Data sheet



SIPLUS S7-1500 CPU 1513-1 PN -40°C+60°C with conformal coating based on 6ES7513-1AL02-0AB0 . Central processing unit with Work memory 300 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 1513-1 PN
Product function	
● I&M data	Yes; I&M0 to I&M3
• Isochronous mode	Yes; Distributed and central; with minimum OB $6x$ cycle of $500~\mu s$ (distributed) and 1 ms (central)
Configuration control	
via dataset	Yes
Display	
Screen diagonal [cm]	3.45 cm
Control elements	
Number of keys	8
Mode buttons	2
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

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Reverse polarity protection	Yes
Mains buffering	
 Mains/voltage failure stored energy time 	5 ms
Repeat rate, min.	1/s
Input current	
Current consumption (rated value)	0.7 A
Current consumption, max.	0.95 A
Inrush current, max.	1.9 A; Rated value
l²t	0.02 A ² ·s
Power	
Infeed power to the backplane bus	10 W
Power consumption from the backplane bus	5.5 W
(balanced)	
Power loss	
Power loss, typ.	5.7 W
Memory	
Number of slots for SIMATIC memory card	1
SIMATIC memory card required	Yes
Work memory	
integrated (for program)	300 kbyte
integrated (for data)	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 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
• Number range	the user: 1 59 999, and number range of DBs created via SFC
	86: 60 000 60 999
• Size, max.	1.5 Mbyte; For DBs with absolute addressing, the max. size is 64
	КВ
FB	
Number range	0 65 535
• Size, max.	300 kbyte



FC	
FC	0. 05 505
Number range	0 65 535
• Size, max.	300 kbyte
OB	300 kbyte
• Size, max.	100
Number of free cycle OBsNumber of time alarm OBs	20
	20
Number of delay alarm OBs	20; With minimum OB 3x cycle of 500 µs
Number of cyclic interrupt OBs	20, With Hillimidin OB 3x cycle of 500 μs
Number of process alarm OBs Number of DDV4 plans OBs	
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
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),	128 kbyte; In total; available retentive memory for bit memories,
max.	timers, counters, DBs, and technology data (axes): 88 KB
Extended retentive data area (incl. timers, counters,	1.5 Mbyte; When using PS 6 0W 24/48/60 V DC HF
flags), max.	



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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
Local data	
per priority class, max.	64 kbyte; max. 16 KB per block
Address area	0.040
Number of IO modules	2 048; max. number of modules / submodules
I/O address area	OO blocker All investor are in the process investor
• 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	32; A distributed I/O system is characterized not only by the integration of distributed I/O via PROFINET or PROFIBUS
	communication modules, but also by the connection of I/O via AS-
	i master modules or links (e.g. IE/PB-Link)
N	
Number of DP masters	A A COM (PROFINET - PROFIRMS)
Number of DP masters ● Via CM	6; A maximum of 6 CMs (PROFINET + PROFIBUS) can be inserted in total
• Via CM	
Via CM Number of IO Controllers	inserted in total
Via CMNumber of IO Controllersintegrated	1 6; A maximum of 6 CMs (PROFINET + PROFIBUS) can be
 Via CM Number of IO Controllers integrated Via CM 	1 6; A maximum of 6 CMs (PROFINET + PROFIBUS) can be
 Via CM Number of IO Controllers integrated Via CM Rack	1 6; A maximum of 6 CMs (PROFINET + PROFIBUS) can be inserted in total
 Via CM Number of IO Controllers integrated Via CM Rack Modules per rack, max. 	1 6; A maximum of 6 CMs (PROFINET + PROFIBUS) can be inserted in total 32; CPU + 31 modules
 Via CM Number of IO Controllers integrated Via CM Rack Modules per rack, max. Number of lines, max. 	1 6; A maximum of 6 CMs (PROFINET + PROFIBUS) can be inserted in total 32; CPU + 31 modules
 Via CM Number of IO Controllers integrated Via CM Rack Modules per rack, max. Number of lines, max. PtP CM 	1 6; A maximum of 6 CMs (PROFINET + PROFIBUS) can be inserted in total 32; CPU + 31 modules 1 the number of connectable PtP CMs is only limited by the number
 Via CM Number of IO Controllers integrated Via CM Rack Modules per rack, max. Number of lines, max. PtP CM Number of PtP CMs 	1 6; A maximum of 6 CMs (PROFINET + PROFIBUS) can be inserted in total 32; CPU + 31 modules 1 the number of connectable PtP CMs is only limited by the number



