6ES7516-2GN00-0AB0

## **Data sheet**



SIMATIC DP, CPU 1516PRO F-2 PN for ET 200pro, Central processing unit with work memory 1.5 MB for program and 5 MB for data, 1st interface: PROFINET IRT with 3-port switch, 2nd interface: PROFINET RT, 10 ns bit performance, degree of protection: IP65/67, SIMATIC Memory Card required, Connection module required

General information	
Product type designation	CPU 1516pro F-2 PN
HW functional status	FS02
Firmware version	V2.9
Product function	
● I&M data	Yes; I&M0 to I&M3
<ul> <li>Isochronous mode</li> </ul>	Yes; Via X1, with minimum OB 6x cycle of 500 µs
Engineering with	
<ul> <li>STEP 7 TIA Portal configurable/integrated from version</li> </ul>	V17 (FW V2.9) / V14 (FW V2.0) 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
²t	0.001 A <sup>2</sup> ·s
from supply voltage 1L+, max.	0.4 A
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)	1.5 Mbyte
• integrated (for data)	5 Mbyte
Load memory	
Plug-in (SIMATIC Memory Card), max.	32 Gbyte
Backup	
maintenance-free	Yes

CPU processing times	
for bit operations, typ.	10 ns
for word operations, typ.	12 ns
for fixed point arithmetic, typ.	16 ns
for floating point arithmetic, typ.	64 ns
CPU-blocks	
Number of elements (total)	8 000; Blocks (OB, FB, FC, DB) and UDTs
DB	0 000, Blocks (OB, 1 B, 1 O, BB) and OB 13
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.	5 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
<ul> <li>Number of free cycle OBs</li> </ul>	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	24
S7 counter	
Number	2 048
Retentivity	2 040
— adjustable	Yes
IEC counter	103
• 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	
Retentivity — adjustable	Yes
·	Yes
— adjustable	512 kbyte; In total; available retentive memory for bit memories, timers,
— adjustable  Data areas and their retentivity  Retentive data area (incl. timers, counters, flags), max.	
— adjustable  Data areas and their retentivity  Retentive data area (incl. timers, counters, flags), max.  Flag	512 kbyte; In total; available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 472 KB
— adjustable  Data areas and their retentivity  Retentive data area (incl. timers, counters, flags), max.  Flag  • Size, max.	512 kbyte; In total; available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 472 KB  16 kbyte
— adjustable  Data areas and their retentivity  Retentive data area (incl. timers, counters, flags), max.  Flag  • Size, max.  • Number of clock memories	512 kbyte; In total; available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 472 KB
— adjustable  Data areas and their retentivity  Retentive data area (incl. timers, counters, flags), max.  Flag  • Size, max.  • Number of clock memories  Data blocks	512 kbyte; In total; available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 472 KB  16 kbyte 8; 8 clock memory bit, grouped into one clock memory byte
— adjustable  Data areas and their retentivity  Retentive data area (incl. timers, counters, flags), max.  Flag  • Size, max.  • Number of clock memories  Data blocks  • Retentivity adjustable	512 kbyte; In total; available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 472 KB  16 kbyte 8; 8 clock memory bit, grouped into one clock memory byte
— adjustable  Data areas and their retentivity  Retentive data area (incl. timers, counters, flags), max.  Flag  • Size, max.  • Number of clock memories  Data blocks  • Retentivity adjustable  • Retentivity preset	512 kbyte; In total; available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 472 KB  16 kbyte 8; 8 clock memory bit, grouped into one clock memory byte
— adjustable  Data areas and their retentivity  Retentive data area (incl. timers, counters, flags), max.  Flag  • Size, max.  • Number of clock memories  Data blocks  • Retentivity adjustable	512 kbyte; In total; available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 472 KB  16 kbyte 8; 8 clock memory bit, grouped into one clock memory byte

Address 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
Hardware configuration	
Number of distributed IO systems	64; A distributed I/O system is characterized not only by the integration of
Nambar of algulation to systems	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	
<ul><li>integrated</li></ul>	2
• Via CM	0
Rack	
<ul> <li>Modules per rack, max.</li> </ul>	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
	Yes
<ul><li>in AS, master</li><li>in AS, device</li></ul>	Yes
on Ethernet via NTP  Interfaces	Yes
Number of PROFINET interfaces	2
Number of PROFIBUS interfaces	0
1. Interface	
Interface types	V V4 P0
• 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
