SIEMENS

Data sheet



SIMATIC DP, CPU 1512SP F-1 PN for ET 200SP, Central processing unit with Work memory 300 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 F-1 PN
HW functional status	FS05
Firmware version	V2.9
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 $625~\mu s$
Engineering with	
 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	
 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
l²t	0.14 A²·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	
• 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.	48 ns
for word operations, typ.	58 ns
	77 ns
for fixed point arithmetic, typ. for floating point arithmetic, typ.	307 ns
CPU-blocks	307 118
	4 000 Plants (OR ER EO DR) and URT-
Number of elements (total)	4 000; Blocks (OB, FB, FC, DB) and UDTs
DB	4 00 000 1 11 11 11 1 1 1 1 1 1 1 1 1 1
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 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; 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.	128 kbyte; Available retentive memory for bit memories, timers, counters, DBs,
assa a. sa (iioi. timoro, southolo, nago), max.	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	
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.	80; 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	31010
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	10 0, 1, yp.: 2 0
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	ι ου, για συσπααριοί
Interface types	Voc. V1 P2: opt. V1 P1 and V1 P2 via PunAdantar P1 Ov. P.145
RJ 45 (Ethernet) Number of ports	Yes; X1 P3; opt. X1 P1 and X1 P2 via BusAdapter BA 2x RJ45
Number of ports integrated switch	3; 1. integr. + 2. via BusAdapter
• integrated switch	Yes
BusAdapter (PROFINET) Protocole	Yes; compatible BusAdapters: BA 2x RJ45, BA 2x FC, BA 2x M12
Protocols	Vac ID d
IP protocol	Yes; IPv4

PROFINET IO Controller	Yes
PROFINET IO Device	Yes
 SIMATIC communication 	Yes
Open IE communication	Yes; Optionally also encrypted
Web server	Yes
Media redundancy	Yes; MRP Automanager according to IEC 62439-2 Edition 2.0
PROFINET IO Controller	
Services	
— PG/OP communication	Yes
— Isochronous mode	Yes
Direct data exchange	Yes; Requirement: IRT and isochronous mode (MRPD optional)
— IRT	Yes
— PROFlenergy	Yes; per user program
— Prioritized startup	Yes; Max. 32 PROFINET devices
Number of connectable IO Devices, max.	128; In total, up to 512 distributed I/O devices can be connected via AS-i,
— Number of confidentable to Devices, max.	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	8; in total across all interfaces
activated/deactivated, max.	-,
 Number of IO Devices per tool, max. 	8
— Updating times	The minimum value of the update time also depends on communication share
. 0	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	$250~\mu s$ 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
— for send cycle of 500 μs	500 μs to 8 ms
— 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 μ s: 375 μ s, 625 μ s 3 875 μ s)
Update time for RT	0.0 μ0)
— for send cycle of 250 μs	250 μs to 128 ms
— for send cycle of 500 μs	500 μs 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	4 113 to 312 113
Services	
	Voc
— PG/OP communication	Yes
— Isochronous mode	No V
— IRT	Yes
— PROFlenergy	Yes; per user program
— Shared device	Yes
Number of IO Controllers with shared device, max.	4
 activation/deactivation of I-devices 	Yes; per user program
Asset management record	Yes; per user program
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
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Services	

