



SIMATIC S7-1500F, CPU 1517F-3 PN, central processing unit with 6 MB work memory for program and 50 MB for data, 1st interface: PROFINET IRT with 2-port switch, 2nd interface: PROFINET IRT, with 2-port switch, 3rd interface: Ethernet, 0.6 ns bit performance, SIMATIC Memory Card required

General information	
Product type designation	CPU 1517F-3 PN
HW functional status	FS01
Firmware version	V4.1
<ul style="list-style-type: none"> FW update possible 	Yes
Product function	
<ul style="list-style-type: none"> I&M data 	Yes; I&M0 to I&M3
<ul style="list-style-type: none"> Isochronous mode 	Yes; Distributed and central; with minimum OB 6x cycle of 250 μ s (distributed) and 1 ms (central)
<ul style="list-style-type: none"> SysLog 	Yes
Engineering with	
<ul style="list-style-type: none"> STEP 7 TIA Portal configurable/integrated from version 	V21 (FW V4.1) / V20 (FW V4.0) or higher
Configuration control	
via dataset	Yes
Display	
Screen diagonal [cm]	6.1 cm
Control elements	
Number of keys	8
Mode buttons	2
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	
<ul style="list-style-type: none"> Mains/voltage failure stored energy time 	5 ms
<ul style="list-style-type: none"> Repeat rate, min. 	1/s
Input current	
Current consumption (rated value)	1.07 A
Current consumption, max.	1.5 A
Inrush current, max.	1.5 A; Rated value
I^2t	0.4 A ² ·s
Power	
Infeed power to the backplane bus	12 W
Power consumption from the backplane bus (balanced)	30 W
Power loss	
Power loss, typ.	13.6 W
Memory	
Number of slots for SIMATIC memory card	1
SIMATIC memory card required	Yes
Work memory	
<ul style="list-style-type: none"> integrated (for program) 	6 Mbyte
<ul style="list-style-type: none"> integrated (for data) 	50 Mbyte
Load memory	
<ul style="list-style-type: none"> Plug-in (SIMATIC Memory Card), max. 	32 Gbyte
Backup	
<ul style="list-style-type: none"> maintenance-free 	Yes

CPU processing times	
for bit operations, typ.	0.6 ns
for word operations, typ.	1.3 ns
for fixed point arithmetic, typ.	1.3 ns
for floating point arithmetic, typ.	3.8 ns
CPU-blocks	
Number of elements (total)	20 000; 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.	16 Mbyte; For DBs with absolute addressing, the max. size is 64 KB
FB	
• Number range	0 ... 65 535
• Size, max.	1 Mbyte
FC	
• Number range	0 ... 65 535
• Size, max.	1 Mbyte
OB	
• Size, max.	1 Mbyte
• Number of free cycle OBs	100
• Number of time alarm OBs	20
• Number of delay alarm OBs	20
• Number of cyclic interrupt OBs	20; with minimum OB 3x cycle of 100 µs
• Number of process alarm OBs	50
• Number of DPV1 alarm OBs	3
• Number of isochronous mode OBs	3
• 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
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.	2.25 Mbyte; in total; for bit memories, timers, counters, DBs, and technology data (axes)
Extended retentive data area (incl. timers, counters, flags), max.	50 Mbyte; When using PS 6 0W 24/48/60 V DC HF
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	16 384; 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)	32 kbyte
— Outputs (volume)	32 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	64; 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)
Number of DP masters	
• Via CM	8; A maximum of 8 CMs/CPs (PROFIBUS, PROFINET, Ethernet) can be inserted in total
Number of IO Controllers	
• integrated	2
• Via CM	8; A maximum of 8 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	64
Clock synchronization	
• supported	Yes
• to DP, master	Yes; via PROFIBUS CM / CP
• on DP, device	Yes; via PROFIBUS CM / CP
• in AS, master	Yes
• in AS, device	Yes
• on Ethernet via NTP	Yes
Interfaces	
Number of PROFINET interfaces	3
Number of PROFIBUS interfaces	0
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	
— Isochronous mode	Yes
— Direct data exchange	Yes; Requirement: IRT and isochronous mode (MRPD optional)
— IRT	Yes
— PROFINergy	Yes; per user program
— Prioritized startup	Yes; Max. 32 PROFINET devices
— Number of connectable IO Devices, max.	512; in total, up to 1661 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
— Of which IO devices with IRT, max.	64; with DFP: 256 IO devices in 8 DFP groups
— Number of connectable IO Devices for RT, max.	512
— of which in line, max.	512
— 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 µs to 4 ms
— 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 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	
— Isochronous mode	Yes
— IRT	Yes
— PROFINergy	Yes; per user program
— Shared device	Yes
— Number of IO Controllers with shared device, max.	4
— activation/deactivation of I-devices	Yes; per user program
— Asset management record	Yes; per user program
2. Interface	
Interface types	
• RJ 45 (Ethernet)	Yes; X2
• 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	
— Isochronous mode	Yes

