG/OP communication
- Isochronous mode
- Direct data exchange
- IRT
- PROFIenergy
- 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

Yes
 Yes
 Yes; Requirement: IRT and isochronous mode (MRPD optional)
 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

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

- PG/OP communication
- Isochronous mode
- IRT
- PROFIenergy
- Shared device
- Number of IO Controllers with shared device, max.
- activation/deactivation of I-devices
- Asset management record

Yes
 No
 Yes
 Yes; per user program
 Yes
 4
 Yes; per user program
 Yes; per user program

2. Interface

Interface types

<ul style="list-style-type: none"> • RS 485 	Yes; Via CM DP module
<ul style="list-style-type: none"> • Number of ports 	1
Protocols	
<ul style="list-style-type: none"> • PROFIBUS DP master 	Yes
<ul style="list-style-type: none"> • PROFIBUS DP slave 	Yes
<ul style="list-style-type: none"> • SIMATIC communication 	Yes
PROFIBUS DP master	
<ul style="list-style-type: none"> • Number of connections, max. 	48; Of which 4 each reserved for ES and HMI
<ul style="list-style-type: none"> • Number of DP slaves, max. 	125; In total, up to 512 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
Services	
<ul style="list-style-type: none"> — PG/OP communication 	Yes
<ul style="list-style-type: none"> — Equidistance 	No
<ul style="list-style-type: none"> — Isochronous mode 	No
<ul style="list-style-type: none"> — Activation/deactivation of DP slaves 	Yes
Interface types	
RJ 45 (Ethernet)	
<ul style="list-style-type: none"> • 100 Mbps 	Yes
<ul style="list-style-type: none"> • Autonegotiation 	Yes
<ul style="list-style-type: none"> • Autocrossing 	Yes
<ul style="list-style-type: none"> • Industrial Ethernet status LED 	Yes
RS 485	
<ul style="list-style-type: none"> • Transmission rate, max. 	12 Mbit/s
Protocols	
PROFIsafe	No
Number of connections	
<ul style="list-style-type: none"> • Number of connections, max. 	128; via integrated interfaces of the CPU and connected CPs / CMs
<ul style="list-style-type: none"> • Number of connections reserved for ES/HMI/web 	10
<ul style="list-style-type: none"> • Number of connections via integrated interfaces 	88
<ul style="list-style-type: none"> • Number of connections per CP/CM 	32
<ul style="list-style-type: none"> • Number of S7 routing paths 	16
Redundancy mode	
<ul style="list-style-type: none"> • H-Sync forwarding 	Yes
Media redundancy	
<ul style="list-style-type: none"> — Media redundancy 	Yes; only via BusAdapter
<ul style="list-style-type: none"> — MRP 	Yes; MRP Automanager according to IEC 62439-2 Edition 2.0, MRP Manager; MRP Client
<ul style="list-style-type: none"> — MRP interconnection, supported 	Yes; as MRP ring node according to IEC 62439-2 Edition 3.0
<ul style="list-style-type: none"> — MRPD 	Yes; Requirement: IRT
<ul style="list-style-type: none"> — Switchover time on line break, typ. 	200 ms; For MRP, bumpless for MRPD
<ul style="list-style-type: none"> — Number of stations in the ring, max. 	50
SIMATIC communication	
<ul style="list-style-type: none"> • PG/OP communication 	Yes; encryption with TLS V1.3 pre-selected
<ul style="list-style-type: none"> • S7 routing 	Yes
<ul style="list-style-type: none"> • Data record routing 	Yes
<ul style="list-style-type: none"> • S7 communication, as server 	Yes
<ul style="list-style-type: none"> • S7 communication, as client 	Yes
<ul style="list-style-type: none"> • User data per job, max. 	See online help (S7 communication, user data size)
Open IE communication	
<ul style="list-style-type: none"> • TCP/IP 	Yes
<ul style="list-style-type: none"> — Data length, max. 	64 kbyte
<ul style="list-style-type: none"> — several passive connections per port, supported 	Yes
<ul style="list-style-type: none"> • ISO-on-TCP (RFC1006) 	Yes
<ul style="list-style-type: none"> — Data length, max. 	64 kbyte
<ul style="list-style-type: none"> • UDP 	Yes
<ul style="list-style-type: none"> — Data length, max. 	2 kbyte; 1 472 bytes for UDP broadcast
<ul style="list-style-type: none"> — UDP multicast 	Yes; Max. 5 multicast circuits
<ul style="list-style-type: none"> • DHCP 	Yes
<ul style="list-style-type: none"> • DNS 	Yes
<ul style="list-style-type: none"> • SNMP 	Yes

