SIEMENS

Data sheet

6ES7412-5HK06-0AB0



SIMATIC S7-400H, CPU 412-5H, central processing unit for S7-400H and S7-400F/FH, 5 interfaces: 1x MPI/DP, 1x DP, 1x PN and 2 for sync modules, 1 MB memory (512 KB data/512 KB program)

General information	
Product type designation	CPU 412-5H PN/DP
HW functional status	1
Firmware version	V6.0
Product function	
Isochronous mode	No
Engineering with	
 Programming package 	As of STEP 7 V5.5 SP2 with HF1
CiR - Configuration in RUN	
CiR synchronization time, basic load	100 ms
CiR synchronization time, time per I/O byte	0 µs
Supply voltage	
Rated value (DC)	Power supply via system power supply
Input current	
from backplane bus 5 V DC, typ.	1.6 A
from backplane bus 5 V DC, max.	1.9 A
from backplane bus 24 V DC, max.	150 mA; 150 mA per DP interface
from interface 5 V DC, max.	90 mA; At each DP interface
Power loss	
Power loss, typ.	7.5 W
Memory	
Type of memory	RAM
Work memory	
 integrated 	1 Mbyte
 integrated (for program) 	512 kbyte
 integrated (for data) 	512 kbyte
• expandable	No
Load memory	
expandable FEPROM	Yes; with Memory Card (FLASH)
 expandable FEPROM, max. 	64 Mbyte
 integrated RAM, max. 	512 kbyte
expandable RAM	Yes
• expandable RAM, max.	64 Mbyte
Backup	
• present	Yes
with battery	Yes; all data
without battery	No
Battery	
Backup battery	
 Backup current, typ. 	180 μA; Valid up to 40°C

Backup current, max.	1 000 µA
Backup time, max.	Dealt with in the module data manual with the secondary conditions and the
• Buotup tino, max.	factors of influence
 Feeding of external backup voltage to CPU 	5 V DC to 15 V DC
CPU processing times	
for bit operations, typ.	31.25 ns
for word operations, typ.	31.25 ns
for fixed point arithmetic, typ.	31.25 ns
for floating point arithmetic, typ.	62.5 ns
CPU-blocks	
DB	
Number, max.	6 000; Number range: 1 to 16000
• Size, max.	64 kbyte
FB	
Number, max.	3 000; Number range: 0 to 7999
• Size, max.	64 kbyte
FC	
Number, max.	3 000; Number range: 0 to 7999
• Size, max.	64 kbyte
OB	
• Number, max.	see instruction list
• Size, max.	64 kbyte
Number of free cycle OBs	1; OB 1
 Number of time alarm OBs 	4; OB 10-13
 Number of delay alarm OBs 	4; OB 20-23
 Number of cyclic interrupt OBs 	4; OB 32-35
 Number of process alarm OBs 	4; OB 40-43
 Number of DPV1 alarm OBs 	3; OB 55-57
 Number of startup OBs 	2; OB 100, 102
 Number of asynchronous error OBs 	9; OB 80-88
 Number of synchronous error OBs 	2; OB 121, 122
Nesting depth	
 per priority class 	24
 additional within an error OB 	1
Counters, timers and their retentivity	
S7 counter	
Number	2 048
Retentivity	
— adjustable	Yes
— preset	Z 0 to Z 7
Counting range	
— lower limit	0
— upper limit	999
IEC counter	
• present	Yes
• Type	SFB
Number	Unlimited (limited only by RAM capacity)
S7 times	0.040
Number	2 048
Retentivity	Vaa
— adjustable	Yes
— preset	No times retentive
Time range	10 mg
— lower limit	10 ms
— upper limit	9 990 s
IEC timer	Vac
• present	Yes
• Type	SFB
Number Data areas and their retentivity	Unlimited (limited only by RAM capacity)
Data areas and their retentivity	
Retentive data area (incl. timers, counters, flags), max.	Total working and load memory (with backup battery)

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Flag	
• Size, max.	8 192 byte
Retentivity available	Yes
Retentivity preset	MB 0 to MB 15
Number of clock memories	8; in 1 memory byte
Local data	
adjustable, max.	16 kbyte
• preset	8 kbyte
Address area	
I/O address area	
Inputs	8 kbyte
Outputs	8 kbyte
Process image	
Inputs, adjustable	8 kbyte
Outputs, adjustable	8 kbyte
Inputs, default	256 byte
Outputs, default	256 byte
• consistent data, max.	244 byte
Access to consistent data in process image	Yes
Subprocess images	
 Number of subprocess images, max. 	15
Digital channels	
Inputs	65 536
— of which central	65 536
Outputs	65 536
— of which central	65 536
Analog channels	
Inputs	4 096
— of which central	4 096
Outputs	4 096
•	
— of which central	4 096
— of which central Hardware configuration	
