

Siemens
EcoTech



SIMATIC S7-1500, CPU 1516-3 PN/DP, central processing unit with 2 MB work memory for program and 7.5 MB for data 1st interface: PROFINET IRT with 2-port switch, 2nd interface: PROFINET RT, 3rd interface: PROFIBUS, 6 ns bit performance, SIMATIC Memory Card required - - approvals and certificates according to entry 109817466 at support.industry.siemens.com to be considered! -



General information	
Product type designation	CPU 1516-3 PN/DP
HW functional status	FS04
Firmware version	V4.0
<ul style="list-style-type: none"> FW update possible 	Yes
Product function	
<ul style="list-style-type: none"> I&M data 	Yes; I&M0 to I&M3
<ul style="list-style-type: none"> Isochronous mode 	Yes; Distributed and central; with minimum OB 6x cycle of 375 μ s (distributed) and 1 ms (central)
<ul style="list-style-type: none"> SysLog 	Yes
Engineering with	
<ul style="list-style-type: none"> STEP 7 TIA Portal configurable/integrated from version 	V20 (FW V4.0) / V18 (FW V3.0) or higher; configurable with older TIA Portal versions as 6ES7516-3AN02-0AB0
Configuration control	
via dataset	Yes
Display	
Screen diagonal [cm]	6.1 cm
Control elements	
Number of keys	8
Mode buttons	2
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
<ul style="list-style-type: none"> Repeat rate, min. 	1/s
Input current	
Current consumption (rated value)	0.69 A
Current consumption, max.	1.08 A
Inrush current, max.	1.15 A; Rated value
I Δ t	0.6 A 2 ·s
Power	
Infed power to the backplane bus	12 W
Power consumption from the backplane bus (balanced)	6.7 W
Power loss	

Power loss, typ.	4 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)	7.5 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)	8 000; 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.	7.5 Mbyte; For DBs with absolute addressing, the max. size is 64 KB
FB	
• Number range	0 ... 65 535
• Size, max.	1 Mbyte
FC	
• Number range	0 ... 65 535
• Size, max.	1 Mbyte
OB	
• 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 250 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

Data areas and their retentivity	
Retentive data area (incl. timers, counters, flags), max.	512 kbyte; In total; available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 472 KB
Extended retentive data area (incl. timers, counters, flags), max.	7.5 Mbyte; When using PS 6 0W 24/48/60 V DC HF
Flag	
<ul style="list-style-type: none"> • Size, max. • Number of clock memories 	16 kbyte 8; 8 clock memory bit, grouped into one clock memory byte
Data blocks	
<ul style="list-style-type: none"> • Retentivity adjustable • Retentivity preset 	Yes No
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	8 192; max. number of modules / submodules
I/O address area	
<ul style="list-style-type: none"> • Inputs • Outputs 	32 kbyte; All inputs are in the process image 32 kbyte; All outputs are in the process image
per integrated IO subsystem	
<ul style="list-style-type: none"> — Inputs (volume) — Outputs (volume) 	8 kbyte 8 kbyte
per CM/CP	
<ul style="list-style-type: none"> — Inputs (volume) — Outputs (volume) 	8 kbyte 8 kbyte
Subprocess images	
<ul style="list-style-type: none"> • 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	
<ul style="list-style-type: none"> • integrated • Via CM 	1 8; A maximum of 8 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total
Number of IO Controllers	
<ul style="list-style-type: none"> • integrated • Via CM 	2 8; A maximum of 8 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total
Rack	
<ul style="list-style-type: none"> • Modules per rack, max. • Number of lines, max. 	32; CPU + 31 modules 1
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. 	Hardware clock 6 wk; At 40 °C ambient temperature, typically 10 s; Typ.: 2 s
Operating hours counter	
<ul style="list-style-type: none"> • Number 	16
Clock synchronization	
<ul style="list-style-type: none"> • supported • to DP, master • on DP, device • in AS, master • in AS, device • on Ethernet via NTP 	Yes Yes Yes; via PROFIBUS CM / CP Yes Yes Yes
Interfaces	
Number of PROFINET interfaces	2
Number of PROFIBUS interfaces	1
1. Interface	
Interface types	

