SIEMENS

Data sheet

6ES7516-3AN01-0AB0



SIMATIC S7-1500, CPU 1516-3 PN/DP, CENTRAL PROCESSING UNIT WITH WORKING MEMORY 1 MB FOR PROGRAM AND 5 MB FOR DATA, 1. INTERFACE: PROFINET IRT WITH 2 PORT SWITCH, 2. INTERFACE: PROFINET RT, 3. INTERFACE: PROFIBUS, 10 NS BIT-PERFORMANCE, SIMATIC MEMORY CARD NECESSARY

General information	
Product type designation	CPU 1516-3 PN/DP
HW functional status	FS03
Firmware version	V2.1
Engineering with	
 STEP 7 TIA Portal configurable/integrated as of version 	V14 SP1 (FW V2.1) / V13 SP1 Update 4 (FW V1.8) or higher
Configuration control	
via dataset	Yes
Display	
Screen diagonal [cm]	6.1 cm
Control elements	
Number of keys	6
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)	0.85 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 (balanced)	6.7 W
Power loss	
Power loss, typ.	7 W
Memory	
Number of slots for SIMATIC memory card	1
SIMATIC memory card required	Yes
Work memory	
 integrated (for program) 	1 Mbyte
 integrated (for data) 	5 Mbyte
Load memory	
 Plug-in (SIMATIC Memory Card), max. 	32 Gbyte
Backup	
maintenance-free	Yes
CPU processing times	
for bit operations, typ.	10 ns
for word operations, typ.	12 ns
for fixed point arithmetic, typ.	16 ns
for floating point arithmetic, typ.	64 ns
CPU-blocks	
Number of elements (total)	6 000; 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.	5 Mbyte; For non-optimized block accesses, the max. size of the DB is 64 KB
FB	
Number range	0 65 535
• Size, max.	512 kbyte
FC	

• Size, max.512 kbyteOB• Number of free cycle OBs512 kbyte• Number of free cycle OBs20• Number of thee alarn OBs20• Number of delay alarn OBs20• Number of cyclic interrupt OBs20• Number of process alarn OBs20• Number of process alarn OBs3• Number of IbV1 alarn OBs3• Number of IbV1 faitn OBs2• Number of IbV1 faitn OBs2• Number of Isochronous mode OBs2• Number of Isochronous error OBs4• Number of sharup OBs2• Number of alagnostic alarn OB2• Number of alagnostic ala	Number range	0 65 535
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		5 Mbyte; When using PS 60W 24/48/60V DC HF

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• Number, max.	16 kbyte
Number of clock memories	8; 8 clock memory bits, grouped into one clock memory byte
Data blocks	Yes
Retentivity adjustable	
Retentivity preset	No
Local data	
• 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	
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
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)
Number of IO Controllero	can be inserted in total
Number of IO Controllers	0
• integrated	
● 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	
Number of PtP CMs	the number of connectable PtP CMs is only limited by the number
	of available slots
Time of day Clock	
• Type	Hardware clock
· 740	

Backup time	6 wk; At 40 °C ambient temperature, typically
Deviation per day, max.	10 s; Typ.: 2 s
Operating hours counter	10 3, 1yp., 2 3
Number	16
Clock synchronization	
	Yes
• 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	
Number of ports	2
 integrated switch 	Yes
• RJ 45 (Ethernet)	Yes; X1
Functionality	
IP protocol	Yes; IPv4
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
— Open IE communication	Yes
— IRT	Yes
— MRP	Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50
— MRPD	Yes; Requirement: IRT
— PROFlenergy	Yes
— Prioritized startup	Yes; Max. 32 PROFINET devices
- Number of connectable IO Devices, max.	256; In total, up to 1 000 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,	256
max.	200
— of which in line, max.	256
— Number of IO Devices that can be	8; in total across all interfaces
simultaneously 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 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; 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	
— 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	
Services	
— PG/OP communication	Yes
— S7 routing	Yes
— Isochronous mode	No
— Open IE communication	Yes
— IRT	Yes
— MRP	Yes
— MRPD	Yes; Requirement: IRT
— PROFlenergy	Yes
— Shared device	Yes
 — Number of IO Controllers with shared device, max. 	4
2. Interface	
Interface types	
Number of ports	1
 integrated switch 	No

RJ 45 (Ethernet)	Yes; X2
Functionality	
IP protocol	Yes; IPv4
PROFINET IO Controller	Yes
PROFINET IO Device	Yes
 SIMATIC communication 	Yes
Open IE communication	Yes
Web server	Yes
Media redundancy	No
PROFINET IO Controller	
Services	
— PG/OP communication	Yes
— S7 routing	Yes
— Isochronous mode	No
— Open IE communication	Yes
— IRT	No
— MRP	No
- PROFlenergy	Yes
— Prioritized startup	No
— Number of connectable IO Devices, max.	32; 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, 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
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
— Open IE communication	Yes
— IRT	No
— MRP	No
— MRPD	No
— PROFlenergy	Yes