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, slave	Yes
● on Ethernet via NTP	Yes
nterfaces	
Number of PROFINET interfaces	1
1. Interface	
Interface types	
• RJ 45 (Ethernet)	Yes; X1
Number of ports	2
• integrated switch	Yes
Protocols	
• IP protocol	Yes; IPv4
 PROFINET IO Controller 	Yes
PROFINET IO Device	Yes
 SIMATIC communication 	Yes
Open IE communication	Yes; Optionally also encrypted
• Web server	Yes
Media redundancy	Yes
PROFINET IO Controller	
Services	
— PG/OP communication	Yes
— S7 routing	Yes
— Isochronous mode	Yes
 Direct data exchange 	Yes; Requirement: IRT and isochronous mode (MRPD optional)
— IRT	Yes
— MRP	Yes; as MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50
— MRPD	Yes; Requirement: IRT
— PROFlenergy	Yes; per user program
— Prioritized startup	Yes; Max. 32 PROFINET devices
— Number of connectable IO Devices, max.	128; In total, up to 512 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
— Of which IO devices with IRT, max.	64



max.

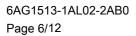
- Number of connectable IO Devices for RT,



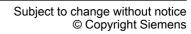
128

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— of which in line, max.	128
 Number of IO Devices that can be simultaneously activated/deactivated, max. 	8; in total across all interfaces
 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	$250~\mu s$ to 4 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 500 μs of the isochronous OB is decisive
— for send cycle of 500 μs	500 μs 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 $\mu s)$
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
— IRT	Yes
— MRP	Yes; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP Manager; MRP Client; max. number of devices in the ring: 50
— MRPD	Yes; Requirement: IRT
— PROFlenergy	Yes; per user program
— Shared device	Yes
 Number of IO Controllers with shared device, max. 	4
 Asset management record 	Yes; per user program
Interface types	
RJ 45 (Ethernet)	
• 100 Mbps	Yes
 Autonegotiation 	Yes



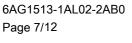
Autocrossing



Yes

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
Redundancy mode	
H-Sync forwarding	Yes
Media redundancy	
 Switchover time on line break, typ. 	200 ms; For MRP, bumpless for MRPD
 Number of stations in the ring, max. 	50
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.	2 kbyte; 1 472 bytes for UDP broadcast
— UDP multicast	Yes; Max. 5 multicast circuits
• DHCP	No
• SNMP	Yes
• DCP	Yes
• LLDP	Yes
Web server	
• HTTP	Yes; Standard and user pages
• HTTPS	Yes; Standard and user pages
OPC UA	
Runtime license required	Yes
OPC UA Client	Yes
Application authentication	Yes
— Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256



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— User authentication	"anonymous" or by user name & password
— Number of connections, max.	4
 Number of nodes of the client interfaces, 	1 000
max.	
 Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_Rea dList/OPC_UA_WriteList, max. 	300
 Number of elements for one call of OPC_UA_NameSpaceGetIndexList, max. 	20
 Number of elements for one call of OPC_UA_MethodGetHandleList, max. 	100
 Number of simultaneous calls of the client instructions per connection (except OPC_UA_ReadList,OPC_UA_WriteList,OPC_ UA_MethodCall), max. 	1
 Number of simultaneous calls of the client instructions OPC_UA_ReadList,OPC_UA_WriteList and OPC_UA_MethodCall, max. 	5
 Number of registerable nodes, max. 	5 000
 Number of registerable method calls of OPC_UA_MethodCall, max. 	100
— Number of inputs/outputs when calling OPC_UA_MethodCall, max.	20
OPC UA Server	Yes; Data access (read, write, subscribe), method call, custom address space
 Application authentication 	Yes
— Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
 User authentication 	"anonymous" or by user name & password
Number of sessions, max.	32
 Number of accessible variables, max. 	50 000
 Number of registerable nodes, max. 	10 000
 Number of subscriptions per session, max. 	20
— Sampling interval, min.	100 ms
— Publishing interval, min.	500 ms
— Number of server methods, max.	20
 Number of inputs/outputs per server method, max. 	20
— Number of monitored items, max.	1 000; for 1 s sampling interval and 1 s send interval
— Number of server interfaces, max.	10; or 20, depending on type of server interface
 Number of nodes for user-defined server interfaces, max. 	1 000
Further protocols	