<ul> <li>SIMATIC communication</li> </ul>	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)
<u>≂</u>	Yes
— IRT	
— IRT — PROFlenergy	Yes; per user program
— PROFlenergy	Yes; per user program
<ul><li>— PROFlenergy</li><li>— Prioritized startup</li><li>— Number of connectable IO Devices, max.</li></ul>	Yes; per user program Yes; Max. 32 PROFINET devices 256; In total, up to 1 000 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
<ul> <li>— PROFlenergy</li> <li>— Prioritized startup</li> <li>— Number of connectable IO Devices, max.</li> <li>— Of which IO devices with IRT, max.</li> </ul>	Yes; per user program Yes; Max. 32 PROFINET devices 256; In total, up to 1 000 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET 64
<ul> <li>— PROFlenergy</li> <li>— Prioritized startup</li> <li>— Number of connectable IO Devices, max.</li> <li>— Of which IO devices with IRT, max.</li> <li>— Number of connectable IO Devices for RT, max.</li> </ul>	Yes; per user program Yes; Max. 32 PROFINET devices 256; In total, up to 1 000 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET 64 256
<ul> <li>— PROFlenergy</li> <li>— Prioritized startup</li> <li>— Number of connectable IO Devices, max.</li> <li>— Of which IO devices with IRT, max.</li> </ul>	Yes; per user program Yes; Max. 32 PROFINET devices 256; In total, up to 1 000 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET 64
<ul> <li>— PROFlenergy</li> <li>— Prioritized startup</li> <li>— Number of connectable IO Devices, max.</li> <li>— Of which IO devices with IRT, max.</li> <li>— Number of connectable IO Devices for RT, max.</li> <li>— of which in line, max.</li> <li>— Number of IO Devices that can be simultaneously</li> </ul>	Yes; per user program Yes; Max. 32 PROFINET devices 256; In total, up to 1 000 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET 64 256 256

Update time for IRT  - for send cycle of 250 µs  - for send cycle of 250 µs  - for send cycle of 500 µs  - for send cycle of 500 µs  - for send cycle of 7 ms  - for send cycle of 8 ms  - with IRT and parameterization of "odd" send cycles  Update sime for RT  - for send cycle of 500 µs  - for send cycle of 7 ms  - for send cycle of 7 ms  - for send cycle of 8 ms  - for send cycle of 7 ms  - for send cycle of 8 ms  - for send cycle of 9 ms  - for send cycle of 8 ms  - for send cycle of 9 ms  - for send cycle of 1 ms  - for send cycle of 2 ms  - for send cycle of 1 ms  - for send cycle of 2 ms  - for send cycle of 1 ms  - for send cycle of 2 ms  - for send cycle of 1 ms  - for send cycle of 1 ms  - for send cycle of 1 ms  - for		
- for send cycle of 250 µs - for send cycle of 500 µs - for send cycle of 500 µs - for send cycle of 1 ms - for send cycle of 1 ms - for send cycle of 1 ms - for send cycle of 2 ms - for send cycle of 3 ms - for send cycle of 4 ms - With RT and parameterization of "odd" send cycles - With RT and parameterization of "odd" send cycles - With RT and parameterization of "odd" send cycles - for send cycle of 250 µs - for send cycle of 250 µs - for send cycle of 250 µs - for send cycle of 1 ms - for send cycle of 4 ms - FROFINET IO Device - PROFInentry - Profit cycles distrup - Number of ports - Asset management record - RIA (Selbernet) - Number of ports - Interface byes - RIA (Selbernet) - Number of ports - Interface byes - RIA (Selbernet) - Number of ports - PROFINET IO Controller - PROFIN		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
- For send cycle of 500 µs - For send cycle of 2 ms - For send cycle of 4 ms - With IRT and parameterization of "odd" send cycles - With IRT and parameterization of "odd" send cycles - For send cycle of 500 µs - For send cycle of 500 µs - For send cycle of 500 µs - For send cycle of 1 ms - For send cycle of 1 ms - For send cycle of 1 ms - For send cycle of 4 ms - For send cycle of 5 ms - For send cycle of 5 ms - For send cycle of 5 ms - For send cycle of 1 ms - For send cycle of 5 ms - For send cycle of 1 ms - For send cycle of 10 ms - For send cycle of 1 ms - For send cycle of 10 ms - For send c	Update time for IRT	
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- for send cycle of 4 ms - With IRT and parameterization of 'odd' send cycles  - With IRT and parameterization of 'odd' send cycles  - With IRT and parameterization of 'odd' send cycles  - With IRT and parameterization of 'odd' send cycles  - For send cycle of 250 µs - For send cycle of 250 µs - For send cycle of 1 ms - For send cycle of 2 ms - For send cycle of 2 ms - For send cycle of 4 ms - For send cycle of 4 ms - For send cycle of 4 ms - FREFINET IO Device  - FREFINET IO Device  - PROFINET IO Controllers - FREFINET IO Controllers with shared device, max activation/deactivation of I-devices - Asset management record  - No - Number of 1O Controllers - FREFINET IO Device  - PROFINET IO Controller - FREFINET IO Device - PROFINET IO Controller - PROFINET IO	— for send cycle of 500 μs	500 μs to 8 ms
