



SIMATIC DP, CPU 1513pro F-2 PN for ET 200pro, central processing unit with 450 KB work memory for program and 1.5 MB for data, 1st interface: PROFINET IRT with 3-port switch, 2nd interface: PROFINET RT, 40 ns bit performance, Degree of protection: IP65/67, SIMATIC Memory Card required connection module required

General information	
Product type designation	CPU 1513pro F-2 PN
HW functional status	FS01
Firmware version	V2.9
Product function	
• I&M data	Yes; I&M0 to I&M3
• Isochronous mode	Yes; Via X1, with minimum OB 6x cycle of 500 µs
Engineering with	
• STEP 7 TIA Portal configurable/integrated from version	V17 (FW V2.9) / V16 (FW V2.8) or higher
Configuration control	
via dataset	No
Control elements	
Mode selector switch	1
Supply voltage	
Rated value (DC)	24 V
permissible range, lower limit (DC)	20.4 V
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Mains buffering	
• Mains/voltage failure stored energy time	5 ms
Input current	
Current consumption (rated value)	0.31 A
Current consumption, max.	0.4 A
Inrush current, max.	0.4 A; Rated value
I^2t	0.001 A ² ·s
Power	
Infeed power to the backplane bus	2.275 W
Power loss	
Power loss, typ.	5.3 W
Memory	
Number of slots for SIMATIC memory card	1
SIMATIC memory card required	Yes
Work memory	
• integrated (for program)	450 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)	4 000; 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.	1.5 Mbyte; For DBs with absolute addressing, the max. size is 64 KB
FB	
• Number range	0 ... 65 535
• Size, max.	450 kbyte
FC	
• Number range	0 ... 65 535
• 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; 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	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
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; In total; available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 88 KB
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	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
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)
Number of IO Controllers	
• integrated	2
• Via CM	0
Rack	
• Modules per rack, max.	16; Expansion width max. 1.2 m
• Number of lines, max.	1
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
Number of PROFIBUS interfaces	0
1. Interface	
Interface types	
• RJ 45 (Ethernet)	Yes; X1 P3
• Number of ports	3; 2x M12 + 1x RJ45
• 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
— Isochronous mode	Yes
— Direct data exchange	Yes; Requirement: IRT and isochronous mode (MRPD optional)
— IRT	Yes
— 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
— 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; 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; 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 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

- PG/OP communication Yes
- Isochronous mode No
- 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

2. Interface

Interface types

- RJ 45 (Ethernet) No
- Number of ports 1; 1x M12
- integrated switch No

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 No

PROFINET IO Controller

Services

- PG/OP communication Yes
- Isochronous mode No
- Direct data exchange No
- IRT No
- PROFINergy Yes
- Prioritized startup No
- Number of connectable IO Devices, max. 32; In total, up to 512 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
— Isochronous mode	No
— IRT	No
— 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

Interface types

RJ 45 (Ethernet)

• 100 Mbps	Yes
• Autonegotiation	Yes
• Autocrossing	Yes
• Industrial Ethernet status LED	Yes

Protocols

PROFIsafe Yes; V2.4 / V2.6

Number of connections

• Number of connections, max.	128; Via integrated interfaces of the CPU
• Number of connections reserved for ES/HMI/web	10
• Number of connections via integrated interfaces	128
• Number of S7 routing paths	16

Redundancy mode

• H-Sync forwarding	Yes
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Media redundancy

— Media redundancy	Yes; only via 1st interface (X1)
— MRP	Yes; MRP Automanager according to IEC 62439-2 Edition 2.0, MRP Manager; MRP Client
— MRP interconnection, supported	Yes; as MRP ring node according to IEC 62439-2 Edition 3.0
— MRPD	Yes; Requirement: IRT
— Switchover time on line break, typ.	200 ms; For MRP, bumpless for MRPD
— Number of stations in the ring, max.	50

SIMATIC communication

• PG/OP communication	Yes; encryption with TLS V1.3 pre-selected
• S7 routing	Yes
• 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	Yes
• DNS	Yes
• SNMP	Yes
• DCP	Yes
• LLDP	Yes
• Encryption	Yes; Optional