<ul style="list-style-type: none"> • RJ 45 (Ethernet) • Number of ports • integrated switch 	<p>Yes; X1</p> <p>2</p> <p>Yes</p>
Protocols	
<ul style="list-style-type: none"> • IP protocol • PROFINET IO Controller • PROFINET IO Device • SIMATIC communication • Open IE communication • Web server • Media redundancy 	<p>Yes; IPv4</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes; Optionally also encrypted</p> <p>Yes</p> <p>Yes</p>
PROFINET IO Controller	
Services	
— Isochronous mode	Yes
— Direct data exchange	Yes; Requirement: IRT and isochronous mode (MRPD optional)
— IRT	Yes
— PROFIenergy	Yes; per user program
— Prioritized startup	Yes; Max. 32 PROFINET devices
— Number of connectable IO Devices, max.	256; in total, up to 1024 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
— Of which IO devices with IRT, max.	64
— Number of connectable IO Devices for RT, max.	256
— of which in line, max.	256
— 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
— PROFINET Security Class	1
Update time for IRT	
— for send cycle of 250 μ s	250 μ s to 4 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 375 μ s of the isochronous OB is decisive
— for send cycle of 500 μ s	500 μ s 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	
— for send cycle of 250 μ s	250 μ s to 128 ms
— for send cycle of 500 μ s	500 μ 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	
— Isochronous mode	No
— IRT	Yes
— PROFIenergy	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
— PROFINET Security Class	SNMP Configuration and DCP Read Only
2. Interface	
Interface types	
<ul style="list-style-type: none"> • RJ 45 (Ethernet) • Number of ports • integrated switch 	<p>Yes; X2</p> <p>1</p> <p>No</p>
Protocols	
<ul style="list-style-type: none"> • 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	
— Isochronous mode	No
— Direct data exchange	No
— IRT	No
— PROFINergy	Yes; per user program
— Prioritized startup	No
— Number of connectable IO Devices, max.	32; in total, up to 1024 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
— Number of connectable IO Devices for RT, max.	32
— of which in line, max.	32
— 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
— PROFINET Security Class	1
Update time for RT	
— for send cycle of 1 ms	1 ms to 512 ms

PROFINET IO Device

Services	
— Isochronous mode	No
— IRT	No
— PROFINergy	Yes; per user program
— Prioritized startup	No
— 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
— PROFINET Security Class	SNMP Configuration and DCP Read Only

3. Interface

Interface types

• RS 485	Yes; X3
• Number of ports	1

Protocols

• PROFIBUS DP master	Yes
• PROFIBUS DP device	No
• SIMATIC communication	Yes

PROFIBUS DP master

• Number of connections, max.	48; for the integrated PROFIBUS DP interface
• max. number of DP devices	125; In total, up to 1 000 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET

Services

— Equidistance	Yes
— Isochronous mode	Yes
— 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
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Protocols

