Data sheet

SIMATIC S7-1500, CPU 1517-3 PN/DP, Central processing unit with work memory 2 MB for Program and 8 MB for data, 1st interface: PROFINET IRT with 2-port switch, 2nd interface: PROFINET RT, 3rd interface: PROFIBUS, 2 ns bit performance, SIMATIC Memory Card required



General information	
Product type designation	CPU 1517-3 PN/DP
HW functional status	FS08
Firmware version	V2.8
Product function	
● I&M data	Yes; I&M0 to I&M3
• Isochronous mode	Yes; Distributed and central; with minimum OB $6x$ cycle of $250~\mu s$ (distributed) and 1 ms (central)
Engineering with	
 STEP 7 TIA Portal configurable/integrated from version 	V16 (FW V2.8) / V13 Update 3 (FW V1.6) or higher
Configuration control	
via dataset	Yes
Display	
Screen diagonal [cm]	6.1 cm
Control elements	
Number of keys	6
Mode selector switch	1

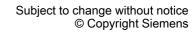
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Cupply voltors	
Supply voltage Type of supply voltage	24 V DC
<u> </u>	
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Mains buffering	
Mains/voltage failure stored energy time	5 ms
Repeat rate, min.	1/s
Input current	
Current consumption (rated value)	1.55 A
Inrush current, max.	2.4 A; Rated value
l²t	0.02 A ² ·s
Power	
Infeed power to the backplane bus	12 W
Power consumption from the backplane bus	30 W
(balanced)	
Power loss	
Power loss, typ.	24 W
Memory	
Number of slots for SIMATIC memory card	1
SIMATIC memory card required	Yes
Work memory	
• integrated (for program)	2 Mbyte
• integrated (for data)	8 Mbyte
Load memory	
Plug-in (SIMATIC Memory Card), max.	32 Gbyte
Backup	
maintenance-free	Yes
CPU processing times	
for bit operations, typ.	2 ns
for word operations, typ.	3 ns
for fixed point arithmetic, typ.	3 ns
for floating point arithmetic, typ.	12 ns
	12.10
CPU-blocks	40,000 Phylic (OD ED EO DD) 111DT
Number of elements (total)	12 000; 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.	8 Mbyte; For DBs with absolute addressing, the max. size is 64 KB



FB	
Number range	0 65 535
• Size, max.	1 Mbyte
FC	1 Mbyte
Number range	0 65 535
• Size, max.	1 Mbyte
OB	- mayte
• Size, max.	1 Mbyte
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 100 μs
Number of process alarm OBs	50
Number of DPV1 alarm OBs	3
Number of isochronous mode OBs	3
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



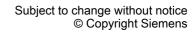


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Retentive data area (incl. timers, counters, flags),	768 kbyte; In total; available retentive memory for bit memories,
max.	timers, counters, DBs, and technology data (axes): 700 KB
Extended retentive data area (incl. timers, counters, flags), max.	8 Mbyte; When using PS 6 0W 24/48/60 V DC HF
Flag	
Number, 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	16 384; 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)	32 kbyte; Max. 32 KB via X1; max. 8 KB via X2 or X3
— Outputs (volume)	32 kbyte; Max. 32 KB via X1; max. 8 KB via X2 or X3
per CM/CP	
— Inputs (volume)	8 kbyte
— Outputs (volume)	8 kbyte
Subprocess images	
Number of subprocess images, max.	32
Hardware configuration	
Number of distributed IO systems	64; 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	
• integrated	1
● Via CM	8; A maximum of 8 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total
Number of IO Controllers	
• integrated	2
• Via CM	8; A maximum of 8 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total
Rack	
Modules per rack, max.	32; CPU + 31 modules
Number of lines, max.	1
PtP CM	





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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
• in AS, master	Yes
• in AS, slave	Yes
● on Ethernet via NTP	Yes
Interfaces	
Number of PROFINET interfaces	2
Number of PROFIBUS interfaces	1
1. Interface	
Interface types	
• RJ 45 (Ethernet)	Yes; X1
Number of ports	2
• integrated switch	Yes
Protocols	
• 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
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; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP Manager; MRP Client; max. number of devices in the ring: 50
— MRPD	Yes; Requirement: IRT