— Direct data exchange	Yes; Requirement: IRT and isochronous mode (MRPD optional)
— IRT	Yes
— PROFINergy	Yes; per user program
— Prioritized startup	No
— Number of connectable IO Devices, max.	512; in total, up to 1661 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
— Of which IO devices with IRT, max.	64; with DFP: 256 IO devices in 8 DFP groups
— Number of connectable IO Devices for RT, max.	512
— of which in line, max.	512
— 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 µs to 4 ms
— 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 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

— Isochronous mode	Yes
— IRT	Yes
— PROFINergy	Yes; per user program
— Prioritized startup	No
— Shared device	Yes
— Number of IO Controllers with shared device, max.	4
— activation/deactivation of I-devices	Yes; per user program
— Asset management record	Yes; per user program

3. Interface

Interface types

● RJ 45 (Ethernet)	Yes; X3
● Number of ports	1
● integrated switch	No

Protocols

● IP protocol	Yes; IPv4
● PROFINET IO Controller	No
● PROFINET IO Device	No
● SIMATIC communication	Yes
● Open IE communication	Yes; Optionally also encrypted
● Web server	Yes

Interface types

RJ 45 (Ethernet)

● 100 Mbps	Yes
● 1000 Mbps	Yes; only possible at the X3 interface of the CPU
● Autonegotiation	Yes
● Autocrossing	Yes
● Industrial Ethernet status LED	Yes

Protocols

PROFIsafe	Yes; V2.4 / V2.6
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Number of connections	
<ul style="list-style-type: none"> ● Number of connections, max. ● Number of connections reserved for ES/HMI/web ● Number of connections via integrated interfaces ● Number of S7 routing paths 	<p>320; via integrated interfaces of the CPU and connected CPs / CMs</p> <p>10</p> <p>288</p> <p>64</p>
Redundancy mode	
<ul style="list-style-type: none"> ● H-Sync forwarding 	Yes
Media redundancy	
<ul style="list-style-type: none"> — Media redundancy — MRP — MRP interconnection, supported — MRPD — Switchover time on line break, typ. — Number of stations in the ring, max. 	<p>via the X1 or X2 interface</p> <p>Yes; MRP Automanager according to IEC 62439-2 Edition 2.0, MRP Manager; MRP Client</p> <p>Yes; as MRP ring node according to IEC 62439-2 Edition 3.0</p> <p>Yes; Requirement: IRT</p> <p>200 ms; For MRP, bumpless for MRPD</p> <p>50</p>
SIMATIC communication	
<ul style="list-style-type: none"> ● PG/OP communication ● S7 routing ● Data record routing ● S7 communication, as server ● S7 communication, as client ● User data per job, max. 	<p>Yes; encryption with TLS V1.3 pre-selected</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>See online help (S7 communication, user data size)</p>
Open IE communication	
<ul style="list-style-type: none"> ● TCP/IP <ul style="list-style-type: none"> — Data length, max. — several passive connections per port, supported ● ISO-on-TCP (RFC1006) <ul style="list-style-type: none"> — Data length, max. ● UDP <ul style="list-style-type: none"> — Data length, max. — UDP multicast ● DHCP ● DNS ● SNMP ● DCP ● LLDP ● Encryption 	<p>Yes</p> <p>64 kbyte</p> <p>Yes</p> <p>Yes</p> <p>64 kbyte</p> <p>Yes</p> <p>2 kbyte; 1 472 bytes for UDP broadcast</p> <p>Yes; max. 128 multicast circuits</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes; Optional</p>
Web server	
<ul style="list-style-type: none"> ● HTTP ● HTTPS ● web API <ul style="list-style-type: none"> — Number of sessions, max. — number of simultaneous HTTP calls, max. — HTTP request body, max. 	<p>Yes; Standard and user pages</p> <p>Yes; Standard and user pages</p> <p>200</p> <p>4</p> <p>131 072 byte</p>
OPC UA	
<ul style="list-style-type: none"> ● Runtime license required ● OPC UA Client <ul style="list-style-type: none"> — Application authentication — Security policies — User authentication — Number of connections, max. — Number of nodes of the client interfaces, recommended max. — Number of elements for one call of OPC-UA-NodeGetHandleList/OPC-UA-ReadList/OPC-UA-WriteList, max. — Number of elements for one call of OPC-UA-NameSpaceGetIndexList, max. — Number of elements for one call of OPC-UA-MethodGetHandleList, max. 	<p>Yes; "Large" license required</p> <p>Yes; Data Access (registered Read/Write), Method Call</p> <p>Yes</p> <p>Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256</p> <p>"anonymous" or by user name & password</p> <p>40</p> <p>5 000</p> <p>300</p> <p>20</p> <p>100</p>

