



Spare part SIMATIC S7-1500, CPU 1511-1 PN, Central processing unit with Work memory 150 KB for program and 1 MB for data, 1st interface, PROFINET IRT with 2-port switch, 60 ns bit performance, SIMATIC Memory Card required

General information	
Product type designation	CPU 1511-1 PN
HW functional status	FS06
Firmware version	V1.8
Product function	
• Isochronous mode	Yes; With minimum OB 6x cycle of 625 µs
Engineering with	
• STEP 7 TIA Portal configurable/integrated from version	V13 SP1 Update 4
Configuration control	
via dataset	Yes
Display	
Screen diagonal [cm]	3.45 cm
Control elements	
Number of keys	6
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)	0.7 A
Inrush current, max.	1.9 A; Rated value
I²t	0.02 A²·s
Power	
Infeed power to the backplane bus	10 W
Power consumption from the backplane bus (balanced)	5.5 W
Power loss	
Power loss, typ.	5.7 W
Memory	
SIMATIC memory card required	Yes
Work memory	
• integrated (for program)	150 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.	60 ns
for word operations, typ.	72 ns
for fixed point arithmetic, typ.	96 ns
for floating point arithmetic, typ.	384 ns
CPU-blocks	
Number of elements (total)	2 000; 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.	1 Mbyte; For non-optimized block accesses, the max. size of the DB is 64 KB
FB	
• Number range	0 ... 65 535
• Size, max.	150 kbyte
FC	
• Number range	0 ... 65 535
• Size, max.	150 kbyte
OB	
• Size, max.	150 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	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
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; In total; available retentive memory for bit memories, timers, counters, DBs, 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	1 024; 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	20
Number of DP masters	
• Via CM	4; A maximum of 4 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total
Number of IO Controllers	
• integrated	1
• Via CM	4; A maximum of 4 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
• 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
• in AS, master	Yes
• in AS, device	Yes
• on Ethernet via NTP	Yes
Interfaces	
Number of PROFINET interfaces	1
1. Interface	
Interface types	
• RJ 45 (Ethernet)	Yes; X1
• Number of ports	2
• integrated switch	Yes
Protocols	
• 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
— Isochronous mode	Yes
— IRT	Yes
— PROFIenergy	Yes
— Prioritized startup	Yes; Max. 32 PROFINET devices

— Number of connectable IO Devices, max.	128; In total, up to 256 distributed I/O devices can be connected via 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 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

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 625 µs of the isochronous OB is decisive
— for send cycle of 500 µs	500 µs to 8 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 625 µs of the isochronous OB is decisive
— 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 µs: 375 µs, 625 µs ... 3 875 µs)

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
— Isochronous mode	No
— IRT	Yes
— PROFIenergy	Yes
— Shared device	Yes
— Number of IO Controllers with shared device, max.	4

Interface types

RJ 45 (Ethernet)

• 100 Mbps	Yes
• Autonegotiation	Yes
• Autocrossing	Yes
• Industrial Ethernet status LED	Yes

Protocols

PROFIsafe	No
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Number of connections

• Number of connections, max.	96; via integrated interfaces of the CPU and connected CPs / CMs
• Number of connections reserved for ES/HMI/web	10
• Number of connections via integrated interfaces	64
• Number of S7 routing paths	16

Redundancy mode

Media redundancy

— MRP	Yes; as MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50
— Switchover time on line break, typ.	200 ms
— Number of stations in the ring, max.	50

SIMATIC communication

• S7 routing	Yes
• 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

<ul style="list-style-type: none"> • ISO-on-TCP (RFC1006) <ul style="list-style-type: none"> — Data length, max. • UDP <ul style="list-style-type: none"> — Data length, max. • DHCP • SNMP • DCP • LLDP 	Yes 64 kbyte Yes 1 472 byte No Yes Yes Yes
Web server	
<ul style="list-style-type: none"> • HTTP • HTTPS 	Yes; Standard and user-defined pages Yes; Standard and user-defined pages
Further protocols	
<ul style="list-style-type: none"> • MODBUS 	Yes; MODBUS TCP
Isochronous mode	
Equidistance	Yes
S7 message functions	
Number of login stations for message functions, max.	32
Program alarms	Yes
Number of configurable program messages, max.	5 000
Number of simultaneously active program alarms	
<ul style="list-style-type: none"> • Number of program alarms • Number of alarms for system diagnostics • Number of alarms for motion technology objects 	300 100 80
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
Status/control	
<ul style="list-style-type: none"> • Status/control variable • Variables • Number of variables, max. <ul style="list-style-type: none"> — of which status variables, max. — of which control variables, max. 	Yes Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 200; per job 200; per job
Forcing	
<ul style="list-style-type: none"> • Forcing, variables • Number of variables, max. 	Peripheral inputs/outputs 200
Diagnostic buffer	
<ul style="list-style-type: none"> • present • Number of entries, max. <ul style="list-style-type: none"> — of which powerfail-proof 	Yes 1 000 500
Traces	
<ul style="list-style-type: none"> • Number of configurable Traces 	4; Up to 512 KB of data per trace are possible
Interrupts/diagnostics/status information	
Diagnostics indication LED	
<ul style="list-style-type: none"> • RUN/STOP LED • ERROR LED • MAINT LED • Connection display LINK TX/RX 	Yes Yes Yes Yes
Supported technology objects	
Motion Control	Yes
<ul style="list-style-type: none"> • Speed-controlled axis <ul style="list-style-type: none"> — Number of speed-controlled axes, max. • Positioning axis <ul style="list-style-type: none"> — Number of positioning axes, max. • Synchronized axes (relative gear synchronization) <ul style="list-style-type: none"> — Number of axes, max. 	6; Requirement: There must be no other motion technology objects created; note: The number of axes affects the cycle time of the PLC program; selection guide via the TIA Selection Tool 6; Requirement: There must be no other motion technology objects created; note: The number of axes affects the cycle time of the PLC program; selection guide via the TIA Selection Tool 3; Requirement: There must be no other motion technology objects created; note: The number of axes affects the cycle time of the PLC program; selection guide via the TIA Selection Tool

<ul style="list-style-type: none"> • External encoders <ul style="list-style-type: none"> — Number of external encoders, max. 		6; Requirement: There must be no other motion technology objects created; note: The number of axes affects the cycle time of the PLC program; selection guide via the TIA Selection Tool
Controller <ul style="list-style-type: none"> • PID_Compact • PID_3Step • PID-Temp 		Yes; Universal PID controller with integrated optimization Yes; PID controller with integrated optimization for valves Yes; PID controller with integrated optimization for temperature
Counting and measuring <ul style="list-style-type: none"> • High-speed counter 		Yes
Ambient conditions		
Ambient temperature during operation		
<ul style="list-style-type: none"> • horizontal installation, min. • horizontal installation, max. 		0 °C 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. • vertical installation, max. 		0 °C 40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off
configuration / header		
configuration / programming / header		
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
programming / cycle time monitoring / header		
• lower limit		adjustable minimum cycle time
• upper limit		adjustable maximum cycle time
Dimensions		
Width		35 mm
Height		147 mm
Depth		129 mm
Weights		
Weight, approx.		430 g

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