— of which central Hardware configuration Number of expansion units, max.	21
- of which central Hardware configuration Number of expansion units, max. connectable OPs	21 47
of which central Hardware configuration Number of expansion units, max. connectable OPs Multicomputing	21
— of which central Hardware configuration Number of expansion units, max. connectable OPs Multicomputing Interface modules	21 47 No
	21 47 No 6
— of which central Hardware configuration Number of expansion units, max. connectable OPs Multicomputing Interface modules • Number of connectable IMs (total), max. • Number of connectable IM 460s, max.	21 47 No 6 6
— of which central Hardware configuration Number of expansion units, max. connectable OPs Multicomputing Interface modules • Number of connectable IMs (total), max. • Number of connectable IM 460s, max. • Number of connectable IM 463s, max.	21 47 No 6
	21 47 No 6 6 4; Single mode only
	21 47 No 6 6 4; Single mode only 2
	21 47 No 6 6 4; Single mode only 2 10; CP 443-5 Extended
	21 47 No 6 6 4; Single mode only 2 10; CP 443-5 Extended No
	21 47 No 6 6 4; Single mode only 2 10; CP 443-5 Extended
	21 47 No 6 6 4; Single mode only 2 10; CP 443-5 Extended No 0
	21 47 No 6 6 4; Single mode only 2 10; CP 443-5 Extended No 0
	21 47 No 6 6 4; Single mode only 2 10; CP 443-5 Extended No 0
	21 47 No 6 6 4; Single mode only 2 10; CP 443-5 Extended No 0 1 0 See manual Automation System S7-400H fault-tolerant systems. Limited by
	21 47 No 6 6 4; Single mode only 2 10; CP 443-5 Extended No 0 1 0 See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections See manual Automation System S7-400H fault-tolerant systems. Limited by
	21 47 No 6 6 4; Single mode only 2 10; CP 443-5 Extended No 0 1 0 See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections
	21 47 No 6 6 4; Single mode only 2 10; CP 443-5 Extended No 0 1 0 See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections 14; Of which max. 10 CP as DP master
	21 47 No 6 6 4; Single mode only 2 10; CP 443-5 Extended No 0 1 0 See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections
	21 47 No 6 6 4; Single mode only 2 10; CP 443-5 Extended No 0 1 0 See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections 14; Of which max. 10 CP as DP master
	21 47 No 6 6 4; Single mode only 2 10; CP 443-5 Extended No 0 1 0 See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections 14; Of which max. 10 CP as DP master
	21 47 No 6 6 4; Single mode only 2 10; CP 443-5 Extended No 0 1 0 See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections 14; Of which max. 10 CP as DP master
	21 47 No 6 6 6 6 6 6 7 10; CP 443-5 Extended No 0 1 0 See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections 14; Of which max. 10 CP as DP master 2
 – of which central Hardware configuration Number of expansion units, max. connectable OPs Multicomputing Interface modules Number of connectable IMs (total), max. Number of connectable IM 460s, max. Number of connectable IM 463s, max. Number of DP masters integrated via CP Mixed mode IM + CP permitted via interface module Number of IO Controllers integrated via CP Number of operable FMs and CPs (recommended) FM CP, PtP PROFIBUS and Ethernet CPs Slots required slots Time of day Clock Hardware clock (real-time) 	21 47 No 6 6 6 6 7 10; CP 443-5 Extended No 0 1 0 See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections 14; Of which max. 10 CP as DP master 2 Yes

• Deviation per day (unbuffered), max.	8.6 s; Power on
	o.o s, Power on
Operating hours counter • Number	10
	16
Number/Number range	0 to 15
Range of values	SFCs 2, 3 and 4: 0 to 32767 hours SFC 101: 0 to 2^31 - 1 hours
• Granularity	1h
retentive	Yes
Clock synchronization	
supported	Yes
• to MPI, master	Yes
• on MPI, device	Yes
• to DP, master	Yes
• on DP, device	Yes
• in AS, master	Yes
• in AS, device	Yes
on Ethernet via NTP	Yes; As client
Time difference in system when synchronizing via	
• Ethernet, max.	10 ms; Via NTP