- For send cycle of 4 ms - With IRT and parameterization of "odd" send cycles - With IRT and parameterization of "odd" send cycles - For send cycle of 250 µs - For send cycle of 250 µs - For send cycle of 1 ms - For send cycle of 4 ms - For send cycle of 1 ms - For send cycle of 10 ms - For send cycle of 1 ms - For send cycle of 10 ms - For send cycle of 1 ms - For send cycle of 10 ms - For send cycle of 1 ms - For send cycle of 1 ms - For send cycle of 10 ms - For send cycle of 1 ms - For send cycle - For send cycle - For send cycle - For send cycle - For send cyc	— for send cycle of 1 ms	1 ms to 16 ms
Update time = set "odd" send clock (any multiple of 125 µs: 375 µs).  Update time for RT  - for send cycle of 250 µs - for send cycle of 500 µs - for send cycle of 150 µs - for send cycle of 15 ms - f	— for send cycle of 2 ms	2 ms to 32 ms
Update time for RT  for send cycle of 250 µs for send cycle of 500 µs for send cycle of 1500 µs for for for for send cycle of 1500 µs for	— for send cycle of 4 ms	4 ms to 64 ms
- for send cycle of 500 µs - for send cycle of 1500 µs - for send cycle of 2500 µs - for send cycle of 4500 µs - FROFINET OF send cycle of 4500 µs - for send cycle of 4500 µs - FROFINET IO Centrolier - FROFINET IO Cent	·	Update time = set "odd" send clock (any multiple of 125 $\mu s:375~\mu s,625~\mu s \dots 3~875~\mu s)$
- for send cycle of 500 µs	Update time for RT	
for send cycle of 1 ms for send cycle of 2 ms for send cycle of 4 ms	— for send cycle of 250 μs	250 µs to 128 ms
for send cycle of 1 ms for send cycle of 4 ms for for for for send cycle of 6 ms for for for for send cycle of 6 ms for for for for for send cycle of 6 ms for for for for for send cycle of 6 ms for	— for send cycle of 500 μs	500 μs to 256 ms
for send cycle of 4 ms  PROFINET IO Device  Services  PG/OP communication Isochronous mode IRT PROFlenergy Prioritized startup Shared device Number of IO Controllers with shared device, max activation/deactivation of I-devices Asset management record  2. Interface  Interface types R.4.5 (Ethernet) Number of ports Integrated switch Number of ports Integrated switch PROFINET IO Device PROFINET IO Device PROFINET IO Controller		
PROFINET IO Device  Services  - PG/OP communication - Isochronous mode - IRT - PROFlenergy - Prioritized startup - Number of IO Controllers with shared device, max activation/deactivation of I-devices - Asset management record - Number of IO Devices for RT, max Isochronous mode - IRT - PROFlenergy - Prioritized startup - Number of IO Devices per tool, max Asset management record - Ves - Number of IO Devices per tool, max Updating times - IRT minimum value of the update time also depends on communication set for PROFINET IO Devices, and on the quantity Remainded the user of IO Devices, and on the quantity Remainded the update time also depends on communication set for PROFINET IO Devices, and on the quantity Remainded the update time also depends on communication set for PROFINET IO Devices, and on the quantity Number of IO Devices per tool, max Number of IO Devices per tool, max Updating times - The minimum value of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity.	— for send cycle of 2 ms	2 ms to 512 ms
Services  - PG/OP communication	— for send cycle of 4 ms	4 ms to 512 ms
- PG/OP communication Yes  - Isochronous mode No  - IRT Yes  - PROFlenergy Yes; per user program No  - Shared device Yes  - Number of IO Controllers with shared device, max.  - activation/deactivation of I-devices Yes; per user program  - Asset management record Yes; per user program  - Asset management record Yes; per user program  2. Interface lypes  • RJ 45 (Elbrenet) No  • Number of ports 1; 1x M12  • integrated switch No  Protocols  • IP protocol Yes  • PROFINET IO Controller Yes  • PROFINET IO Device Yes  • SIMATIC communication Yes  • Open IE communication Yes  • Media redundancy No  PROFINET IO Controller Yes  - Media redundancy No  PROFINET IO Controller Yes  - Media redundancy No  PROFINET IO Controller Yes  - Proficial acknange No  - IRT No  - PROFINET IO Controller Yes  - PROFINET IO Controller Yes  - Media redundancy No  - PROFINET IO Controller Yes  - Media redundancy No  - PROFINET IO Controller Yes  - Proficial acknange No  - IRT No  - PROFINET IO Controller Services  - PROFINET IO Controller Services  - PG/OP communication Yes  - Proficial acknange No  - Iret No  - PROFINET IO Controller No  - Isochronous mode No  - Number of Connectable IO Devices, max.  - Number of Connectable IO Devices for RT, max.  - of which in line, max.  - of which in line, max.  - Number of IO Devices per tool, max.  - Number of IO Devices per tool, max.  - Number of IO Devices per tool, max.  - Updating times  - The minimum value of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity of t		
