



\*\*\*Spare part\*\*\* SIPLUS S7-1500 CPU 1516-3PN/DP -40...+60 °C Startup -20 °C with conformal coating based on 6ES7516-3AN00-0AB0 . Central processing unit with Work memory 1 MB for program and 5 MB for data, 1st interface, PROFINET IRT with 2-port switch, 2nd interface, Ethernet, 3rd interface, PROFIBUS, 10 ns bit performance, SIMATIC Memory Card required -40...+60 °C with conformal coating based on 6ES7516-3AN00-0AB0

### General information

Product type designation	CPU 1516-3 PN/DP
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### Display

Screen diagonal [cm]	6.1 cm
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### 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

### Input current

Current consumption (rated value)	0.85 A
Inrush current, max.	2.4 A; Rated value
I <sup>2</sup> t	0.39 A <sup>2</sup> ·s

### Power

Infeed power to the backplane bus	12 W
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Power consumption from the backplane bus (balanced)	6.7 W
<b>Power loss</b>	
Power loss, typ.	7 W
<b>Memory</b>	
SIMATIC memory card required	Yes
<b>Work memory</b>	
• integrated (for program)	1 Mbyte
• integrated (for data)	5 Mbyte
<b>Load memory</b>	
• Plug-in (SIMATIC Memory Card), max.	2 Gbyte
<b>Backup</b>	
• maintenance-free	Yes
<b>CPU processing times</b>	
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
<b>CPU-blocks</b>	
Number of blocks (total)	6 000
<b>DB</b>	
• Number, max.	6 000; Number range: 1 to 65535
• Size, max.	5 Mbyte
<b>FB</b>	
• Number, max.	5 998; Number range: 1 to 65535
• Size, max.	512 kbyte
<b>FC</b>	
• Number, max.	5 999; Number range: 1 to 65535
• Size, max.	512 kbyte
<b>OB</b>	
• Size, max.	512 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
• Number of process alarm OBs	50
• Number of DPV1 alarm OBs	3
• Number of isochronous mode OBs	2
• 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
<b>Nesting depth</b>	
• per priority class	24

### Counters, timers and their retentivity

<b>S7 counter</b>	
• Number	2 048
<b>Retentivity</b>	
— adjustable	Yes
<b>IEC counter</b>	
• Number	Any (only limited by the main memory)
<b>Retentivity</b>	
— adjustable	Yes
<b>S7 times</b>	
• Number	2 048
<b>Retentivity</b>	
— adjustable	Yes
<b>IEC timer</b>	
• Number	Any (only limited by the main memory)
<b>Retentivity</b>	
— adjustable	Yes

### Data areas and their retentivity

Retentive data area (incl. timers, counters, flags), max.	512 kbyte; Available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 472 KB
<b>Flag</b>	
• Number, max.	16 kbyte
• Number of clock memories	8; 8 clock memory bits, grouped into one clock memory byte
<b>Local data</b>	
• per priority class, max.	64 kbyte; max. 16 KB per block

### Address area

Number of IO modules	8 192
<b>I/O address area</b>	
• Inputs	32 kbyte; All inputs are in the process image
• Outputs	32 kbyte; All outputs are in the process image
<b>per integrated IO subsystem</b>	
— Inputs (volume)	8 kbyte
— Outputs (volume)	8 kbyte
<b>per CM/CP</b>	
— Inputs (volume)	8 kbyte
— Outputs (volume)	8 kbyte
<b>Subprocess images</b>	

• Number of subprocess images, max.	32
<b>Hardware configuration</b>	
Number of distributed IO systems	10
<b>Number of DP masters</b>	
• integrated	1
• Via CM	8; A maximum of 8 CMs (PROFINET + PROFIBUS) can be inserted in total
<b>Number of IO Controllers</b>	
• integrated	1
<b>Rack</b>	
• Modules per rack, max.	32; CPU + 31 modules
• Number of lines, max.	1
<b>PtP CM</b>	
• Number of PtP CMs	the number of connectable PtP CMs is only limited by the number of available slots
<b>Time of day</b>	
<b>Clock</b>	
• Type	Hardware clock
• Backup time	6 wk; At 40 °C ambient temperature, typically
• Deviation per day, max.	10 s; Typ.: 2 s
<b>Clock synchronization</b>	
• supported	Yes
• to DP, master	Yes
• in AS, master	Yes
• in AS, slave	Yes
• on Ethernet via NTP	Yes
<b>Interfaces</b>	
Number of PROFINET interfaces	2
Number of PROFIBUS interfaces	1
<b>1. Interface</b>	
<b>Interface types</b>	
• Number of ports	2
• integrated switch	Yes
• RJ 45 (Ethernet)	Yes
<b>Functionality</b>	
• PROFINET IO Controller	Yes
• PROFINET IO Device	Yes
• SIMATIC communication	Yes
• Open IE communication	Yes
• Web server	Yes
• Media redundancy	Yes