— Prioritized startup	Νο
— Shared device	Yes
— Number of IO Controllers with shared	4
device, max.	
3. Interface Interface types	
Number of ports	1
• RS 485	Yes; X3
Functionality	
PROFIBUS DP master	Yes
PROFIBUS DP slave	No
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	
Protocols Number of connections	
	256; via integrated interfaces of the CPU and connected CPs / CMs
Number of connections	
Number of connections Number of connections, max. Number of connections reserved for 	CMs
Number of connections • Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of connections via integrated	CMs 10
Number of connections • Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of connections via integrated interfaces	CMs 10 128
Number of connections • Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of connections via integrated interfaces • Number of S7 routing paths	CMs 10 128
Number of connections • Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of connections via integrated interfaces • Number of S7 routing paths SIMATIC communication	CMs 10 128 16
Number of connections • Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of connections via integrated interfaces • Number of S7 routing paths SIMATIC communication • S7 communication, as server	CMs 10 128 16 Yes
Number of connections • Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of connections via integrated interfaces • Number of S7 routing paths SIMATIC communication • S7 communication, as server • S7 communication, as client	CMs 10 128 16 Yes Yes
Number of connections • Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of connections via integrated interfaces • Number of S7 routing paths SIMATIC communication • S7 communication, as server • S7 communication, as client • User data per job, max.	CMs 10 128 16 Yes Yes
Number of connections • Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of connections via integrated interfaces • Number of S7 routing paths SIMATIC communication • S7 communication, as server • S7 communication, as client • User data per job, max. Open IE communication	CMs 10 128 16 Yes Yes See online help (S7 communication, user data size)
Number of connections • Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of connections via integrated interfaces • Number of S7 routing paths SIMATIC communication • S7 communication, as server • S7 communication, as client • User data per job, max. Open IE communication • TCP/IP	CMs 10 128 16 Yes Yes See online help (S7 communication, user data size) Yes
Number of connections • Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of connections via integrated interfaces • Number of S7 routing paths SIMATIC communication • 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,	CMs 10 128 16 Ves Yes See online help (S7 communication, user data size) Ves See online help (S7 communication, user data size)
Number of connections • Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of connections via integrated interfaces • Number of S7 routing paths SIMATIC communication • 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	CMs 10 128 16 Yes Yes See online help (S7 communication, user data size) Yes 64 kbyte Yes
Number of connections • Number of connections, max. • Number of connections reserved for ES/HMI/web • Number of connections via integrated interfaces • Number of S7 routing paths SIMATIC communication • 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)	CMs 10 128 16 Yes Yes See online help (S7 communication, user data size) Yes 64 kbyte Yes 64 kbyte Yes

— Data length, max.	1 472 byte
— 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	
OPC UA Server	Yes; Data access (read, write, subscribe), runtime license required
 Application authentication 	Yes
— Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
— User authentication	"anonymous" or by user name & password
Further protocols	
MODBUS	Yes; MODBUS TCP
Media redundancy	
 Switchover time on line break, typ. 	200 ms; For MRP, bumpless for MRPD
• Number of stations in the ring, max.	50
Isochronous mode	
Isochronous operation (application synchronized up to terminal)	Yes; With minimum OB 6x cycle of 375 μs
Equidistance	Yes
S7 message functions	
Number of login stations for message functions, max.	32
Program alarms	Yes
Number of configurable program alarms	10 000
Number of simultaneously active program alarms	
 Number of program alarms 	600

 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 8 engineering
	systems
Status block	Yes; Up to 8 simultaneously (in total across all ES clients)
Single step	No
Status/control	X
 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, variables 	Peripheral inputs/outputs
 Number of variables, max. 	200
Diagnostic buffer	
• present	Yes
 Number of entries, max. 	3 200
— 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
 Connection display LINK TX/RX 	Yes
Supported technology objects	
Motion Control	Yes; Note: The number of axes affects the cycle time of the PLC
	program; selection guide via the TIA Selection Tool or SIZER
Number of available Motion Control resources	2 400
for technology objects (except cam disks)	
Required Motion Control resources	40
— per speed-controlled axis	40
— per positioning axis	80
— per synchronous axis	160
— per external encoder	80
— per output cam	20

— per cam track 160	
— per probe 40	
Positioning axis	
— 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) 	
Controller	
PID_Compact Yes; Universal I	PID controller with integrated optimization
PID_3Step Yes; PID control	ller with integrated optimization for valves
PID-Temp Yes; PID control	ller with integrated optimization for temperature
Counting and measuring	
• High-speed counter Yes	
Ambient conditions	
Ambient temperature during operation	
horizontal installation, min. 0 °C	
 horizontal installation, max. 60 °C; Display: °C, the display in 	50 °C, at an operating temperature of typically 50 is switched off
• vertical installation, min. 0 °C	
• vertical installation, max. 40 °C; Display: °C, the display i	40 °C, at an operating temperature of typically 40 is switched off
Ambient temperature during storage/transportation	
• min40 °C	
• max. 70 °C	
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: Write protection Yes	
Protection level: Write protection Yes	

 lower limit upper limit	adjustable minimum cycle time adjustable maximum cycle time
Dimensions	
Width	70 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	845 g
last modified:	10/05/2017