— Number of simultaneous calls of the client instructions for session management, per connection, max.	1
— Number of simultaneous calls of the client instructions for data access, per connection, max.	5; for OPC-UA_MethodCall 200 in total (no limit per connection)
— 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, alarms & condition (A&C), custom address space, role-based access control
— Application authentication	Yes
— Security policies	available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256, Aes128Sha256RsaOaep, Aes256Sha256RsaPss
— User authentication	"anonymous" or by user name & password
— GDS support (certificate management)	Yes
— Number of sessions, max.	64
— Number of accessible variables, max.	200 000
— Number of registerable nodes, max.	50 000
— Number of subscriptions per session, max.	50
— Sampling interval, min.	10 ms
— Publishing interval, min.	10 ms
— Number of server methods, max.	4 000; max. 100 concurrently running jobs each for asynchronous instructions OPC-UA_ServerMethodPre (V1.1) and OPC-UA_ServerMethodPost (V1.1)
— Number of inputs/outputs per server method, max.	20
— Number of monitored items, recommended max.	50 000; for 1 s sampling interval and 1 s send interval
— Number of server interfaces, max.	10 of each "Server interfaces" / "Companion specification" type and 20 of the type "Reference namespace"
— Number of nodes for user-defined server interfaces, max.	100 000
• Alarms and Conditions	Yes
— Number of program alarms	400
— Number of alarms for system diagnostics	200
Further protocols	
• MODBUS	Yes; MODBUS TCP
S7 message functions	
Number of login stations for message functions, max.	64
number of subscriptions, max.	750
number of tags/attributes for subscriptions, max.	120 000
Program alarms	Yes
Number of configurable program messages, max.	20 000; Program messages are generated by the "Program_Alarm" block, ProDiag or GRAPH
Number of loadable program messages in RUN, max.	20 000
Number of simultaneously active program alarms	
• Number of program alarms	2 000
• Number of alarms for system diagnostics	1 000
• Number of alarms for motion technology objects	960
Test commissioning functions	
Joint commission (Team Engineering)	Yes; Parallel online access possible for up to 10 engineering systems
Status block	Yes; Up to 16 simultaneously (in total across all ES clients)
Single step	No
Number of breakpoints	20
Profiling	Yes
Status/control	
• Status/control variable	Yes; without fail-safe
• Variables	inputs/outputs, bit memories, DBs, peripheral I/Os (without fail-safe), times, counters
• Number of variables, max.	
— of which status variables, max.	200; per job
— of which control variables, max.	200; per job
Forcing	