• MPI, max.	200 ms
Interfaces	
Number of RS 485 interfaces	2
Number of other interfaces	2; Fiber-optic interface
Optical interface	No
1. Interface	
Interface type	MPI/PROFIBUS DP
Isolated	Yes
Interface types	
• RS 485	Yes
 Output current of the interface, max. 	150 mA
Protocols	
• MPI	Yes
PROFIBUS DP master	Yes
PROFIBUS DP device	No
MPI	
Number of connections	32; If a diagnostics repeater is used on the line, the number of connection
	resources on the line is reduced by 1
• Transmission rate, max.	12 Mbit/s
Services	
— PG/OP communication	Yes
— Routing	Yes
— Global data communication	No
— S7 basic communication	No
- S7 communication	Yes
- S7 communication, as client	Yes
— S7 communication, as server	Yes
PROFIBUS DP master	
Number of connections, max.	16; If a diagnostics repeater is used on the line, the number of connection
	resources on the line is reduced by 1
Transmission rate, max.	12 Mbit/s
 max. number of DP devices 	32
Services	
— PG/OP communication	Yes
— Routing	Yes
— Global data communication	No
- S7 basic communication	No
— S7 communication	Yes
— S7 communication, as client	Yes
- S7 communication, as server	Yes
— Equidistance	No
— Equidistance — Isochronous mode	No
— SYNC/FREEZE	No

- Directed and approximation of the functions - Directed and approximation of the functions - Directed approximation of the functions - Directed approximation of the function of the functio		No
Address area 2 ktyrle		
- Inputs max. 2 ktype - Corputs max. 2 ktype tel interface / DP moster / payload data per DP Device / header - uper Gdat per DP device, max. 244 kyte - Dupts, max. - Outputs, max. - Outputs, max. - Outputs, max. - Outputs, max. - State of connections No configuration of CPU as DP stave Number of connections No configuration of CPU as DP stave Number of connections No configuration of CPU as DP stave Number of connections No configuration of CPU as DP stave Number of connections No configuration of CPU as DP stave Number of connections No configuration of CPU as DP stave Number of connections No configuration of CPU as DP stave Number of connections No configuration of CPU as DP stave Number of connections No configuration of CPU as DP stave Number of connections No configuration of CPU as DP stave Number of ports Statud Vos Autorosptation Autorosptation Yos Autorosptation Yos Nucleoner of ports Z No PROFINET ID Conform Yos Nucleoner of ports Z No PROFINET ID Device	— DPV1	Yes
	Address area	
It interface / DP mater / payload data por DP Device / hastor 244 byte - Impuls, max. 244 byte - Outputs, max. 244 byte - Outputs, max. 244 byte - Stots, max. 244 byte - port elot, max. 244 byte - port elot, max. 244 byte - byte dot, max. 245 byte - Interface byte PROFINET - Nuch are dots Yes - PROFINET IC Controller Yes - PROFINET IC Controller	— Inputs, max.	2 kbyte
	— Outputs, max.	2 kbyte
Dupus, max. 244 byte - Outputs, max. 244 byte - Stots, max. 244 byte - per tak, max. 244 byte - per tak, max. 245 byte PROFENSUS PP since - per tak, max. 245 byte PROFENSUS PP since - Number of connections No configuration of CPU as DP since - Number of connections - No configuration of CPU as DP since - Number of connections - Number of connections - Automognation - Automognation - Automognation - Number of poins - ReGENET IO Controller - REGNET IO Controller - REGNE	1st interface / DP master / payload data per DP Device / heade	
- Orguns, max. 244 byte: - Stats, max. 128 byte PROFINELY DP dave - Number of connections No configuration of CPU as DP slave 2 Interface Professions - Number of connections No configuration of CPU as DP slave 2 Interface Profession - Stats, max. 128 byte - PROFINET - Solids - Autoregraded - Autoregradedec - Autoregraded - Autoregraded - Autoregraded	— user data per DP device, max.	244 byte
 Sits, max. Sits, max. PROFIBUS DP silve Number of connections No configuration of CPU as DP slave Number of connections No configuration of CPU as DP slave Interface type PROFINET Solated Automatic detection of transmission rate Yes No Interface types PROFINET IO Controller Yes Servides PROFINET IO Controll	— Inputs, max.	244 byte
