Data sheet



SIMATIC S7-1500F, CPU 1515F-2 PN, central processing unit with work memory 750 KB for program and 3 MB for data, 1st interface: PROFINET IRT with 2-port switch, 2nd interface: PROFINET RT, 30 ns bit performance, SIMATIC Memory Card required

General information		
Product type designation	CPU 1515F-2 PN	
HW functional status	FS01	
Firmware version	V2.8	
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)	
Engineering with		
 STEP 7 TIA Portal configurable/integrated from version 	V16 (FW V2.8) / as of V13 SP1 (FW V1.8) configurable with 6ES7515-2FM01-0AB0	
Configuration control		
via dataset	Yes	
Display		
Screen diagonal [cm]	6.1 cm	
Control elements		
Number of keys	8	
Mode buttons	2	

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Supply voltage	0.000
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	
 Mains/voltage failure stored energy time 	5 ms
Repeat rate, min.	1/s
Input current	
Current consumption (rated value)	0.8 A
Current consumption, max.	1.1 A
Inrush current, max.	2.4 A; Rated value
I²t	0.02 A ² ·s
Power	
Infeed power to the backplane bus	12 W
Power consumption from the backplane bus (balanced)	6.2 W
Power loss	
Power loss, typ.	6.3 W
Memory	
Number of slots for SIMATIC memory card	1
SIMATIC memory card required	Yes
Work memory	
• integrated (for program)	750 kbyte
• integrated (for data)	3 Mbyte
Load memory	
Plug-in (SIMATIC Memory Card), max.	32 Gbyte
Backup	
maintenance-free	Yes
CPU processing times	
for bit operations, typ.	30 ns
for word operations, typ.	36 ns
for fixed point arithmetic, typ.	48 ns
for floating point arithmetic, typ.	192 ns
CPU-blocks	
Number of elements (total)	6 000; 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



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● Size, max.	3 Mbyte; For DBs with absolute addressing, the max. size is 64 KB	
FB		
Number range	0 65 535	
• Size, max.	500 kbyte	
FC		
Number range	0 65 535	
• Size, max.	500 kbyte	
ОВ		
• Size, max.	500 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; With minimum OB 3x cycle of 500 μs	
 Number of process alarm OBs 	50	
 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; Up to 8 possible for F-blocks	
Counters, timers and their retentivity		
S7 counter	0.040	
Number	2 048	
Retentivity		
— adjustable	Yes	
IEC counter		
Number	Any (only limited by the main memory)	
Retentivity	V	
— adjustable	Yes	
S7 times	0.040	
• Number	2 048	
Retentivity	Voc	
— adjustable	Yes	
IEC timer	Any (only limited by the main memory)	
• Number	Any (only limited by the main memory)	
Retentivity	V ₁ .	
— adjustable	Yes	



ata areas and their retentivity	
Retentive data area (incl. timers, counters, flags),	512 kbyte; In total; available retentive memory for bit memories,
max.	timers, counters, DBs, and technology data (axes): 472 KB
Extended retentive data area (incl. timers, counters, flags), max.	3 Mbyte; When using PS 6 0W 24/48/60 V DC HF
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
• per priority diass, max.	o radyte, max. To the per block
ddress area	
Number of IO modules	8 192; 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
·	
ardware 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	16
Clock synchronization	
• supported	Yes
● in AS, master	Yes
● in AS, slave	Yes
• on Ethernet via NTP	Yes
Interfaces	
Number of PROFINET interfaces	2
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; MRP Automanager according to IEC 62439-2 Edition 2.0
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; 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
— Prioritized startup	Yes; Max. 32 PROFINET devices



256; In total, up to 1 000 distributed I/O devices can be connected - Number of connectable IO Devices, max. via AS-i, PROFIBUS or PROFINET 64 - Of which IO devices with IRT, max. 256 - Number of connectable IO Devices for RT, max. 256 - of which in line, max.

8; in total across all interfaces - Number of IO Devices that can be simultaneously activated/deactivated, max.

The minimum value of the update time also depends on - Updating times communication share set for PROFINET IO, on the number of IO

8

Update time for IRT

- Number of IO Devices per tool, max.