## 2. Interface

Interface types	
• Number of ports	1
• integrated switch	No
• RJ 45 (Ethernet)	Yes

  

Functionality	
• PROFINET IO Controller	No
• PROFINET IO Device	No
• SIMATIC communication	Yes
• Open IE communication	Yes
• Web server	Yes

## 3. Interface

Interface types	
• Number of ports	1
• RS 485	Yes

  

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

Number of connections	
• Number of connections, max.	256
• Number of connections reserved for ES/HMI/web	10
• Number of connections via integrated interfaces	128

  

PROFINET IO Controller	
Services	
— PG/OP communication	Yes
— S7 routing	Yes
— Isochronous mode	Yes
— Open IE communication	Yes

— IRT	Yes
— PROFINergy	Yes
— Prioritized startup	Yes; Max. 32 PROFINET devices
— Number of connectable IO Devices, max.	256; In total, up to 768 distributed I/O devices can be connected via CPs/CMs via 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
— 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
<b>Redundancy mode</b>	
— MRP	Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50
<b>Update time for IRT</b>	
— for send cycle of 250 $\mu$ s	250 $\mu$ s to 4 ms
— for send cycle of 500 $\mu$ s	500 $\mu$ 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 $\mu$ s: 375 $\mu$ s, 625 $\mu$ s ... 3 875 $\mu$ s)
<b>Update time for RT</b>	
— for send cycle of 250 $\mu$ s	250 $\mu$ s to 128 ms
— for send cycle of 500 $\mu$ s	500 $\mu$ 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
<b>PROFINET IO Device</b>	
<b>Services</b>	
— PG/OP communication	Yes
— S7 routing	Yes
— Isochronous mode	Yes
— Open IE communication	Yes
— IRT	Yes
— PROFINergy	Yes
<b>Redundancy mode</b>	
— MRP	Yes
<b>SIMATIC communication</b>	

• S7 communication, as server	Yes
• S7 communication, as client	Yes
• User data per job, max.	See online help (S7 communication, user data size)
<b>Open IE communication</b>	
• TCP/IP	Yes
— Data length, max.	64 kbyte
• ISO-on-TCP (RFC1006)	Yes
— Data length, max.	64 kbyte
• UDP	Yes
— Data length, max.	1 472 byte
• DHCP	No
• SNMP	Yes
• DCP	Yes
• LLDP	Yes
<b>Web server</b>	
• HTTP	Yes; Standard and user-defined pages
• HTTPS	Yes; Standard and user-defined pages
<b>PROFIBUS DP master</b>	
<b>Services</b>	
— PG/OP communication	Yes
— S7 routing	Yes
— Isochronous mode	Yes
— Equidistance	Yes
— Number of DP slaves	125; In total, up to 768 distributed I/O devices can be connected via CPs/CMs via PROFIBUS or PROFINET.
— Activation/deactivation of DP slaves	Yes
<b>Further protocols</b>	
• MODBUS	Yes; MODBUS TCP
<b>Media redundancy</b>	
• Switchover time on line break, typ.	200 ms
• Number of stations in the ring, max.	50
<b>Isochronous mode</b>	
Isochronous operation (application synchronized up to terminal)	Yes
Equidistance	Yes
<b>S7 message functions</b>	
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	1 000
<b>Test commissioning functions</b>	