	— Outputs, max.	244 byte
PROFIDUS DP slave No configuration of CPU as DP slave Interface PROFINET Solated Yes automatic detection of maxmission rate Yes, Autoneoning Autoregotation Yes Change of IP address at runtime, supported No Interface type Yes Change of IP address at runtime, supported No Interface type Yes Autoregotation Yes Change of IP address at runtime, supported No Interface types Yes • Report of ports 2 • integrated switch Yes • PROFINET IO Controller Yes • PROFINET IO Controller Yes • PROFINET OD Controller Yes • ProfFlobus DP davice No	— Slots, max.	244
Number of connections No configuration of CPU as DP slave 2 Interface PROFINET Interface type PROFINET Instanda Yes automatic detection of transmission rate Yes Autonospitation Yes Autonospitation Yes Autonossing Yes Charge of IP address at runtime, supported No Interface types Yes • Rid S (Ennet) Yes • Number of ports 2 • integrated switch Yes • PROFINET IO Controller Yes • PROFINET IO Device No • PROFINES DP advece No • PROFINES DP device No	— per slot, max.	128 byte
2 Interface PROFINET Interface type PROFINET Isolated Yes automatic detection of transmission rate Yes Autorogenetic Yes Autorogenetic Yes Autorogenetic Yes Change of IP address at runtime, supported No Interface types * • RJ 45 (Ethernet) Yes • RV 45 (Ethernet) Yes • PROFINET IO Controller Yes • PROFINET IO Device No • Open IE communication Yes • Row Instance No • Open IE communication Yes • Stand device No • Open IE communi	PROFIBUS DP slave	
Interface type PROFINET Isolated Yes automatic detection of transmission rate Yes, Autoensing Autorogotation Yes Autorosping Yes Change of IP address at runtime, supported No Interface types Yes Change of IP address at runtime, supported No Interface types Yes Change of IP address at runtime, supported No Interface types Yes PROFINET IO Controller Yes Interface types No PROFINET IO Controller No Interface type No PROFINET IO Controller Yes Veb server No Individe terminication Yes PROFINET IO Controller Yes Interface type No POROFISUS DP device No POROFINET IO Controller 100 Mbit/s <td>Number of connections</td> <td>No configuration of CPU as DP slave</td>	Number of connections	No configuration of CPU as DP slave
Isolated Yes automatic detection of transmission rate Yes, Autosensing Autorespitation Yes Autorssing Yes Charge of IP address at runtime, supported No Interface types Yes • RU 45 (Ethernet) Yes • Number of ports 2 • integrated switch Yes • PROFINET ID Controller Yes • PROFINET ID Device No • PROFINET CBA No • Open IE communication Yes • Veb server No • Open IE communication Yes • PROFINET IO Controller Yes • PROFINET IO Controller Yes • Transmission rate, max. 100 Mbit/s Services - • PROFINET IO Controller Yes • Transmission rate, max. 100 Mbit/s Services - • PROFINET IO Controller Yes • Transmission rate, max. 100 Mbit/s Services - • Torderad device Yes • Sh	2. Interface	
automatic detection of transmission rate Yes; Autocensing Autorcossing Yes Change of IP address at runtime, supported No Interface types • • R4 45 (Ethernet) Yes • Number of ports 2 • Integrated switch Yes PROFINET IO Controller Yes • PROFINET IO Double No • PROFINET IO Double No • PROFINET IO Double No • PROFINET OBA No • PROFINET OBA No • PROFINET OBA No • PROFINET CBA No • Profine doubancy Yes PEROFINET (Controller Interface doubancy • Profine doubancy <td>Interface type</td> <td>PROFINET</td>	Interface type	PROFINET