— 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 500 µs of the isochronous OB is

decisive

devices, and on the quantity of configured user data

500 µs to 8 ms — for send cycle of 500 µs 1 ms to 16 ms - for send cycle of 1 ms 2 ms to 32 ms - for send cycle of 2 ms 4 ms to 64 ms - for send cycle of 4 ms

Update time = set "odd" send clock (any multiple of 125 µs: 375 - With IRT and parameterization of "odd"

send cycles μ s, 625 μ s ... 3 875 μ s)

Update time for RT

250 µs to 128 ms — for send cycle of 250 µs 500 µs to 256 ms — for send cycle of 500 µs 1 ms to 512 ms - for send cycle of 1 ms 2 ms to 512 ms - for send cycle of 2 ms 4 ms to 512 ms - for send cycle of 4 ms

PROFINET IO Device

Services

Yes - PG/OP communication Yes

- S7 routing No Isochronous mode

- IRT Yes

Yes; MRP Automanager acc. to IEC 62439-2 Edition 2.0; MRP - MRP Manager; MRP Client; max. number of devices in the ring: 50

- MRPD Yes; Requirement: IRT — PROFlenergy Yes; per user program

Yes - Shared device

4 Number of IO Controllers with shared device, max.

- Asset management record Yes; per user program

Interfere tunes	
Interface types	Yes; X2
• RJ 45 (Ethernet)	
Number of ports	1
• integrated switch	No
Protocols	V ID 4
• IP protocol	Yes; IPv4
PROFINET IO Controller	Yes
PROFINET IO Device	Yes
SIMATIC communication	Yes
Open IE communication	Yes
Web server	Yes
Media redundancy	No
PROFINET IO Controller	
Services	
— PG/OP communication	Yes
— S7 routing	Yes
— Isochronous mode	No
 Direct data exchange 	No
— IRT	No
— MRP	No
— MRPD	No
— PROFlenergy	Yes
 Prioritized startup 	No
 Number of connectable IO Devices, max. 	32; In total, up to 1 000 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
 Number of connectable IO Devices for RT, max. 	32
— of which in line, max.	32
 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 RT	
— for send cycle of 1 ms	1 ms to 512 ms
PROFINET IO Device	
Services	
— PG/OP communication	Yes
— S7 routing	Yes
— Isochronous mode	No
— IRT	No



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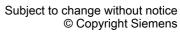
— MRP	No
— MRPD	No
— PROFlenergy	Yes
— Prioritized startup	No
— Shared device	Yes
 Number of IO Controllers with shared device, max. 	4
— Asset management record	Yes; per user program

— Asset management record	Yes; per user program
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.	192; 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	108

 Number of connections, max. 	192; 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 	108
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



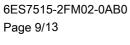
— UDP multicast



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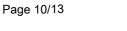
Yes; Max. 5 multicast circuits

• 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
User authentication	"anonymous" or by user name & password
— Number of connections, max.	10
 Number of nodes of the client interfaces, max. 	2 000
 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.	48