- Isochronous mode - IRT - PROFlenergy - Prioritized startup - Shared device - Number of IO Controllers with shared device, max activation/deactivation of I-devices - Asset management record  2. Interface Interface types - R J 45 (Ethernet) - Number of ports - Interface types - R J 45 (Ethernet) - Number of ports - Interface types - Interface types - Interface types - PROFINET IO Controller - PROFINET IO Device - SIMATIC communication - Ves - SIMATIC communication - Ves - SIMATIC communication - Ves - Simatic redundancy - Web server - Media redundancy - Media redundancy - PROFINET IO Controller - PROFINET IO Controller - PROFINET IO Controller - Isochronous mode - Direct data exchange - IRT - PROFienergy - Prioritized startup - Number of connectable IO Devices, max Number of IO Devices per tool, max Number of IO Devices per tool, max Number of IO Devices per tool, max Updating times - Imminimum value of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET I		Yes
— IRT — PROFlenergy Yes; per user program — Prioritized startup No — Shared device Yes — Number of IO Controllers with shared device, max. — activation/deactivation of I-devices Yes; per user program — Asset management record Yes; per user program — Asset management record Yes; per user program  2. Interface Interface types  • RI 45 (Ethernet) No • Number of ports • integrated switch No  Protocols • IP protocol • PROFINET IO Controller Yes • PROFINET IO Device • PROFINET IO Device • SIMATIC communication Yes; Optionally also encrypted • Web server • Media redundancy No • PROFINET IO Controller  Services  — PG/DP communication — Isochronous mode — Direct data exchange — IRT — PROFlenergy — Prioritized startup — Number of connectable IO Devices, max. — Number of connectable IO Devices for RT, max. — of which in line, max — of which in line, max — of which in line, max — Number of IO Devices per tool, max. — Number of IO Devices per tool, max. — Number of IO Devices per tool, max. — Updating times  The minimum value of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on the quantity set for PROFINET IO, on the number of IO devices, and on t		
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— Shared device — Number of IO Controllers with shared device, max. — activation/deactivation of I-devices — Asset management record  2. Interface  Interface types  R J 45 (Ethernet) No No Number of ports integrated switch No  Protocols  I 1; 1x M12 I 1x		
- Number of IO Controllers with shared device, max activation/deactivation of I-devices - Asset management record  2. Interface  Interface types  • RJ 45 (Ethernet) • Number of ports • It, 1x M12 • integrated switch  Protocols  • IP protocol • PROFINET IO Controller • PROFINET IO Device • SIMATIC communication • Web server • Media redundancy • Media redundancy • Mo  PROFINET IO Controller • PROFINET IO Device • Simatic communication • Yes; Optionally also encrypted • Media redundancy • No  PROFINET IO Controller Services  - PG/OP communication - Isochronous mode - Direct data exchange - IRT - PROFIenergy - Prioritized startup - Number of connectable IO Devices, max Number of connectable IO Devices for RT, max of which in line, max of which in line, max Number of IO Devices that can be simultaneously activated/deactivated, max Number of IO Devices per tool, max Updating times  4 Yes; per user program - Yes; Optionally also encrypted - Yes - No	·	
- activation/deactivation of I-devices - Asset management record  2. Interface Interface types  • RJ 45 (Ethernet) • Number of ports • Integrated switch  Protocols  • IP protocol • PROFINET IO Controller • PROFINET IO Device • SIMATIC communication • Ves • Media redundancy  PROFINET IO Controller • Media redundancy  PROFINET IO Controller • PROFINET IO Controller • PROFINET IO Controller • PROFINET IO Device • SIMATIC communication • Ves • Media redundancy  PROFINET IO Controller  Services  - PC/OP communication • Ves - IRT - PROFInergy - Prioritized startup - Number of connectable IO Devices, max Number of connectable IO Devices for RT, max of which in line, max Of which in line, max Number of IO Devices per tool, max Number of IO Devices per tool, max Updating times  - The minimum value of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity set of the proper or the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity set of the proper or the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity set of the proper or the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity set of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity set of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity set of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity set of IO devices and the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity set of IO devices and the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity set of IO devices and the IO devices and the IO devic		
