

SIPLUS S7-1500 CPU 1511-1 PN -40 ... +60 °C STARTUP -20 °C WITH CONFORMAL COATING BASED ON 6ES7511-1AK01-0AB0 . CENTRAL PROCESSING UNIT WITH WORKING MEMORY 150 KB FOR PROGRAM AND 1 MB FOR DATA, 1. INTERFACE: PROFINET IRT WITH 2 PORT SWITCH, 60 NS BIT-PERFORMANCE, SIMATIC MEMORY CARD NECESSARY



Figure similar

General information	
Product type designation	CPU 1511-1 PN
Display	
Screen diagonal [cm]	3.45 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
Input current	
Current consumption (rated value)	0.7 A
Inrush current, max.	1.9 A; Rated value
I ² t	0.34 A ² ·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	
<ul style="list-style-type: none"> integrated (for program) 	150 kbyte
<ul style="list-style-type: none"> integrated (for data) 	1 Mbyte
Load memory	
<ul style="list-style-type: none"> Plug-in (SIMATIC Memory Card), max. 	2 Gbyte
Backup	
<ul style="list-style-type: none"> 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 blocks (total)	2 000
DB	
<ul style="list-style-type: none"> Number, max. 	2 000; Number range: 1 to 65535
<ul style="list-style-type: none"> Size, max. 	1 Mbyte
FB	
<ul style="list-style-type: none"> Number, max. 	1 998; Number range: 1 to 65535
<ul style="list-style-type: none"> Size, max. 	150 kbyte
FC	
<ul style="list-style-type: none"> Number, max. 	1 999; Number range: 1 to 65535
<ul style="list-style-type: none"> Size, max. 	150 kbyte
OB	
<ul style="list-style-type: none"> Size, max. 	150 kbyte
<ul style="list-style-type: none"> Number of free cycle OBs 	100
<ul style="list-style-type: none"> Number of time alarm OBs 	20
<ul style="list-style-type: none"> Number of delay alarm OBs 	20
<ul style="list-style-type: none"> Number of cyclic interrupt OBs 	20
<ul style="list-style-type: none"> Number of process alarm OBs 	50
<ul style="list-style-type: none"> Number of DPV1 alarm OBs 	3
<ul style="list-style-type: none"> Number of isochronous mode OBs 	1
<ul style="list-style-type: none"> 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; Available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 88 KB
Flag	
• Number, max.	16 kbyte
• Number of clock memories	8; 8 clock memory bits, 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
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
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
Clock synchronization	
• supported	Yes
• in AS, master	Yes
• in AS, slave	Yes
• on Ethernet via NTP	Yes

Interfaces

Number of PROFINET interfaces	1
-------------------------------	---

1. Interface

Interface types	
• Number of ports	2
• integrated switch	Yes
• RJ 45 (Ethernet)	Yes
Functionality	
• PROFINET IO Controller	Yes
• PROFINET IO Device	Yes
• SIMATIC communication	Yes
• Open IE communication	Yes

- Web server Yes
- Media redundancy Yes

Interface types

RJ 45 (Ethernet)

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

Protocols

Number of connections

- Number of connections, max. 96
- Number of connections reserved for ES/HMI/web 10
- Number of connections via integrated interfaces 64

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. 128; In total, up to 256 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. 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

Redundancy mode

- MRP Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50

Update time for IRT

- for send cycle of 250 μ s 250 μ s to 4 ms
- 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 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
— S7 routing	Yes
— Isochronous mode	Yes
— Open IE communication	Yes
— IRT	Yes
— PROFinergy	Yes
Redundancy mode	
— MRP	Yes
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
• 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
Web server	
• HTTP	Yes; Standard and user-defined pages
• HTTPS	Yes; Standard and user-defined pages
Further protocols	
• MODBUS	Yes; MODBUS TCP
Media redundancy	

- Switchover time on line break, typ. 200 ms
- Number of stations in the ring, max. 50

Isochronous mode

Isochronous operation (application synchronized up to terminal)	Yes
Equidistance	Yes

S7 message functions

Number of login stations for message functions, max.	32
Program alarms	Yes
Number of configurable program alarms	5 000
Number of simultaneously active program alarms	500

Test commissioning functions

Status block	Yes; up to 8 simultaneously
Single step	No

Status/control	
• Status/control variable	Yes
• Variables	Inputs, outputs, memory bits, DB, times, counters
• Number of variables, max.	
— of which status variables, max.	200; per job
— of which control variables, max.	200; per job

Forcing	
• Forcing, variables	Inputs, outputs
• Number of variables, max.	200

Diagnostic buffer	
• present	Yes
• Number of entries, max.	
— of which powerfail-proof	500

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	
• Speed-controlled axis	
— Number of speed-controlled axes, max.	6; Up to 6 axes in total (speed-controlled, positioning axis, external encoders) are supported
• Positioning axis	
— Number of positioning axes, max.	6; Up to 6 axes in total (speed-controlled, positioning axis, external encoders) are supported

<ul style="list-style-type: none"> • External encoders <ul style="list-style-type: none"> — Number of external encoders, max. 	6; Up to 6 axes in total (speed-controlled, positioning axis, external encoders) are supported
Controller <ul style="list-style-type: none"> • PID_Compact • PID_3Step 	Yes; Universal PID controller with integrated optimization Yes; PID controller with integrated optimization for valves
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. • vertical installation, min. • vertical installation, max. 	-40 °C; = Tmin; Startup @ -20 °C 60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off -40 °C; = Tmin; Startup @ -20 °C 40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off
Ambient temperature during storage/transportation	
<ul style="list-style-type: none"> • min. • max. 	-40 °C 70 °C
Altitude during operation relating to sea level	
<ul style="list-style-type: none"> • Installation altitude above sea level, max. • Ambient air temperature-barometric pressure-altitude 	5 000 m Tmin ... Tmax at 1 140 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)
Relative humidity	
<ul style="list-style-type: none"> • With condensation, tested in accordance with IEC 60068-2-38, max. 	100 %; RH incl. condensation / frost (no commissioning in bedewed state), horizontal installation
Resistance	
Coolants and lubricants	
<ul style="list-style-type: none"> — Resistant to commercially available coolants and lubricants 	Yes
Use in stationary industrial systems	
<ul style="list-style-type: none"> — to biologically active substances according to EN 60721-3-3 — to chemically active substances according to EN 60721-3-3 — to mechanically active substances according to EN 60721-3-3 	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna); Class 3B3 on request Yes; Class 3C4 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); * Yes; Class 3S4 incl. sand, dust, *
Use on ships/at sea	
<ul style="list-style-type: none"> — to biologically active substances according to EN 60721-3-6 — to chemically active substances according to EN 60721-3-6 	Yes; Class 6B2 mold and fungal spores (excluding fauna); Class 6B3 on request Yes; Class 6C3 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *

— to mechanically active substances according to EN 60721-3-6

Yes; Class 6S3 incl. sand, dust; *

from supply voltage 1L+

— Note regarding classification of environmental conditions acc. to EN 60721

* The supplied plug covers must remain in place over the unused interfaces during operation!

Configuration

Programming

Programming language

— LAD

Yes

— FBD

Yes

— STL

Yes

— SCL

Yes

— GRAPH

Yes; As of STEP 7 V12 SP1

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

35 mm

Height

147 mm

Depth

129 mm

Weights

Weight, approx.

430 g

Other

Note:

At temperatures below 0 °C legibility may be restricted and representation of dynamic contents may be slower

last modified:

05/18/2018