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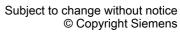
 Number of accessible variables, max. 	100 000
 Number of registerable nodes, max. 	20 000
 Number of subscriptions per session, max. 	20
— Sampling interval, min.	100 ms
— Publishing interval, min.	200 ms
 Number of server methods, max. 	50
 Number of inputs/outputs per server method, max. 	20
 Number of monitored items, max. 	2 000; for 1 s sampling interval and 1 s send interval
 Number of server interfaces, max. 	10
 Number of nodes for user-defined server 	5 000
interfaces, max.	
Further protocols	
• MODBUS	Yes; MODBUS TCP
Isochronous mode	
Equidistance	Yes
S7 message functions	22
Number of login stations for message functions, max. Program alarms	32 Yes
Number of configurable program messages, max.	10 000; Program messages are generated by the
Number of configurable program messages, max.	10 000, 1 regram messages are generated by the
	"Program_Alarm" block, ProDiag or GRAPH
Number of loadable program messages in RUN,	"Program_Alarm" block, ProDiag or GRAPH 5 000
Number of loadable program messages in RUN, max.	-
· -	-
max.	-
max. Number of simultaneously active program alarms	5 000
max. Number of simultaneously active program alarms • Number of program alarms	5 000 800
max. Number of simultaneously active program alarms Number of program alarms Number of alarms for system diagnostics	5 000 800 200
max. Number of simultaneously active program alarms Number of program alarms Number of alarms for system diagnostics Number of alarms for motion technology objects	5 000 800 200
max. Number of simultaneously active program alarms Number of program alarms Number of alarms for system diagnostics Number of alarms for motion technology	5 000 800 200
max. Number of simultaneously active program alarms Number of program alarms Number of alarms for system diagnostics Number of alarms for motion technology objects Test commissioning functions	5 000 800 200 160 Yes; Parallel online access possible for up to 8 engineering
max. Number of simultaneously active program alarms Number of program alarms Number of alarms for system diagnostics Number of alarms for motion technology objects Test commissioning functions Joint commission (Team Engineering)	5 000 800 200 160 Yes; Parallel online access possible for up to 8 engineering systems
max. Number of simultaneously active program alarms Number of program alarms Number of alarms for system diagnostics Number of alarms for motion technology objects Test commissioning functions Joint commission (Team Engineering)	5 000 800 200 160 Yes; Parallel online access possible for up to 8 engineering systems Yes; Up to 8 simultaneously (in total across all ES clients)
max. Number of simultaneously active program alarms Number of program alarms Number of alarms for system diagnostics Number of alarms for motion technology objects Test commissioning functions Joint commission (Team Engineering) Status block Single step	5 000 800 200 160 Yes; Parallel online access possible for up to 8 engineering systems Yes; Up to 8 simultaneously (in total across all ES clients) No
max. Number of simultaneously active program alarms Number of program alarms Number of alarms for system diagnostics Number of alarms for motion technology objects Test commissioning functions Joint commission (Team Engineering) Status block Single step Number of breakpoints	5 000 800 200 160 Yes; Parallel online access possible for up to 8 engineering systems Yes; Up to 8 simultaneously (in total across all ES clients) No
max. Number of simultaneously active program alarms Number of program alarms Number of alarms for system diagnostics Number of alarms for motion technology objects Test commissioning functions Joint commission (Team Engineering) Status block Single step Number of breakpoints Status/control	5 000 800 200 160 Yes; Parallel online access possible for up to 8 engineering systems Yes; Up to 8 simultaneously (in total across all ES clients) No 8
max. Number of simultaneously active program alarms Number of program alarms Number of alarms for system diagnostics Number of alarms for motion technology objects Test commissioning functions Joint commission (Team Engineering) Status block Single step Number of breakpoints Status/control Status/control variable	5 000 800 200 160 Yes; Parallel online access possible for up to 8 engineering systems Yes; Up to 8 simultaneously (in total across all ES clients) No 8 Yes Inputs/outputs, memory bits, DBs, distributed I/Os, timers,



6ES7515-2FM02-0AB0

Forcing

— of which control variables, max.



200; per job

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• Forcing, variables	Peripheral inputs/outputs
 Number of variables, max. 	200
Diagnostic buffer	
• present	Yes
Number of entries, max.	3 200
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
 Connection display LINK TX/RX 	Yes

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 	2 400
for technology objects	
 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 	7
control cycle of 4 ms (typical value)	
 Number of positioning axes at motion 	14
control cycle of 8 ms (typical value)	
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

Standards, approvals, certificates	
Highest safety class achievable in safety m	ode



• Performance level according to ISO 13849-1

PLe SIL 3

SIL acc. to IEC 61508

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

Ambient conditions

Ambient temperature during operation

• horizontal installation, min. -25 °C; No condensation

horizontal installation, max.
 60 °C; Display: 50 °C, at an operating temperature of typically 50

°C, the display is switched off

• vertical installation, min. -25 °C; No condensation

• 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

• max. 70 °C

Altitude during operation relating to sea level

• Installation altitude above sea level, max. 5 000 m; Restrictions for installation altitudes > 2 000 m, see

manual

Configuration

Programming

Programming language

— LAD Yes; incl. failsafe

— FBD Yes; incl. failsafe

— STL Yes

— SCL— GRAPHYesYes

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; Specific write protection both for Standard and for Failsafe

Protection level: Read/write protection

Yes

• Protection level: Write protection for Failsafe Yes

• Protection level: Complete protection Yes

Cycle time monitoring

• lower limit adjustable minimum cycle time

• upper limit adjustable maximum cycle time



Dimensions		
Width	70 mm	
Height	147 mm	
Depth	129 mm	
Weights		
Weight, approx.	830 g	
	10/00/2020	

last modified: 10/09/2020