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Isochronous mode activation/deactivation of DP devices Yes Interface types	— PG/OP communication	Yes
Interface types		
Interface types RJ 45 (Efferent)		
RJ 45 (Ethernet) • 100 Mbps • Autorogostiag • Autorosiag • Industrial Ethernet status LED RS 485 • Transmission rate, max. 12 Mbl/s Protocols PROFisafe Yes; V2.4 / V2.6 Number of connections • Number of connections, max. • Number of connections searved for ES/HMI/web • Number of connections searved for ES/HMI/web • Number of connections vai integrated interfaces • Number of connections vai integrated interfaces • Number of connections ber CP/CM • Number of S7 routing paths 16 Redundancy mode • H-Sync forwarding Media redundancy — MRP — MRP interconnection, supported — MRPD — Switchover time on line break, typ. — Number of stations in the ring, max. SIMATIC communication • PG/OP communication • PG/OP communication • PG/OP communication • S7 routing • Data record routing • S7 communication, as server • S8 communication, as server • S8 communication, as server • S9 communication • TCP/IP — Data length, max. — several passive connections per port, supported • ISO-on-TCP (REC1006) — Data length, max. — UDP — Data length, max. — UDP — Data length, max. — UDP witicast • UDP — Data length, max. — UDP witicast • UDP — Data length, max. — UDP multicast • UDP — Data length, max. — Ves; MRP Districted interfaces of the CPU and connected CPs / CMs 128, via integrated interfaces of the CPU and connected CPs / CMs 128, via integrated interfaces of the CPU and connected CPs / CMs 128, via integrated interfaces of the CPU and connected CPs / CMs 128, via integrated interfaces of the CPU and connected CPs / CMs 128, via integrated interfaces of the CPU and connected CPs / CMs 128, via integrated inte		Yes
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	MRP interconnection, supported	
- Switchover time on line break, typ Number of stations in the ring, max. SIMATIC communication • PG/OP communication • PG/OP communication • S7 routing • Data record routing • S7 communication, as server • S7 communication, as client • User data per job, max. Open IE communication • TCP/IP - Data length, max several passive connections per port, supported • ISO-on-TCP (RFC1006) - Data length, max. • UDP - Data length, max UDP multicast • DHCP 200 ms; For MRP, bumpless for MRPD 50 50 Som MRP, bumpless for MRPD 50 Yes; encryption with TLS V1.3 pre-selected Yes Yes Yes Yes Yes Yes • Se online help (S7 communication, user data size) Yes 64 kbyte Yes • ISO-on-TCP (RFC1006) - Data length, max. • UDP - Data length, max UDP multicast Yes; Max. 5 multicast circuits Yes	**	
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— UDP multicast◆ DHCPYes; Max. 5 multicast circuitsYes		
• DHCP Yes	5 ·	
2.10		
• SNMP Yes		
• DCP Yes		
• LLDP Yes		
• Encryption Yes; Optional		
Web server		1 co, optional
HTTP Yes; Standard and user pages		Yes: Standard and user names
HTTPS Yes; Standard and user pages OPC UA		res, stantiant and user pages
		Voc
Runtime license required Yes ODC LIA Client	·	
OPC UA Client Yes Application outbooking to the properties to the properties of the properti		
— Application authentication Yes		
— Security policies Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256	— Security policies	

Lloor outbonties	"Ion any many all as by year name 0 naces year
User authentication	"anonymous" or by user name & password
— Number of connections, max.— Number of nodes of the client interfaces,	1 000
recommended max.	1 000
 Number of elements for one call of 	300
OPC_UA_NodeGetHandleList/OPC_UA_ReadList/OPC_I max.	
Number of elements for one call of	20
OPC_UA_NameSpaceGetIndexList, max.	
 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, custom address space
Application authentication	Yes
— Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
— User authentication	"anonymous" or by user name & password
 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, recommended 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
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	
Status/control variable	Yes; without fail-safe
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
Forcing	
Forcing	Yes; without fail-safe
 Forcing, variables 	Peripheral inputs/outputs
Number of variables, max.	200
Diagnostic buffer	
• present	Yes
 Number of entries, max. 	1 000
<u> </u>	

— of which powerfail-proof	500
Traces	
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; 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 	800
Required Motion Control resources	
— per speed-controlled axis	40
— per positioning axis	80
per positioning axis per synchronous axis	160
— per synchronous axis — per external encoder	80
•	20
— per output cam — per cam track	160
— per cam track — per probe	40
Positioning axis	10
 Number of positioning axes at motion control cycle of 4 ms (typical value) 	5
Number of positioning axes at motion control cycle of 8 ms (typical value)	10
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	
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	e 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
Ambient conditions	
Ambient temperature during operation	
 horizontal installation, min. 	-25 °C; No condensation
 horizontal installation, max. 	0°C
 vertical installation, min. 	-25 °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
— 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
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