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Interface types		
Interface types  RJ 45 (Ethernet) No Number of ports integrated switch No  Protocols  IP protocol PROFINET IO Controller Services PROFIBUS or PROFINET PROFIBUS or PROFINET Services Ser		Tes, per user program
RJ 45 (Ethernet) Number of ports I; 1x M12 integrated switch No  Protocols  IP protocol PROFINET IO Controller Services PG/OP communication IB of No Protocols  PROFINET IO Controller Yes Open IE communication Web server Media redundancy No  PROFINET IO Controller Services PG/OP communication Yes No PROFINET IO Controller  Services PG/OP communication Yes No PROFINET IO Controller  Services PG/OP communication Yes No PROFINET IO Controller  Services PG/OP communication Yes No PROFINET IO Controller  Services PG/OP communication Yes No PROFINET IO Controller  Services PG/OP communication Yes No PROFINET IO Controller  Services PROFIDEN ID Controller  Se		
<ul> <li>Number of ports</li> <li>integrated switch</li> <li>No</li> </ul> Protocols  IP protocol  PROFINET IO Controller PROFINET IO Device SIMATIC communication Open IE communication Web server Media redundancy PROFINET IO Controller Services  PG/OP communication PG/OP communication Ves No PROFINET IO Controller  Services  PG/OP communication No Services  PG/OP controller  Services  PG/OP communication No Services  PG/OP controller  Yes No No No No PROFINET io Controller  Services  PG/OP controller  Se	**	No
Integrated switch  Protocols  IP protocol  IP protocol  PROFINET IO Controller  PROFINET IO Device  SIMATIC communication  Open IE communication  Web server  Media redundancy  PROFINET IO Controller  Services  PG/OP communication  PG/OP communication  PG/OP communication  PG/OP communication  PG/OP communication  PROFINET IO Controller  Services  PG/OP communication  Isochronous mode  Direct data exchange  PROFIenergy  PROFIenergy  Proirtitzed startup  No  No  Number of connectable IO Devices, max.  Number of connectable IO Devices for RT, max.  Of which in line, max.  Number of IO Devices that can be simultaneously activated/deactivated, max.  Number of IO Devices per tool, max.  Number of IO Devices per tool, max.  He minimum value of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity set of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity set of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity set of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity set of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity set of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity set of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity set of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity set of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity set of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity set of the update time also depends on communication set for PROFINET IO.		1: 1x M12
Protocols  IP protocol PROFINET IO Controller PROFINET IO Device PROFINET IO Device SIMATIC communication Open IE communication Web server Media redundancy No  PROFINET IO Controller  Services  — PG/OP communication — Isochronous mode — Direct data exchange — IRT — PROFlenergy — Prioritized startup — Number of connectable IO Devices, max. — Number of Connectable IO Devices for RT, max. — of which in line, max. — Number of IO Devices that can be simultaneously activated/deactivated, max. — Number of IO Devices per tool, max. — Updating times  Yes, Optionally also encrypted Yes, Optio	·	