Status block	Yes; up to 8 simultaneously
Single step	No
<b>Status/control</b>	
<ul style="list-style-type: none"> <li>• Status/control variable</li> <li>• Variables</li> <li>• Number of variables, max. <ul style="list-style-type: none"> <li>— of which status variables, max.</li> <li>— of which control variables, max.</li> </ul> </li> </ul>	Yes Inputs, outputs, memory bits, DB, times, counters 200; per job 200; per job
<b>Forcing</b>	
<ul style="list-style-type: none"> <li>• Forcing, variables</li> <li>• Number of variables, max.</li> </ul>	Inputs, outputs 200
<b>Diagnostic buffer</b>	
<ul style="list-style-type: none"> <li>• present</li> <li>• Number of entries, max. <ul style="list-style-type: none"> <li>— of which powerfail-proof</li> </ul> </li> </ul>	Yes 500
<b>Interrupts/diagnostics/status information</b>	
<b>Diagnostics indication LED</b>	
<ul style="list-style-type: none"> <li>• RUN/STOP LED</li> <li>• ERROR LED</li> <li>• MAINT LED</li> <li>• Connection display LINK TX/RX</li> </ul>	Yes Yes Yes Yes
<b>Supported technology objects</b>	
<b>Motion Control</b>	
<ul style="list-style-type: none"> <li>• Speed-controlled axis <ul style="list-style-type: none"> <li>— Number of speed-controlled axes, max.</li> </ul> </li> <li>• Positioning axis <ul style="list-style-type: none"> <li>— Number of positioning axes, max.</li> </ul> </li> <li>• External encoders <ul style="list-style-type: none"> <li>— Number of external encoders, max.</li> </ul> </li> </ul>	Yes 20; Up to 20 axes in total (speed-controlled, positioning axis, external encoders) are supported 20; Up to 20 axes in total (speed-controlled, positioning axis, external encoders) are supported 20; Up to 20 axes in total (speed-controlled, positioning axis, external encoders) are supported
<b>Controller</b>	
<ul style="list-style-type: none"> <li>• PID_Compact</li> <li>• PID_3Step</li> </ul>	Yes; Universal PID controller with integrated optimization Yes; PID controller with integrated optimization for valves
<b>Counting and measuring</b>	
<ul style="list-style-type: none"> <li>• High-speed counter</li> </ul>	Yes
<b>Ambient conditions</b>	
<b>Ambient temperature during operation</b>	
<ul style="list-style-type: none"> <li>• horizontal installation, min.</li> </ul>	-40 °C; = Tmin; Startup @ -20 °C



<ul style="list-style-type: none"> <li>• horizontal installation, max.</li> </ul>	60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off
<ul style="list-style-type: none"> <li>• vertical installation, min.</li> </ul>	-40 °C; = Tmin; Startup @ -20 °C
<ul style="list-style-type: none"> <li>• vertical installation, max.</li> </ul>	40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off
<b>Ambient temperature during storage/transportation</b>	
<ul style="list-style-type: none"> <li>• min.</li> </ul>	-40 °C
<ul style="list-style-type: none"> <li>• max.</li> </ul>	70 °C
<b>Altitude during operation relating to sea level</b>	
<ul style="list-style-type: none"> <li>• Ambient air temperature-barometric pressure-altitude</li> </ul>	Tmin ... Tmax at 1 080 hPa ... 795 hPa (-1 000 m ... +2 000 m) // Tmin ... (Tmax - 10 K) at 795 hPa ... 658 hPa (+2 000 m ... +3 500 m) // Tmin ... (Tmax - 20 K) at 658 hPa ... 540 hPa (+3 500 m ... +5 000 m)
<b>Relative humidity</b>	
<ul style="list-style-type: none"> <li>• With condensation, tested in accordance with IEC 60068-2-38, max.</li> </ul>	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)
<b>Resistance</b>	
<b>Use in stationary industrial systems</b>	
<ul style="list-style-type: none"> <li>— to biologically active substances according to EN 60721-3-3</li> </ul>	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna); Class 3B3 on request
<ul style="list-style-type: none"> <li>— to chemically active substances according to EN 60721-3-3</li> </ul>	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!
<ul style="list-style-type: none"> <li>— to mechanically active substances according to EN 60721-3-3</li> </ul>	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!
<b>Configuration</b>	
<b>Programming</b>	
<b>Programming language</b>	
<ul style="list-style-type: none"> <li>— LAD</li> </ul>	Yes
<ul style="list-style-type: none"> <li>— FBD</li> </ul>	Yes
<ul style="list-style-type: none"> <li>— STL</li> </ul>	Yes
<ul style="list-style-type: none"> <li>— SCL</li> </ul>	Yes
<ul style="list-style-type: none"> <li>— GRAPH</li> </ul>	Yes; As of STEP 7 V12 SP1
<b>Know-how protection</b>	
<ul style="list-style-type: none"> <li>• User program protection/password protection</li> </ul>	Yes
<ul style="list-style-type: none"> <li>• Copy protection</li> </ul>	Yes
<ul style="list-style-type: none"> <li>• Block protection</li> </ul>	Yes
<b>Access protection</b>	
<ul style="list-style-type: none"> <li>• Password for display</li> </ul>	Yes
<ul style="list-style-type: none"> <li>• Protection level: Write protection</li> </ul>	Yes
<ul style="list-style-type: none"> <li>• Protection level: Read/write protection</li> </ul>	Yes
<ul style="list-style-type: none"> <li>• Protection level: Complete protection</li> </ul>	Yes
<b>Cycle time monitoring</b>	

- 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
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**last modified:** 05/18/2018