

SIPLUS S7-1500 CPU 1511F-1 PN -25...+60°C start up -20°C with conformal coating based on 6ES7511-1FK01-0AB0 . Central processing unit with Work memory 225 KB for program and 1 MB for data, 1st interface: PROFINET IRT with 2-port switch, 60 ns bit performance, SIMATIC Memory Card required



Figure similar

General information	
Product type designation	CPU 1511F-1 PN
HW functional status	FS01
Firmware version	V1.8
Engineering with	
<ul style="list-style-type: none"> <li>STEP 7 TIA Portal configurable/integrated as of version</li> </ul>	V13 SP1 Update 4
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

Reverse polarity protection	Yes
<b>Mains buffering</b>	
• Mains/voltage failure stored energy time	5 ms
<b>Input current</b>	
Current consumption (rated value)	0.7 A
Inrush current, max.	1.9 A; Rated value
$I^2t$	0.02 A <sup>2</sup> ·s
<b>Power</b>	
Infeed power to the backplane bus	10 W
Power consumption from the backplane bus (balanced)	5.5 W
<b>Power loss</b>	
Power loss, typ.	5.7 W
<b>Memory</b>	
SIMATIC memory card required	Yes
<b>Work memory</b>	
• integrated (for program)	225 kbyte
• integrated (for data)	1 Mbyte
<b>Load memory</b>	
• Plug-in (SIMATIC Memory Card), max.	32 Gbyte
<b>Backup</b>	
• maintenance-free	Yes
<b>CPU processing times</b>	
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
<b>CPU-blocks</b>	
Number of blocks (total)	2 000
<b>DB</b>	
• Number, max.	2 000; Number range: 1 to 65535
• Size, max.	1 Mbyte; For non-optimized block accesses, the max. size of the DB is 64 KB
<b>FB</b>	
• Number, max.	1 998; Number range: 1 to 65535
• Size, max.	225 kbyte
<b>FC</b>	
• Number, max.	1 999; Number range: 1 to 65535
• Size, max.	225 kbyte
<b>OB</b>	

• Size, max.	225 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; Up to 8 possible for F-blocks
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#### Counters, timers and their retentivity

##### S7 counter

• Number	2 048
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##### Retentivity

— adjustable	Yes
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##### IEC counter

• Number	Any (only limited by the main memory)
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##### Retentivity

— adjustable	Yes
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##### S7 times

• Number	2 048
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##### Retentivity

— adjustable	Yes
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##### IEC timer

• Number	Any (only limited by the main memory)
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##### Retentivity

— adjustable	Yes
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#### 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
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##### Flag

• Number, 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

<b>Local data</b>	
• per priority class, max.	64 kbyte; max. 16 KB per block
<b>Address area</b>	
Number of IO modules	1 024; max. number of modules / submodules
<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	5
<b>Number of DP masters</b>	
• Via CM	4; A maximum of 4 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total
<b>Number of IO Controllers</b>	
• integrated	1
• Via CM	4; A maximum of 4 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total
<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>Operating hours counter</b>	
• Number	8
<b>Clock synchronization</b>	
• 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; X1

#### Protocols

- 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; 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

##### 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 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
<b>Update time for IRT</b>	
— 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)
<b>Update time for RT</b>	
— 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
<b>PROFINET IO Device</b>	
<b>Services</b>	
— PG/OP communication	Yes
— S7 routing	Yes
— Isochronous mode	No
— Open IE communication	Yes
— IRT	Yes
— PROFlenergy	Yes
— Shared device	Yes
— Number of IO Controllers with shared device, max.	4
<b>Redundancy mode</b>	
• MRP	Yes; as MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50
<b>SIMATIC communication</b>	
• S7 communication, as server	Yes