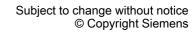


— PROFlenergy Yes; per user program Yes; Max. 32 PROFINET devices - Prioritized startup - Number of connectable IO Devices, max. 512; In total, up to 1 000 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET 64 - Of which IO devices with IRT, max. 512 - Number of connectable IO Devices for RT, max. 512 - of which in line, max. - Number of IO Devices that can be 8; in total across all interfaces simultaneously activated/deactivated, max. 8 - Number of IO Devices per tool, max. The minimum value of the update time also depends on - Updating times 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 250 µs to 4 ms 500 µs to 8 ms — for send cycle of 500 µs 1 ms to 16 ms - for send cycle of 1 ms 2 ms to 32 ms - for send cycle of 2 ms 4 ms to 64 ms - for send cycle of 4 ms Update time = set "odd" send clock (any multiple of 125 µs: 375 - With IRT and parameterization of "odd" send cycles μs, 625 μs ... 3 875 μs) Update time for RT 250 µs to 128 ms — for send cycle of 250 µs 500 µs to 256 ms — for send cycle of 500 µs - for send cycle of 1 ms 1 ms to 512 ms 2 ms to 512 ms - for send cycle of 2 ms - for send cycle of 4 ms 4 ms to 512 ms **PROFINET IO Device** Services Yes - PG/OP communication Yes - S7 routing No - Isochronous mode — IRT Yes - MRP Yes; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP Manager; MRP Client; max. number of devices in the ring: 50 Yes; Requirement: IRT - MRPD Yes; per user program - PROFlenergy Yes — Shared device 4 - Number of IO Controllers with shared device, max. Yes; per user program - Asset management record



2. Interface	
Interface types	
• RJ 45 (Ethernet)	Yes; X2
Number of ports	1
• integrated switch	No
Protocols	
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	No
PROFINET IO Controller	
Services	
— PG/OP communication	Yes
— S7 routing	Yes
— Isochronous mode	No
 Direct data exchange 	No
— IRT	No
— MRP	No
— MRPD	No
— PROFlenergy	Yes; per user program
 Prioritized startup 	No
— Number of connectable IO Devices, max.	128; In total, up to 1 000 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
 Number of connectable IO Devices for RT, 	128
max.	
— 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 RT	
— for send cycle of 1 ms	1 ms to 512 ms
PROFINET IO Device	
Services	
— PG/OP communication	Yes
— S7 routing	Yes
 Isochronous mode 	No





— IRT	No
— MRP	No
— MRPD	No
— PROFlenergy	Yes; per user program
— Prioritized startup	No
— Shared device	Yes
— Number of IO Controllers with shared	4
device, max.	
 Asset management record 	Yes; per user program

3. Interface	
Interface types	
• RS 485	Yes; X3
Number of ports	1
Protocols	
PROFIBUS DP master	Yes
 PROFIBUS DP slave 	No
 SIMATIC communication 	Yes
laterface to we a	
Interface types	
RJ 45 (Ethernet)	
• 100 Mbps	Yes
 Autonegotiation 	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.	320; via integrated interfaces of the CPU and connected CPs /
	CMs
 Number of connections reserved for 	10
ES/HMI/web	
 Number of connections via integrated 	288
interfaces	
 Number of S7 routing paths 	64; in total, only 16 S7-Routing connections are supported via
	PROFIBUS
Redundancy mode	
H-Sync forwarding	Yes
Media redundancy	
 Switchover time on line break, typ. 	200 ms; For MRP, bumpless for MRPD
 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.	2 kbyte; 1 472 bytes for UDP broadcast
— UDP multicast	Yes; Max. 5 multicast circuits
• DHCP	No
• SNMP	Yes
• DCP	Yes
• LLDP	Yes
Web server	
• HTTP	Yes; Standard and user pages
• HTTPS	Yes; Standard and user pages
PROFIBUS DP master	
Number of connections, max.	48; for the integrated PROFIBUS DP interface
Services	
— PG/OP communication	Yes
— S7 routing	Yes
— Data record routing	Yes
— Isochronous mode	Yes
— Equidistance	Yes
— Number of DP slaves	125; In total, up to 1 000 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
— Activation/deactivation of DP slaves	Yes
OPC UA	
Runtime license required	Yes
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.	40
 Number of nodes of the client interfaces, max. 	5 000