PROFIsafe	No
Number of connections	
<ul style="list-style-type: none"> • Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of connections via integrated interfaces • Number of S7 routing paths 	<p>256; via integrated interfaces of the CPU and connected CPs / CMs</p> <p>10</p> <p>128</p> <p>16</p>
Redundancy mode	
<ul style="list-style-type: none"> • H-Sync forwarding 	Yes
Media redundancy	
<ul style="list-style-type: none"> — Media redundancy — MRP — MRP interconnection, supported — MRPD — Switchover time on line break, typ. — Number of stations in the ring, max. 	<p>only via 1st interface (X1)</p> <p>Yes; MRP Automanager according to IEC 62439-2 Edition 2.0, MRP Manager; MRP Client</p> <p>Yes; as MRP ring node according to IEC 62439-2 Edition 3.0</p> <p>Yes; Requirement: IRT</p> <p>200 ms; For MRP, bumpless for MRPD</p> <p>50</p>
SIMATIC communication	
<ul style="list-style-type: none"> • PG/OP communication • S7 routing • Data record routing • S7 communication, as server • S7 communication, as client • User data per job, max. 	<p>Yes; encryption with TLS V1.3 pre-selected</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>See online help (S7 communication, user data size)</p>
Open IE communication	
<ul style="list-style-type: none"> • TCP/IP <ul style="list-style-type: none"> — Data length, max. — several passive connections per port, supported • ISO-on-TCP (RFC1006) <ul style="list-style-type: none"> — Data length, max. • UDP <ul style="list-style-type: none"> — Data length, max. — UDP multicast • DHCP • DNS • SNMP • DCP • LLDP • Encryption 	<p>Yes</p> <p>64 kbyte</p> <p>Yes</p> <p>Yes</p> <p>64 kbyte</p> <p>Yes</p> <p>2 kbyte; 1 472 bytes for UDP broadcast</p> <p>Yes; max. 118 multicast circuits</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes; Optional</p>
Web server	
<ul style="list-style-type: none"> • HTTP • HTTPS • web API <ul style="list-style-type: none"> — Number of sessions, max. — number of simultaneous HTTP calls, max. — HTTP request body, max. 	<p>Yes; Standard and user pages</p> <p>Yes; Standard and user pages</p> <p>100</p> <p>4</p> <p>131 072 byte</p>
OPC UA	
<ul style="list-style-type: none"> • Runtime license required • OPC UA Client <ul style="list-style-type: none"> — 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 	<p>Yes; "Medium" license required</p> <p>Yes; Data Access (registered Read/Write), Method Call</p> <p>Yes</p> <p>Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256</p> <p>"anonymous" or by user name & password</p> <p>10</p> <p>2 000</p> <p>300</p> <p>20</p> <p>100</p> <p>1</p>

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

— Number of alarms for system diagnostics

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

48

100 000

20 000

50

100 ms

100 ms

50; 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"

30 000

Yes

200

100

Further protocols

• MODBUS

Yes; MODBUS TCP

Isochronous mode

Equidistance

Yes

S7 message functions

Number of login stations for message functions, max.

64

number of subscriptions, max.

500

number of tags/attributes for subscriptions, max.

8 000

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, max.

10 000

Number of simultaneously active program alarms

• Number of program alarms

1 000

• Number of alarms for system diagnostics

200

• Number of alarms for motion technology objects

160

Test commissioning functions

Joint commission (Team Engineering)

Yes; Parallel online access possible for up to 8 engineering systems

Status block

Yes; Up to 8 simultaneously (in total across all ES clients)