<ul style="list-style-type: none"> • Forcing • Forcing, variables • Number of variables, max. 	Yes; without fail-safe peripheral inputs/outputs (without fail-safe) 200
Diagnostic buffer	
<ul style="list-style-type: none"> • present • Number of entries, max. — of which powerfail-proof 	Yes 3 200 1 000
Traces	
<ul style="list-style-type: none"> • Number of configurable Traces • Memory size per trace, max. 	8 512 kbyte
Interrupts/diagnostics/status information	
Diagnostics indication LED	
<ul style="list-style-type: none"> • RUN/STOP LED • ERROR LED • MAINT LED • STOP ACTIVE LED • Connection display LINK TX/RX 	Yes Yes Yes Yes Yes
Supported technology objects	
Motion Control <ul style="list-style-type: none"> • Number of available Motion Control resources for technology objects • Required Motion Control resources <ul style="list-style-type: none"> — per speed-controlled axis — per positioning axis — per synchronous axis — per external encoder — per output cam — per cam track — per probe • Positioning axis <ul style="list-style-type: none"> — Number of positioning axes at motion control cycle of 4 ms (typical value) — Number of positioning axes at motion control cycle of 8 ms (typical value) 	Yes; Note: The number of technology objects affects the cycle time of the PLC program; selection guide via the TIA Selection Tool 20 480 40 80 160 80 20 160 40 140 256
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
Standards, approvals, certificates	
Siemens Eco Profile (SEP)	Siemens EcoTech
Recycler Guide available	Yes
Ecological footprint	
Global warming potential	
— global warming potential, (total) [CO2 eq]	317 kg
— global warming potential, (during production) [CO2 eq]	69.3 kg
— global warming potential, (during operation) [CO2 eq]	255 kg
— global warming potential, (after end of life cycle) [CO2 eq]	-7.02 kg
Highest safety class achievable in safety mode	
<ul style="list-style-type: none"> • Performance level according to ISO 13849-1 • SIL acc. to IEC 61508 	PLe SIL 3
Probability of failure (for service life of 20 years and repair time of 100 hours)	
— Low demand mode: PFDavg in accordance with SIL3	< 2.00E-05
— High demand/continuous mode: PFH in accordance with SIL3	< 1.00E-09

Security			
PROFINET Security Class	1		
signed firmware update	Yes		
Secure Boot	Yes		
safely removing data	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. 	0 °C 60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off 0 °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. 	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual		
Configuration			
Programming			
Programming language			
<ul style="list-style-type: none"> — LAD — FBD — STL — SCL — CFC — GRAPH 	Yes; incl. failsafe Yes; incl. failsafe Yes Yes Yes; either CFC or failsafe functionality Yes		
Know-how protection			
<ul style="list-style-type: none"> User program protection/password protection Copy protection Block protection 	Yes Yes Yes		
Access protection			
<ul style="list-style-type: none"> protection of confidential configuration data Password for display Protection level: Write protection Protection level: Read/write protection Protection level: Write protection for Failsafe Protection level: Complete protection User administration Number of users Number of groups Number of roles 	Yes Yes Yes; Specific write protection both for Standard and for Failsafe Yes Yes Yes Yes; device-wide and centralized 100 100 50		
Cycle time monitoring			
<ul style="list-style-type: none"> lower limit upper limit 	adjustable minimum cycle time adjustable maximum cycle time		
Dimensions			
Width	175 mm		
Height	147 mm		
Depth	129 mm		
Weights			
Weight, approx.	1 499 g		
Classifications			
		Version	Classification
	eClass	14	27-24-22-07
	eClass	12	27-24-22-07
	eClass	9.1	27-24-22-07
	eClass	9	27-24-22-07
	eClass	8	27-24-22-07

eClass	7.1	27-24-22-07
eClass	6	27-24-22-07
ETIM	10	EC000236
ETIM	9	EC000236
ETIM	8	EC000236
ETIM	7	EC000236

Approvals / Certificates

General Product Approval



[Miscellaneous](#)

[Manufacturer Declaration](#)

[China RoHS](#)

General Product Approval

For use in hazardous locations



[TUEV](#)



[CCC-Ex](#)

[EM](#)

For use in hazardous locations

Functional Safety



[Type Examination Certificate](#)



IECEX

[Miscellaneous](#)

[CCC-Ex](#)

[Type Examination Certificate](#)

Functional Safety

Maritime application

[TUEV](#)



ABS



BUREAU VERITAS



DNV



LRS

[NK / Nippon Kaiji Kyokai](#)

Maritime application

other

Environment



RINA

[CCS \(China Classification Society\)](#)

[KR \(Korean Register of Shipping\)](#)

[PROFINET](#)



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