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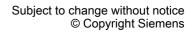
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 Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_Rea dList/OPC_UA_WriteList, max. 	300
— Number of elements for one call of OPC_UA_NameSpaceGetIndexList, max.	20
 Number of elements for one call of OPC_UA_MethodGetHandleList, max. 	100
 Number of simultaneous calls of the client instructions per connection (except OPC_UA_ReadList,OPC_UA_WriteList,OPC_ UA_MethodCall), 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
Number of sessions, max.	64
 Number of accessible variables, max. 	200 000
 Number of registerable nodes, max. 	50 000
 Number of subscriptions per session, max. 	20
— Sampling interval, min.	10 ms
— Publishing interval, min.	10 ms
 Number of server methods, max. 	100
 Number of inputs/outputs per server method, max. 	20
 Number of monitored items, max. 	10 000; for 1 s sampling interval and 1 s send interval
 Number of server interfaces, max. 	10; or 20, depending on type of server interface
 Number of nodes for user-defined server 	30 000
interfaces, max.	
Further protocols	
• MODBUS	Yes; MODBUS TCP
Isochronous mode	
Equidistance	Yes
S7 message functions	



Number of login stations for message functions, max.	64
Program alarms	Yes
Number of configurable program messages, max.	10 000; Program messages are generated by the
	"Program_Alarm" block, ProDiag or GRAPH
Number of loadable program messages in RUN,	5 000
max.	
Number of simultaneously active program alarms	
 Number of program alarms 	2 000
 Number of alarms for system diagnostics 	200
 Number of alarms for motion technology 	160
objects	
Test commissioning functions	
Joint commission (Team Engineering)	Yes; Parallel online access possible for up to 10 engineering
	systems
Status block	Yes; Up to 16 simultaneously (in total across all ES clients)
Single step	No
Number of breakpoints	20
Status/control	
Status/control variable	Yes
Variables	Inputs/outputs, memory bits, DBs, distributed I/Os, timers,
	counters
Number of variables, max.	200
— of which status variables, max.	200; per job
— of which control variables, max.	200; per job
Forcing	
Forcing, variables	Peripheral inputs/outputs
Number of variables, max.	200
Diagnostic buffer	
• present	Yes
Number of entries, max.	3 200
— of which powerfail-proof	1 000
Traces	
 Number of configurable Traces 	8; 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
 Connection display LINK TX/RX 	Yes
Supported technology objects	
Motion Control	Yes; Note: The number of axes affects the cycle time of the PLC





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Counting and measuring	Yes
• PID-Temp	Yes; PID controller with integrated optimization for temperature
• PID_3Step	Yes; PID controller with integrated optimization for valves
 PID_Compact 	Yes; Universal PID controller with integrated optimization
Controller	
 Number of positioning axes at motion control cycle of 8 ms (typical value) 	128
 Number of positioning axes at motion control cycle of 4 ms (typical value) 	70
Positioning axis	
— per probe	40
— per cam track	160
— per output cam	20
— per external encoder	80
— per synchronous axis	160
— per positioning axis	80
— per speed-controlled axis	40
 Required Motion Control resources 	
 Number of available Motion Control resources for technology objects 	10 240

Ambient conditions		
Ambient temperature during operation		
horizontal installation, min.	0 °C	
 horizontal installation, max. 	60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off	
 vertical installation, min. 	0 °C	
• vertical installation, max.	40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off	
Ambient temperature during storage/transportation		
• min.	-40 °C	
• max.	70 °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	
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	
Password for display	Yes
 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	175 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	1 978 g
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