<ul> <li>IP protocol</li> <li>PROFINET IO Controller</li> <li>PROFINET IO Device</li> <li>PROFINET IO Device</li> <li>SIMATIC communication</li> <li>Yes</li> <li>Open IE communication</li> <li>Web server</li> <li>Media redundancy</li> <li>No</li> </ul> PROFINET IO Controller Services <ul> <li>PG/OP communication</li> <li>Isochronous mode</li> <li>Isochronous mode</li> <li>IRT</li> <li>PROFlenergy</li> <li>Prioritized startup</li> <li>No</li> <li>No</li> <li>Nomber of connectable IO Devices, max.</li> <li>Nomber of connectable IO Devices for RT, max.</li> <li>Of which in line, max.</li> <li>Number of IO Devices that can be simultaneously activated/deactivated, max.</li> <li>Updating times</li> </ul> Yes; IPv4 <ul> <li>Yes</li> <li>Yes</li> <li>Yes</li> <li>Yes</li> <li>Yes</li> <li>Yes</li> <li>Yes</li> <li>No</li> <li>Yes; per user program</li> <li>No</li> <li>32; In total, up to 1 000 distributed I/O devices can be connected via AS PROFIBUS or PROFINET</li> </ul> 32 (3); In total across all interfaces <ul> <li>32 (3); in total across all interfaces</li> <li>33 (4); in total across all interfaces</li> <li>45; in total across all interfaces</li> </ul>		
PROFINET IO Controller PROFINET IO Device SIMATIC communication Yes Open IE communication Yes; Optionally also encrypted Web server Media redundancy PROFINET IO Controller Services  - PG/OP communication - Isochronous mode - Direct data exchange - IRT - PROFIenergy - Prioritized startup - Number of connectable IO Devices, max Number of IO Devices that can be simultaneously activated/deactivated, max Updating times  Yes Yes; Optionally also encrypted	• IP protocol	Yes: IPv4
<ul> <li>PROFINET IO Device</li> <li>SIMATIC communication</li> <li>Open IE communication</li> <li>Web server</li> <li>Media redundancy</li> <li>Mo</li> <li>PROFINET IO Controller</li> <li>Services</li> <li>— PG/OP communication</li> <li>— Isochronous mode</li> <li>— Isochronous mode</li> <li>— IRT</li> <li>— PROFlenergy</li> <li>— Prioritized startup</li> <li>— Number of connectable IO Devices, max.</li> <li>— Number of connectable IO Devices for RT, max.</li> <li>— of which in line, max.</li> <li>— Number of IO Devices that can be simultaneously activated/deactivated, max.</li> <li>— Updating times</li> <li>Yes</li> <li>Yes</li> <li>No</li> <li>Yes, per user program</li> <li>No</li> <li>32; In total, up to 1 000 distributed I/O devices can be connected via AS PROFIBUS or PROFINET</li> <li>32</li> <li>8; in total across all interfaces</li> <li>The minimum value of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity</li> </ul>	·	
SIMATIC communication Open IE communication Web server Media redundancy PROFINET IO Controller  Services  - PG/OP communication - Isochronous mode - Direct data exchange - IRT - PROFlenergy - Prioritized startup - Number of connectable IO Devices, max.  - Number of Connectable IO Devices for RT, max of which in line, max Number of IO Devices per tool, max.  - Updating times  - Ves - Nes - Optionally also encrypted  Yes; Optionally also encrypted  Yes; Optionally also encrypted  Yes; Optionally also encrypted  Yes - No  No  - No  No - PROFINET IO Controller  Services  - No - No - No - No - No - PROFINET IO 0 distributed I/O devices can be connected via AS - PROFIBUS or PROFINET  32 - Si in total across all interfaces  - The minimum value of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity - Services  - No - No - IRT - No - PROFINET IO 0 on the number of IO devices, and on the quantity - Services  - PROFINET IO, on the number of IO devices, and on the quantity - Services  - PROFINET IO, on the number of IO devices, and on the quantity - Services - PROFINET IO, on the number of IO devices, and on the quantity - Services - No - No - No - PROFINET IO, on the number of IO devices, and on the quantity - Services - PROFINET IO, on the number of IO devices, and on the quantity		
Open IE communication     Web server     Media redundancy  PROFINET IO Controller  Services  PG/OP communication Isochronous mode Direct data exchange IRT PROFlenergy Prioritized startup No Number of connectable IO Devices, max.  Number of connectable IO Devices for RT, max. Of which in line, max. Number of IO Devices per tool, max.  Number of IO Devices per tool, max.  Updating times  Yes; Optionally also encrypted Yes Yes Yes No		
<ul> <li>◆ Web server</li> <li>◆ Media redundancy</li> <li>PROFINET IO Controller</li> <li>Services</li> <li>— PG/OP communication</li> <li>— Isochronous mode</li> <li>— Direct data exchange</li> <li>— IRT</li> <li>— PROFIenergy</li> <li>— Prioritized startup</li> <li>— Number of connectable IO Devices, max.</li> <li>— Number of connectable IO Devices for RT, max.</li> <li>— of which in line, max.</li> <li>— Number of IO Devices that can be simultaneously activated/deactivated, max.</li> <li>— Number of IO Devices per tool, max.</li> <li>— Updating times</li> <li>Yes</li> <li>No</li> <li>No</li> <li>32; In total, up to 1 000 distributed I/O devices can be connected via AS PROFIBUS or PROFINET</li> <li>32</li> <li>8; in total across all interfaces</li> <li>The minimum value of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity</li> </ul>		