<ul style="list-style-type: none"> <li>• S7 communication, as client</li> </ul>	Yes
<ul style="list-style-type: none"> <li>• User data per job, max.</li> </ul>	See online help (S7 communication, user data size)
<b>Open IE communication</b>	
<ul style="list-style-type: none"> <li>• TCP/IP <ul style="list-style-type: none"> <li>— Data length, max.</li> <li>— several passive connections per port, supported</li> </ul> </li> </ul>	Yes 64 kbyte Yes
<ul style="list-style-type: none"> <li>• ISO-on-TCP (RFC1006) <ul style="list-style-type: none"> <li>— Data length, max.</li> </ul> </li> </ul>	Yes 64 kbyte
<ul style="list-style-type: none"> <li>• UDP <ul style="list-style-type: none"> <li>— Data length, max.</li> </ul> </li> </ul>	Yes 1 472 byte
<ul style="list-style-type: none"> <li>• DHCP</li> </ul>	No
<ul style="list-style-type: none"> <li>• SNMP</li> </ul>	Yes
<ul style="list-style-type: none"> <li>• DCP</li> </ul>	Yes
<ul style="list-style-type: none"> <li>• LLDP</li> </ul>	Yes
<b>Web server</b>	
<ul style="list-style-type: none"> <li>• HTTP</li> </ul>	Yes; Standard and user-defined pages
<ul style="list-style-type: none"> <li>• HTTPS</li> </ul>	Yes; Standard and user-defined pages
<b>Further protocols</b>	
<ul style="list-style-type: none"> <li>• MODBUS</li> </ul>	Yes; MODBUS TCP
<b>Media redundancy</b>	
<ul style="list-style-type: none"> <li>• Switchover time on line break, typ.</li> </ul>	200 ms
<ul style="list-style-type: none"> <li>• Number of stations in the ring, max.</li> </ul>	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 messages, max.	5 000
Number of simultaneously active program alarms	
<ul style="list-style-type: none"> <li>• Number of program alarms</li> </ul>	300
<ul style="list-style-type: none"> <li>• Number of alarms for system diagnostics</li> </ul>	100
<ul style="list-style-type: none"> <li>• Number of alarms for motion technology objects</li> </ul>	80
<b>Test commissioning functions</b>	
Joint commission (Team Engineering)	Yes; Parallel online access possible for up to 3 engineering systems
Status block	Yes; Up to 8 simultaneously (in total across all ES clients)
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.	1 000
— 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
• Speed-controlled axis	
— Number of speed-controlled axes, max.	6; Max. number of speed-controlled axes (requirement: there must be no other motion technology objects created)
• Positioning axis	
— Number of positioning axes, max.	6; Max. number of positioning axes (requirement: there must be no other motion technology objects created)
• Synchronized axes (relative gear synchronization)	
— Number of axes, max.	3; Max. number of synchronous axes (requirement: there must be no other motion technology objects created)
• External encoders	
— Number of external encoders, max.	6; Max. number of external encoders (requirement: there must be no other motion technology objects created)
Controller	
• PID_Compact	Yes; Universal PID controller with integrated optimization
• PID_3Step	Yes; PID controller with integrated optimization for valves
Counting and measuring	
• High-speed counter	Yes
Standards, approvals, certificates	



<b>Highest safety class achievable in safety mode</b>	
<ul style="list-style-type: none"> <li>• Performance level according to ISO 13849-1</li> </ul>	PLe
<ul style="list-style-type: none"> <li>• SIL acc. to IEC 61508</li> </ul>	SIL 3
<b>Ambient conditions</b>	
<b>Ambient temperature during operation</b>	
<ul style="list-style-type: none"> <li>• horizontal installation, min.</li> </ul>	-25 °C; = Tmin; startup @ -25 °C; startup display @ -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>	-25 °C; = Tmin; startup @ -25 °C; startup display @ -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>• Installation altitude above sea level, max.</li> </ul>	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 in bedewed state), horizontal installation
<b>Resistance</b>	
<b>Coolants and lubricants</b>	
<ul style="list-style-type: none"> <li>— Resistant to commercially available coolants and lubricants</li> </ul>	Yes; Incl. diesel and oil droplets in the air
<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 acc. to EN 60068-2-52 (severity degree 3); *
<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, *
<b>Use on ships/at sea</b>	
<ul style="list-style-type: none"> <li>— to biologically active substances according to EN 60721-3-6</li> </ul>	Yes; Class 6B2 mold and fungal spores (excluding fauna); Class 6B3 on request
<ul style="list-style-type: none"> <li>— to chemically active substances according to EN 60721-3-6</li> </ul>	Yes; Class 6C3 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *
<ul style="list-style-type: none"> <li>— to mechanically active substances according to EN 60721-3-6</li> </ul>	Yes; Class 6S3 incl. sand, dust; *
<b>Remark</b>	
<ul style="list-style-type: none"> <li>— Note regarding classification of environmental conditions acc. to EN 60721, EN 60654-4 and ANSI/ISA-71.04</li> </ul>	* The supplied plug covers must remain in place over the unused interfaces during operation!
<b>Conformal coating</b>	
<ul style="list-style-type: none"> <li>• Coatings for printed circuit board assemblies acc. to EN 61086</li> </ul>	Yes; Class 2 for high availability

- Military testing according to MIL-I-46058C, Amendment 7
- Qualification and Performance of Electrical Insulating Compound for Printed Board Assemblies according to IPC-CC-830A

Yes; Discoloration of coating possible during service life

Yes; Conformal coating, Class A

## Configuration

### Programming

#### Programming language

— LAD	Yes; incl. failsafe
— FBD	Yes; incl. failsafe
— 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

#### 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
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## Other

Note:	At temperatures below 0 °C legibility may be restricted and representation of dynamic contents may be slower
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**last modified:** 08/30/2019