Single step

No

Number of breakpoints

8

Profiling

Yes

Status/control

• 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

Forcing

• Forcing

Yes

• Forcing variables

Peripheral inputs/outputs

<ul style="list-style-type: none"> Number of variables, max. 	200
Diagnostic buffer	
<ul style="list-style-type: none"> present 	Yes
<ul style="list-style-type: none"> Number of entries, max. 	3 200
<ul style="list-style-type: none"> — of which powerfail-proof 	500
Traces	
<ul style="list-style-type: none"> Number of configurable Traces 	4
<ul style="list-style-type: none"> Memory size per trace, max. 	512 kbyte
Interrupts/diagnostics/status information	
Diagnostics indication LED	
<ul style="list-style-type: none"> RUN/STOP LED 	Yes
<ul style="list-style-type: none"> ERROR LED 	Yes
<ul style="list-style-type: none"> MAINT LED 	Yes
<ul style="list-style-type: none"> STOP ACTIVE LED 	Yes
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> Number of available Motion Control resources for technology objects 	2 400
<ul style="list-style-type: none"> Required Motion Control resources 	
<ul style="list-style-type: none"> — per speed-controlled axis 	40
<ul style="list-style-type: none"> — per positioning axis 	80
<ul style="list-style-type: none"> — per synchronous axis 	160
<ul style="list-style-type: none"> — per external encoder 	80
<ul style="list-style-type: none"> — per output cam 	20
<ul style="list-style-type: none"> — per cam track 	160
<ul style="list-style-type: none"> — per probe 	40
<ul style="list-style-type: none"> Positioning axis 	
<ul style="list-style-type: none"> — Number of positioning axes at motion control cycle of 4 ms (typical value) 	11
<ul style="list-style-type: none"> — Number of positioning axes at motion control cycle of 8 ms (typical value) 	20
Controller	
<ul style="list-style-type: none"> PID_Compact 	Yes; Universal PID controller with integrated optimization
<ul style="list-style-type: none"> PID_3Step 	Yes; PID controller with integrated optimization for valves
<ul style="list-style-type: none"> PID-Temp 	Yes; PID controller with integrated optimization for temperature
Counting and measuring	
<ul style="list-style-type: none"> High-speed counter 	Yes
Standards, approvals, certificates	
Siemens Eco Profile (SEP)	Siemens EcoTech
Ecological footprint	
<ul style="list-style-type: none"> environmental product declaration 	Yes
Global warming potential	
<ul style="list-style-type: none"> — global warming potential, (total) [CO2 eq] 	102 kg
<ul style="list-style-type: none"> — global warming potential, (during production) [CO2 eq] 	26.5 kg
<ul style="list-style-type: none"> — global warming potential, (during operation) [CO2 eq] 	76.7 kg
<ul style="list-style-type: none"> — global warming potential, (after end of life cycle) [CO2 eq] 	-0.898 kg
product functions / security / header	
PROFINET Security Class	1
signed firmware update	Yes
Secure Boot	Yes
safely removing data	Yes
Ambient conditions	
Ambient temperature during operation	
<ul style="list-style-type: none"> horizontal installation, min. 	-30 °C; No condensation
<ul style="list-style-type: none"> horizontal installation, max. 	60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off
<ul style="list-style-type: none"> vertical installation, min. 	-30 °C; No condensation
<ul style="list-style-type: none"> 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 / header

configuration / programming / header

Programming language	
— LAD	Yes
— FBD	Yes
— STL	Yes
— SCL	Yes
— CFC	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
• Password for display	Yes
• Protection level: Write protection	Yes
• Protection level: Read/write protection	Yes
• Protection level: Write protection for Failsafe	No
• Protection level: Complete protection	Yes
• User administration	Yes; device-wide and centralized
• Number of users	100
• Number of groups	100
• Number of roles	50

programming / cycle time monitoring / header

• lower limit	adjustable minimum cycle time
• upper limit	adjustable maximum cycle time

Dimensions

Width	70 mm
Height	147 mm
Depth	129 mm

Weights

Weight, approx.	469 g
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Classifications

	Version	Classification
eClass	14	27-24-22-07
eClass	12	27-24-22-07
eClass	9.1	27-24-22-07
eClass	9	27-24-22-07
eClass	8	27-24-22-07
eClass	7.1	27-24-22-07
eClass	6	27-24-22-07
ETIM	9	EC000236
ETIM	8	EC000236
ETIM	7	EC000236
IDEA	4	3565
UNSPSC	15	32-15-17-05

Approvals / Certificates

General Product Approval



[Manufacturer Declaration](#)

[Miscellaneous](#)



[Miscellaneous](#)

General Product Approval

For use in hazardous locations



[KC](#)



[EM](#)



[EM](#)

For use in hazardous locations

Test Certificates

Marine / Shipping

[Miscellaneous](#)



[Type Examination Certificate](#)



[Type Test Certificates/Test Report](#)



Marine / Shipping



[NK / Nippon Kaiji Kyokai](#)



[CCS \(China Classification Society\)](#)

Marine / Shipping

other

Environment



[PROFINET](#)



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ماکان کنترول