● Media redundancy  PROFINET IO Controller  Services  - PG/OP communication - Isochronous mode - Direct data exchange - IRT - PROFlenergy - Prioritized startup - Number of connectable IO Devices, max Number of connectable IO Devices for RT, max of which in line, max Number of IO Devices that can be simultaneously activated/deactivated, max Number of IO Devices per tool, max.  No  No  32  Rin total, up to 1 000 distributed I/O devices can be connected via AS PROFIBUS or PROFINET  32  8; in total across all interfaces - Number of IO Devices per tool, max Number of IO Devices per tool, max Updating times  The minimum value of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity	·	
PROFINET IO Controller  Services  - PG/OP communication		
Services  - PG/OP communication - Isochronous mode - Direct data exchange - IRT - PROFlenergy - Prioritized startup - Number of connectable IO Devices, max.  - Of which in line, max Number of IO Devices that can be simultaneously activated/deactivated, max Number of IO Devices per tool, max Updating times  Yes No No No 32; In total, up to 1 000 distributed I/O devices can be connected via AS PROFIBUS or PROFINET  32 8; in total across all interfaces  The minimum value of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity	·	
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<ul> <li>— of which in line, max.</li> <li>— Number of IO Devices that can be simultaneously activated/deactivated, max.</li> <li>— Number of IO Devices per tool, max.</li> <li>— Updating times</li> <li>32</li> <li>8; in total across all interfaces</li> <li>8</li> <li>The minimum value of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity</li> </ul>		
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— Updating times  The minimum value of the update time also depends on communication set for PROFINET IO, on the number of IO devices, and on the quantity		8
set for PROFINET IO, on the number of IO devices, and on the quantity	1 7	
configured user data		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	— for send cycle of 1 ms	1 ms to 512 ms
PROFINET IO Device	FINET IO Device	

Services	Von
— PG/OP communication	Yes
— Isochronous mode	No 
— IRT	No
— PROFlenergy	Yes; per user program
— Prioritized startup	No
— Shared device	Yes
<ul> <li>Number of IO Controllers with shared device, max.</li> </ul>	4
<ul> <li>activation/deactivation of I-devices</li> </ul>	Yes; per user program
Asset management record	Yes; per user program
Interface types	
RJ 45 (Ethernet)	
• 100 Mbps	Yes
<ul> <li>Autonegotiation</li> </ul>	Yes
<ul> <li>Autocrossing</li> </ul>	Yes
Industrial Ethernet status LED	Yes
Protocols	
PROFIsafe	Yes; V2.4 / V2.6
Number of connections	
<ul> <li>Number of connections, max.</li> </ul>	128; Via integrated interfaces of the CPU
<ul> <li>Number of connections reserved for ES/HMI/web</li> </ul>	10
<ul> <li>Number of connections via integrated interfaces</li> </ul>	128
Number of S7 routing paths	16
Redundancy mode	
H-Sync forwarding	Yes
Media redundancy	
— Media redundancy	Yes; only via 1st interface (X1)
— MRP	Yes; MRP Automanager according to IEC 62439-2 Edition 2.0, MRP Manager;
MDD:	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	Very analysis with TLOVA Once calculated
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	V
• 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
	Vac. Ontional
Encryption	Yes; Optional
Web server	res, Optional
Web server • HTTP	Yes; Standard and user pages
Web server  • HTTP  • HTTPS	
Web server • HTTP	Yes; Standard and user pages
Web server  • HTTP  • HTTPS	Yes; Standard and user pages
Web server  • HTTP  • HTTPS  OPC UA	Yes; Standard and user pages Yes; Standard and user pages

— Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15,
— осошту рошогез	Basic256Sha256
— User authentication	"anonymous" or by user name & password
<ul><li>Number of connections, max.</li></ul>	10
<ul> <li>Number of nodes of the client interfaces, recommended max.</li> </ul>	2 000
<ul> <li>Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/OPC_I max.</li> </ul>	300
<ul><li>— Number of elements for one call of OPC_UA_NameSpaceGetIndexList, max.</li></ul>	20
<ul> <li>Number of elements for one call of OPC_UA_MethodGetHandleList, max.</li> </ul>	100
<ul> <li>Number of simultaneous calls of the client instructions for session management, per connection, max.</li> </ul>	1
<ul> <li>Number of simultaneous calls of the client instructions for data access, per connection, max.</li> </ul>	5
<ul> <li>Number of registerable nodes, max.</li> </ul>	5 000
<ul> <li>Number of registerable method calls of OPC_UA_MethodCall, max.</li> </ul>	100