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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; Program messages are generated by the "Program_Alarm" block, ProDiag or GRAPH
Number of simultaneously active program alarms	
 Number of program alarms 	300
 Number of alarms for system diagnostics 	100
 Number of alarms for motion technology objects 	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
Number of breakpoints	8
Status/control	
 Status/control variable 	Yes
 Variables 	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters
Number of variables, max.	
of which status variables, max.	200; per job
of which control variables, max.	200; per job
Forcing	
• Forcing, variables	Peripheral 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
• STOP ACTIVE LED	Yes



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Yes

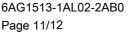
Supported technology objects	
Supported technology objects Motion Control	Yes; Note: The number of axes affects the cycle time of the PLC
	program; selection guide via the TIA Selection Tool or SIZER
 Number of available Motion Control resources for technology objects 	800
Required Motion Control resources	
— per speed-controlled axis	40
— per positioning axis	80
— per synchronous axis	160
— per external encoder	80
— per output cam	20
— per cam track	160
— per probe	40
Positioning axis	
 Number of positioning axes at motion control cycle of 4 ms (typical value) 	5
 Number of positioning axes at motion control cycle of 8 ms (typical value) 	10
Controller	
PID_Compact	Yes; Universal PID controller with integrated optimization
PID_3Step	Yes; PID controller with integrated optimization for valves
PID-Temp	Yes; PID controller with integrated optimization for temperature
Counting and measuring	
High-speed counter	Yes
Ambient conditions	
Ambient temperature during operation	
horizontal installation, min.	-40 °C; = Tmin (incl. condensation/frost)
 horizontal installation, max. 	60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off
vertical installation, min.	-40 °C; = Tmin (incl. condensation/frost)
• vertical installation, max.	40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off
Ambient temperature during storage/transportation	
● min.	-40 °C
	70.00
• max.	70 °C
	70°C
• max.	5 000 m
max. Altitude during operation relating to sea level	



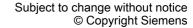
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100 %; RH incl. condensation / frost (no commissioning in • With condensation, tested in accordance with IEC 60068-2-38, max. bedewed state), horizontal installation Resistance Coolants and lubricants Yes; Incl. diesel and oil droplets in the air - Resistant to commercially available coolants and lubricants Use in stationary industrial systems Yes; Class 3B2 mold, fungus and dry rot spores (with the — to biologically active substances according to EN 60721-3-3 exception of fauna); Class 3B3 on request Yes; Class 3C4 (RH < 75 %) incl. salt spray acc. to EN 60068-2-- to chemically active substances according to EN 60721-3-3 52 (severity degree 3); * Yes; Class 3S4 incl. sand, dust, * - to mechanically active substances according to EN 60721-3-3 Use on ships/at sea - to biologically active substances according Yes; Class 6B2 mold, fungal and dry rot spores (excluding fauna) to EN 60721-3-6 Yes; Class 6C3 (RH < 75 %) incl. salt spray acc. to EN 60068-2-- to chemically active substances according 52 (severity degree 3); * to EN 60721-3-6 Yes; Class 6S3 incl. sand, dust; * - to mechanically active substances according to EN 60721-3-6 Usage in industrial process technology Yes; Class 3 (excluding trichlorethylene) Against chemically active substances acc. to EN 60654-4 Yes; Level GX group A/B (excluding trichlorethylene; harmful gas - Environmental conditions for process, concentrations up to the limits of EN 60721-3-3 class 3C4 measuring and control systems acc. to permissible); level LC3 (salt spray) and level LB3 (oil) ANSI/ISA-71.04 Remark * The supplied plug covers must remain in place over the unused - Note regarding classification of interfaces during operation! environmental conditions acc. to EN 60721, EN 60654-4 and ANSI/ISA-71.04 Conformal coating Yes; Class 2 for high reliability • Coatings for printed circuit board assemblies acc. to EN 61086 Yes; Type 1 protection • Protection against fouling acc. to EN 60664-3 Yes; Discoloration of coating possible during service life • Military testing according to MIL-I-46058C, Amendment 7 • Qualification and Performance of Electrical Yes; Conformal coating, Class A Insulating Compound for Printed Board Assemblies according to IPC-CC-830A Configuration Programming Programming language Yes - LAD



- FBD



Yes

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— 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.	405 g
last modified:	10/09/2020