• DCP	Yes
• LLDP	Yes
• Encryption	Yes; Optional
Web server	
• HTTP	Yes; Standard and user pages
• HTTPS	Yes; Standard and user pages
OPC UA	
• Runtime license required	Yes; "Small" license required
• OPC UA Client	Yes
— 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, max.	1 000
— Number of elements for one call of OPC-UA-NodeGetHandleList/OPC-UA-ReadList/C 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 per connection (except OPC-UA-ReadList, OPC-UA-WriteList, OPC-UA-M max.	1
— Number of simultaneous calls of the client instructions OPC-UA-ReadList, OPC-UA-WriteList and OPC-UA-MethodCall, 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, custom address space
— Application authentication	Yes
— Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
— 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.	20
— Sampling interval, min.	100 ms
— Publishing interval, min.	500 ms
— Number of server methods, max.	20
— Number of inputs/outputs per server method, max.	20
— Number of monitored items, max.	1 000; 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.	1 000
• 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
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.	2 500
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	No
Number of breakpoints	8
Status/control	
<ul style="list-style-type: none"> • Status/control variable • Variables • Number of variables, max. <ul style="list-style-type: none"> — of which status variables, max. — of which control variables, max. 	<p>Yes</p> <p>Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters</p> <p>200; per job</p> <p>200; per job</p>
Forcing	
<ul style="list-style-type: none"> • Forcing • Forcing, variables • Number of variables, max. 	<p>Yes</p> <p>Peripheral inputs/outputs</p> <p>200</p>
Diagnostic buffer	
<ul style="list-style-type: none"> • present • Number of entries, max. <ul style="list-style-type: none"> — of which powerfail-proof 	<p>Yes</p> <p>1 000</p> <p>500</p>
Traces	
<ul style="list-style-type: none"> • Number of configurable Traces 	4; Up to 512 KB of data per trace are possible
Interrupts/diagnostics/status information	
Diagnostics indication LED	
<ul style="list-style-type: none"> • RUN/STOP LED • ERROR LED • MAINT LED • Monitoring of the supply voltage (PWR-LED) • Connection display LINK TX/RX 	<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>
Supported technology objects	
<p>Motion Control</p> <ul style="list-style-type: none"> • Number of available Motion Control resources for technology objects • Required Motion Control resources <ul style="list-style-type: none"> — per speed-controlled axis — per positioning axis — per synchronous axis — per external encoder — per output cam — per cam track — 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>Yes; Note: The number of technology objects affects the cycle time of the PLC program; selection guide via the TIA Selection Tool</p> <p>800</p> <p>40</p> <p>80</p> <p>160</p> <p>80</p> <p>20</p> <p>160</p> <p>40</p> <p>5</p> <p>10</p>
<p>Controller</p> <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>
<p>Counting and measuring</p> <ul style="list-style-type: none"> • High-speed counter 	Yes
Ambient conditions	
Ambient temperature during operation	
<ul style="list-style-type: none"> • horizontal installation, min. • horizontal installation, max. • vertical installation, min. • vertical installation, max. 	<p>-25 °C; No condensation</p> <p>60 °C</p> <p>-25 °C; No condensation</p> <p>50 °C</p>

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
— 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 of confidential configuration data	Yes
• Protection level: Write protection	Yes
• Protection level: Read/write protection	Yes
• Protection level: Complete protection	Yes
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.	310 g
last modified:	5/5/2022 