Web server

• HTTP	Yes; Standard and user pages
• HTTPS	Yes; Standard and user pages

OPC UA

• Runtime license required	Yes; "Small" license required
• OPC UA Client	Yes
— Application authentication	Yes
— Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15,

— User authentication	Basic256Sha256
— Number of connections, max.	"anonymous" or by user name & password
— Number of nodes of the client interfaces, recommended max.	4
— Number of elements for one call of OPC-UA_NodeGetHandleList/OPC-UA_ReadList/OPC-UA_WriteList, max.	1 000
— Number of elements for one call of OPC-UA_NameSpaceGetIndexList, max.	300
— Number of elements for one call of OPC-UA_MethodGetHandleList, max.	20
— Number of simultaneous calls of the client instructions for session management, per connection, max.	100
— Number of simultaneous calls of the client instructions for data access, per connection, max.	1
— Number of registerable nodes, max.	5
— Number of registerable method calls of OPC-UA_MethodCall, max.	5 000
— Number of inputs/outputs when calling OPC-UA_MethodCall, max.	100
• OPC UA Server	20
— Application authentication	Yes; Data access (read, write, subscribe), method call, custom address space
— Security policies	Yes
— User authentication	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
— Number of sessions, max.	"anonymous" or by user name & password
— Number of accessible variables, max.	32
— Number of registerable nodes, max.	50 000
— Number of subscriptions per session, max.	10 000
— Sampling interval, min.	20
— Publishing interval, min.	100 ms
— Number of server methods, max.	500 ms
— Number of inputs/outputs per server method, max.	20
— Number of monitored items, recommended max.	20
— Number of server interfaces, max.	1 000; for 1 s sampling interval and 1 s send interval
— Number of nodes for user-defined server interfaces, max.	10 of each "Server interfaces" / "Companion specification" type and 20 of the type "Reference namespace"
	1 000

Further protocols

• MODBUS	Yes; MODBUS TCP
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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 loadable program messages in RUN, max.	2 500
Number of simultaneously active program alarms	
• Number of program alarms	600
• 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; without fail-safe
• 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	Yes; without fail-safe
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<ul style="list-style-type: none"> • Forcing, variables • Number of variables, max. 	Peripheral inputs/outputs 200
Diagnostic buffer	
<ul style="list-style-type: none"> • present • Number of entries, max. <ul style="list-style-type: none"> — of which powerfail-proof 	Yes 1 000 500
Traces	
<ul style="list-style-type: none"> • Number of configurable Traces 	4; Up to 512 KB of data per trace are possible
Interrupts/diagnostics/status information	
Diagnostics indication LED	
<ul style="list-style-type: none"> • RUN/STOP LED • ERROR LED • MAINT LED • Monitoring of the supply voltage (PWR-LED) • Connection display LINK TX/RX 	Yes Yes Yes Yes; green "24 V DC" LED Yes
Supported technology objects	
Motion Control	Yes; Note: The number of technology objects affects the cycle time of the PLC program; selection guide via the TIA Selection Tool
<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) 	800 40 80 160 80 20 160 40 5 10
Controller	Yes; Universal PID controller with integrated optimization
<ul style="list-style-type: none"> • PID_Compact • PID_3Step • PID-Temp 	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	
Highest safety class achievable in safety mode	
Probability of failure (for service life of 20 years and repair time of 100 hours)	
<ul style="list-style-type: none"> — Low demand mode: PFDavg in accordance with SIL3 — High demand/continuous mode: PFH in accordance with SIL3 	< 2.00E-05 < 1.00E-09
Ambient conditions	
Ambient temperature during operation	
<ul style="list-style-type: none"> • horizontal installation, min. • horizontal installation, max. • vertical installation, min. • vertical installation, max. 	-25 °C 55 °C -25 °C 55 °C
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 / header	
configuration / programming / header	
Programming language	
<ul style="list-style-type: none"> — LAD — FBD 	Yes; incl. failsafe 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	
• protection of confidential configuration data	Yes
• Protection level: Write protection	Yes
• Protection level: Read/write protection	Yes
• Protection level: Complete protection	Yes
programming / cycle time monitoring / header	
• lower limit	adjustable minimum cycle time
• upper limit	adjustable maximum cycle time
Dimensions	
Width	135 mm
Height	130 mm
Depth	65 mm
Weights	
Weight, approx.	614 g

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