<ul> <li>Number of inputs/outputs when calling OPC_UA_MethodCall, max.</li> </ul>	20
OPC UA Server	Yes; Data access (read, write, subscribe), method call, custom address space
<ul> <li>Application authentication</li> </ul>	Yes
— Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
— User authentication	"anonymous" or by user name & password
<ul> <li>— GDS support (certificate management)</li> </ul>	Yes
<ul><li>Number of sessions, max.</li></ul>	48
<ul> <li>Number of accessible variables, max.</li> </ul>	100 000
<ul> <li>Number of registerable nodes, max.</li> </ul>	20 000
<ul> <li>Number of subscriptions per session, max.</li> </ul>	20
<ul><li>— Sampling interval, min.</li></ul>	100 ms
<ul><li>— Publishing interval, min.</li></ul>	200 ms
<ul> <li>Number of server methods, max.</li> </ul>	50
<ul> <li>Number of inputs/outputs per server method, max.</li> </ul>	20
<ul> <li>Number of monitored items, recommended max.</li> </ul>	2 000; for 1 s sampling interval and 1 s send interval
<ul> <li>Number of server interfaces, max.</li> </ul>	10 of each "Server interfaces" / "Companion specification" type and 20 of the type "Reference namespace"
<ul> <li>Number of nodes for user-defined server interfaces, max.</li> </ul>	5 000
<ul> <li>Alarms and Conditions</li> </ul>	Yes
<ul> <li>Number of program alarms</li> </ul>	200
Number of alarms for system diagnostics	100
Further protocols	
• MODBUS	Yes; MODBUS TCP
S7 message functions	
Number of login stations for message functions, max.	32
Program alarms	Yes
Number of configurable program messages, max.	10 000; Program messages are generated by the "Program_Alarm" block, ProDiag or GRAPH
Number of loadable program messages in RUN, max.	5 000
Number of simultaneously active program alarms	4.000
Number of program alarms	1 000
Number of alarms for system diagnostics	200
Number of alarms for motion technology objects	160
Test commissioning functions	Very Described and the second of the second
Joint commission (Team Engineering)	Yes; Parallel online access possible for up to 8 engineering systems
Status block	Yes; Up to 8 simultaneously (in total across all ES clients)
Single step	No
Number of breakpoints	8
Status/control	Voc. Standard
<ul><li>Status/control variable</li><li>Variables</li></ul>	Yes; Standard Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters
♥ variabics	inputaroatputa, memory bita, DDs, distributed 1/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; Standard
<ul><li>Forcing, variables</li></ul>	Peripheral inputs/outputs
Number of variables, max.	200
Diagnostic buffer	
• present	Yes
<ul> <li>Number of entries, max.</li> </ul>	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
<ul> <li>Monitoring of the supply voltage (PWR-LED)</li> </ul>	Yes; green "24 V DC" LED
<ul> <li>Connection display LINK TX/RX</li> </ul>	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> <li>Number of available Motion Control resources for</li> </ul>	800
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
<ul> <li>Positioning axis</li> </ul>	
Number of positioning axes at motion control cycle     of 4 mg (hyrical value)	5
of 4 ms (typical value)	40
<ul> <li>Number of positioning axes at motion control cycle of 8 ms (typical value)</li> </ul>	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	163, 1 15 controller with integrated optimization for temperature
High-speed counter	Yes
Standards, approvals, certificates	100
Highest safety class achievable in safety mode	(400)
Probability of failure (for service life of 20 years and repair time	,
<ul> <li>Low demand mode: PFDavg in accordance with SIL3</li> </ul>	< 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
• horizontal installation, max.	55 °C
vertical installation, min.	-25 °C
vertical installation, max.	55 °C
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
■ Installation attitude above sea level, Max.	5 500 m, Nestrictions for installation attitudes > 2 000 m, See manual

configuration / header	
configuration / programming / header	
Programming language	
— LAD	Yes; incl. failsafe
— FBD	Yes; incl. failsafe
— STL	Yes
— SCL	Yes
— GRAPH	Yes
Know-how protection	
<ul> <li>User program protection/password protection</li> </ul>	Yes
Copy protection	Yes
Block protection	Yes
Access protection	
<ul> <li>protection of confidential configuration data</li> </ul>	Yes
<ul> <li>Protection level: Write protection</li> </ul>	Yes
<ul> <li>Protection level: Read/write protection</li> </ul>	Yes
Protection level: Complete protection	Yes
programming / cycle time monitoring / header	
<ul><li>lower limit</li></ul>	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

last modified:

7/13/2024