Autonegotiation Yes Autorcrossing Yes Charge of IP address at runtime. supported No Interface types No • RU 45 (Ethernet) Yes • Number of ports 2 • Integrated switch Yes • PROFINET 10 Controller Yes • PROFINET 10 Device No • PROFINET 05 DP device No • Open IE communication Yes • PROFINET 06 Device No • Open IE communication Yes • PROFINET 06 Controller Yes • Transition rate, max. 100 Mbit/s Services - • PROFINET 06 Controller Yes • Transition rate, max. 100 Mbit/s Services - • Provincetable Yes, Single mode only • Shard device Yes, Single mode only • Shard device Yes • Shard device Yes, Single mode only • Noher of connectable 10 Devices, max. 256 • Orther optic replacement without swap medium Yes • Or which in the, max. 250 us fo 517 ms, am s • Or which in t	Isolated	Yes
Autocrossing Yes Charge of IP address at runtime, supported No Interface types • RU45 (Ethernet) • RU45 (Ethernet) Yes • Integrate disk Yes • PROFINET IO Controller Yes • PROFINET IO Controller Yes • PROFINET IO Device No • PROFINET IC Device No • PROFINET CBA No • PROFIBUS DP master No • PROFIBUS DP device No • Open IE communication Yes • Veta server No • Veta server No • PROFIDE Controller Yes • PROFIDE Communication Yes • PROFIDE Controller Yes • PROFIDE Controller Yes • PROFIDE Controller Yes • PROFIDE Controller Yes • Prof/OP communication Yes • PROFIDE Controller Yes • Prointized startup No • Number of connectable IO Devices, max. 256: In redundant mode via both interfaces • Of which in line, max. 256 • Additionideactivation of 402 Ways and adviation of 10 Devices No • Outputs, max. 256 • Outputs, max. 250 µs to 512 ms, minimum value depends on the n	automatic detection of transmission rate	Yes; Autosensing
Change of IP address at runtime, supported No Interface types • • R4 45 (Ethernet) Yes • Interface types 2 • integrated switch Yes • PROFINET IO Controller Yes • PROFINET IO Device No • PROFINET IO Device No • PROFINET CBA No • PROFINET CBA No • Open IE communication Yes • Open IE communication Yes • PROFINET IO Controller No • Open IE communication Yes • Media redundancy Yes PROFINET IO Controller No • PG/OP communication Yes • Services - • PG/OP communication Yes • Stand device Yes; Single mode only • Shared device Yes; Single mode only • Number of connectable IO Devices, max. 256 • O dwhich in line, max. 256 • O dwhich in line, max. 256 • De	Autonegotiation	Yes
Interface types • Number of ports • Integrated switch • PROFINET ID Controller • PROFINET ID Device • PROFINET ID Device • PROFINET ID Device • PROFINET Device • Open Ecommunication • Media redundancy Yes • PROFINET IO Controller • PROFINET IO Controller <	Autocrossing	Yes
• RJ 45 (Ehernet) Yes • Number of ports 2 • Integrated switch Yes Protocols No • PROFINET IO Device No • PROFINET OBA No • PROFINET OBA No • PROFINET CBA No • PROFINET DS Prester No • Open IE communication Yes • Veb server No • Inition topic of the point connection No • Media redundancy Yes PROFINET IO Controller Yes • Transmission rate, max. 100 Mbit/s Services - • Transmission rate, max. 100 Mbit/s Services - • PG/OP communication Yes • Sontronous mode No • Services Yes (Single mode only • Isochronous mode No • No humber of connectable IO Devices, max. 256; In redundant mode via both interfaces • More of connectable IO Devices for RT, max. 256 • Activation/deactivation of IO Devices No • Device replacement without swap medium Yes <td< td=""><td>Change of IP address at runtime, supported</td><td>No</td></td<>	Change of IP address at runtime, supported	No
• Number of ports 2 • integrated switch Yes Protocol • • PROFINET IO Controller Yes • PROFINET CD A No • PROFINET CD A No • PROFINET CDA No • PROFIBUS DP master No • PROFIBUS DP device No • PROFIEUS DP device No • Open IE communication Yes • Veb server No • No Media redundancy Yes • PROFINET IO Controller • • Transmission rate, max. 100 Mbit/s Services No • PGOP communication Yes • PGOP communication Yes • PGOP communication Yes • Stand device Yes • Stand device Yes • No No • • Number of connectable IO Devices, max. 256 • Activation/deactivation of IO Devices for RT, max. 256 • Activation/deactivation of IO Devices No • Device replacement without swap medium Yes • Send cycles 250 (µs, 501 µs, 1 ms, 2 ms, 4 ms	Interface types	
