

Spare part SIPLUS S7-1500 CPU 1513F-1 PN -25...+60 °C
 Startup -20 °C with conformal coating based on 6ES7 513-1FL00-0AB0 . Central processing unit with work memory 450 KB for program and 1.5 MB for data, 1st interface, PROFINET IRT with 2-port switch, 40 ns bit performance, SIMATIC Memory Card required

General information	
Product type designation	CPU 1513F-1 PN
Firmware version	V1.7
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
Mains buffering	
<ul style="list-style-type: none"> 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
I^2t	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) integrated (for data) 	450 kbyte 1.5 Mbyte
Load memory	

• Plug-in (SIMATIC Memory Card), max.	32 Gbyte
Backup	
• maintenance-free	Yes
CPU processing times	
for bit operations, typ.	40 ns
for word operations, typ.	48 ns
for fixed point arithmetic, typ.	64 ns
for floating point arithmetic, typ.	256 ns
CPU-blocks	
Number of blocks (total)	2 000
DB	
• Number, max.	2 000; Number range: 1 to 65535
• Size, max.	1.5 Mbyte; For non-optimized block accesses, the max. size of the DB is 64 KB
FB	
• Number, max.	1 998; Number range: 1 to 65535
• Size, max.	450 kbyte
FC	
• Number, max.	1 999; Number range: 1 to 65535
• Size, max.	450 kbyte
OB	
• Size, max.	450 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	8
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	2 048; 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	7
Number of DP masters	
• Via CM	6; A maximum of 6 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total

Number of IO Controllers	
<ul style="list-style-type: none"> integrated Via CM 	<p>1</p> <p>6; A maximum of 6 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total</p>
Rack	
<ul style="list-style-type: none"> Modules per rack, max. Number of lines, max. 	<p>32; CPU + 31 modules</p> <p>1</p>
PtP CM	
<ul style="list-style-type: none"> Number of PtP CMs 	the number of connectable PtP CMs is only limited by the number of available slots

Time of day	
Clock	
<ul style="list-style-type: none"> Type Backup time Deviation per day, max. 	<p>Hardware clock</p> <p>6 wk; At 40 °C ambient temperature, typically</p> <p>10 s; Typ.: 2 s</p>
Operating hours counter	
<ul style="list-style-type: none"> Number 	8
Clock synchronization	
<ul style="list-style-type: none"> supported in AS, master in AS, slave on Ethernet via NTP 	<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>

Interfaces	
Number of PROFINET interfaces	1

1. Interface	
Interface types	
<ul style="list-style-type: none"> Number of ports integrated switch RJ 45 (Ethernet) 	<p>2</p> <p>Yes</p> <p>Yes; X1</p>
Functionality	
<ul style="list-style-type: none"> PROFINET IO Controller PROFINET IO Device SIMATIC communication Open IE communication Web server Media redundancy 	<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>

Interface types	
RJ 45 (Ethernet)	
<ul style="list-style-type: none"> 100 Mbps Autonegotiation Autocrossing 	<p>Yes</p> <p>Yes</p> <p>Yes</p>

- Industrial Ethernet status LED

Yes

Protocols

Number of connections

- | | |
|---|---|
| • Number of connections, max. | 128; 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 | 88 |
| • 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 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 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
— PROFINergy	Yes
— Shared device	Yes
— Number of IO Controllers with shared device, max.	4
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
— several passive connections per port, supported	Yes
• 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	
• Number of program alarms	290
• Number of alarms for system diagnostics	100
• Number of alarms for motion technology objects	160

Test commissioning functions

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
<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. • External encoders <ul style="list-style-type: none"> — Number of external encoders, max. 	<p>6; Max. number of speed-controlled axes (requirement: there must be no other motion technology objects created)</p> <p>6; Max. number of positioning axes (requirement: there must be no other motion technology objects created)</p> <p>3; Max. number of synchronous axes (requirement: there must be no other motion technology objects created)</p> <p>6; Max. number of external encoders (requirement: there must be no other motion technology objects created)</p>
Controller	Yes; Universal PID controller with integrated optimization
<ul style="list-style-type: none"> • PID_Compact • PID_3Step 	Yes; PID controller with integrated optimization for valves
Counting and measuring	Yes
<ul style="list-style-type: none"> • High-speed counter 	

Ambient conditions

Ambient temperature during operation	
<ul style="list-style-type: none"> • horizontal installation, min. • horizontal installation, max. • vertical installation, min. • vertical installation, max. 	<p>-25 °C; = Tmin; Startup @ -20 °C</p> <p>60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off</p> <p>-25 °C; = Tmin; Startup @ -20 °C</p> <p>40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off</p>
Ambient temperature during storage/transportation	
<ul style="list-style-type: none"> • min. • max. 	<p>-40 °C</p> <p>70 °C</p>
Altitude during operation relating to sea level	
<ul style="list-style-type: none"> • Ambient air temperature-barometric pressure-altitude 	Tmin ... Tmax at 1 080 hPa ... 795 hPa (-1 000 m ... +2 000 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 under condensation conditions)
Resistance	
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 	<p>Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna); Class 3B3 on request</p> <p>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!</p>

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

Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!

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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