• integrated switch Yes Protecols • ROFINET IO Controller Yes • ROFINET IO Device No • ROFINET CBA No • ROFIBUS DP master No • PROFIBUS DP device No • Denit E communication Yes • PROFINET COntroller No • Open IE communication Yes • Profitus DP device No • Mebia redundancy Yes PROFINET IO Controller • • Transmission rate, max. 100 Mbit's Services • • PGO Communication Yes • PGO Communication Yes • Stared device Yes; Single mode only • Isochronous mode No • Number of connectable IO Devices, max. 256 in redundant mode via both interfaces • Advisition/deadivation of IO Devices No • Number of connectable IO Devices for RT, max. 256 in redundant mode via both interfaces • Of which In line, max. 256 in redundant mode via both interfaces • Other point), supported Yes • Devices changing during operation (partner ports), supported No • Device charging during operation (partner ports), supported Yes • Device replacement without swap medium Yes <	RJ 45 (Ethernet)	Yes
Protocols • RROFINET IO Device No • RROFINET IO Device No • RROFINET CBA No • RROFIBUS DP master No • Open IE communication Yes • Open IE communication Yes • Web server No • Media redundancy Yes PROFINET IO Controller No • Media redundancy Yes PROFINET IO Controller 100 Mbit/s Services - - PG/OP communication Yes - S7 communication Yes - S7 communication Yes - S1 continuciation Yes - Number of connectable IO Devices, max. 256 - Activation/deactivation of IO Devices No - O bevices changing during operation (partner ports), supported No - Device replacement without swap medium Yes - Send cycles 250 µs, 500 µs, 1 ms, 2 ms, 4 ms - Updating time	Number of ports	2
PROFINET IO Controller Yes No PROFINET CBA No PROFINET CBA No PROFINET CBA No PROFIBUS DP device No PROFINET IO Controller Profit Controller PROFINET IO Controller No Stard device Ves; Single mode only No Number of connectable IO Devices, max. Z56 In redundant mode via both interfaces Io Devices changing during operation (partner profs), supported Devices changing during operation (partner profs), supported Devices changing during operation (partner Profs, supported Devices changing during operation (partner Profs, supported Devices changing during operation (partner Profs, supported Devices changing during operation (partner Profs), supported Devices c	 integrated switch 	Yes
• PROFINET IO Device No • PROFINET CBA No • PROFIBUS DP master No • PROFIBUS DP device No • Open IE communication Yes • Point-to-point connection No • Point-to-point connection No • Media redundancy Yes PROFINET IO Controller Procession PROFINET IO Controller Ves PROFOCOMMENTION Yes PROFOCOMENTION Yes PROFOCOMMUNICATION Yes • Transmission rate, max. 100 Mbit/s Services - - S7 communication Yes - Shared device Yes; Single mode only - Shared device Yes; Single mode only - Number of connectable IO Devices, max. 256 - Of which in line, max. 256 - of which in line, max. 256 - of which in line, max. 256 - O Device schanging during operation (pattner ports), supported No - Device replacement without swap medium Yes - Send cycles 250 µs, 500 µs, 1 ms, 2 ms, 4 ms - Updatin	Protocols	
• PROFINET CBANo• PROFIBUS DP masterNo• PROFIBUS DP deviceNo• Open Le communicationYes• Web serverNo• Media redundancyYes• PROFINET IO Controller• Transmission rate, max.100 Mbit/sServices• PC/OP communicationYes• PC/OP communicationYes• Transmission rate, max.100 Mbit/sServices• Transmission rate, max.100 Mbit/sServices• Services for communicationYes- PC/OP communicationYes- S1 communicationYes- S1 communicationYes- Shared deviceYes; Single mode only- Printized startupNo- Number of connectable IO Devices, max.256- of which in line, max.256- Activation/deactivation of IO DevicesNo- Io Devices changing during operation (partner ports), supportedNo- Device replacement without swap mediumYes- Send cycles250 µs, 500 µs, 1 ms, 2 ms, 4 ms- Updating time250 µs, 500 µs, 1 ms, 2 ms, 4 ms- Updating time250 µs, 500 µs, 1 ms, 2 ms, 4 ms- Updating time250 µs, 500 µs, 1 ms, 2 ms, 4 ms- Updating time250 µs, 500 µs, 1 ms, 2 ms, 4 ms- Updating time250 µs, 500 µs, 1 ms, 2 ms, 4 ms- Updating time250 µs, 500 µs, 1 ms, 2 ms, 4 ms- Updating time250 µs, 500 µs, 1 ms, 2 ms, 4 ms- Lopure time10 µs/µs/µs <td>PROFINET IO Controller</td> <td>Yes</td>	PROFINET IO Controller	Yes
• PROFIBUS DP master No • PROFIBUS DP device No • Open IE communication Yes • Web server No • Point-to-point connection No • Media redundancy Yes PROFINET IO Controller - PROFINET IO Controller - • Transmission rate, max. 100 Mbit/s Services - - S7 communication Yes - Shared device Yes; Single mode only - Shared device Yes; Single mode only - Number of connectable IO Devices, max. 256 - Activation/deactivation of IO Devices No - Of which in line, max. 256 - Device replacement without swap medium Yes - Device replacement without swap medium Yes - Device replacement without swap medium Yes - Updating time 250 (µs, 500 µs, 1 ms, 2 ms, 4 ms - Outputs, max. 8 kbyte - Updating time 8 kbyte - Outputs, max. 8 kbyte - User data consistency, max. 9 kbyte - Outputs, max. 8 kbyte - User	PROFINET IO Device	No
• PROFIBUS DP device No • Open IE communication Yes • Web server No • Point-Dopint connection No • Media redundancy Yes PROFINET IO Controller	PROFINET CBA	No
• Open IE communication Yes • Web server No • Point-to-point connection No • Media redundancy Yes PROFINET IO Controller • Transmission rate, max. • PG/OP communication Yes • PG/OP communication Yes • S7 communication Yes - S7 communication Yes - Shared device Yes; Single mode only - Number of connectable IO Devices, max. 256 - Number of connectable IO Devices for RT, max. 256 - of which in line, max. 256 - of which in line, max. 256 - of which in line, max. 256 - Device replacement without swap medium Yes - Device replacement without swap medium Yes - Send cycles 250 µs, 500 µs, 1 ms, 2 ms, 4 ms - Updating time 250 µs to 512 ms, minimum value depends on the number of configured user data and the configured single or redundant mode Address area Inputs, max. Sk byte Outputs, max. Yes by 12 ms, 1024 byte Open IE communication Number of connectoins, max. Ade Outputs proted duser	PROFIBUS DP master	No
• Web server No • Point-to-point connection No • Media redundancy Yes PROFINET IO Controller	PROFIBUS DP device	No
• Point-to-point connection No • Media redundancy Yes PROFINET IO Controller	Open IE communication	Yes
• Media redundancy Yes PROFINET IO Controller 100 Mbit/s • Transmission rate, max. 100 Mbit/s Services - - PG/OP communication Yes - S7 communication Yes - Isochronous mode No - Shared device Yes; Single mode only - Prioritized startup No - Number of connectable IO Devices, max. 256 - of which in line, max. 256 - of which in line, max. 256 - Activation/deactivation of IO Devices No - Device schanging during operation (partner ports), supported No - Device replacement without swap medium Yes - Send cycles 250 µs, 500 µs, 1 ms, 2 ms, 4 ms - Updating time 250 µs, 500 µs, 1 ms, 2 ms, 4 ms - Updating time 250 µs to 512 ms, minimum value depends on the number of configured user data and the configured single or redundant mode Address area - - Inputs, max. 8 kbyte - Outputs, max. 8 kbyte - Use data consistency, max. 1024 byte Open IE communication 020, 21, 25, 102, 135, 161, 34962, 34963, 34964, 65532, 65534, 45534<	Web server	No
PROFINET IO Controller • Transmission rate, max. 100 Mbit/s Services - - PG/OP communication Yes - S7 communication Yes - Isochronous mode No - Shared device Yes; Single mode only - Prioritized startup No - Number of connectable IO Devices, max. 256 - of which in line, max. 256 - Activation/deactivation of IO Devices No - Device schanging during operation (partner ports), supported No - Device replacement without swap medium Yes - Send cycles 250 µs, 500 µs, 1 ms, 2 ms, 4 ms - Updating time 250 µs, 500 µs, 1 ms, 2 ms, 4 ms - Updating time 250 µs, 500 µs, 1 ms, 2 ms, 4 ms - Updating time 250 µs, 500 µs, 1 ms, 2 ms, 4 ms - Updating time 250 µs, 500 µs, 1 ms, 2 ms, 4 ms - Updating time 250 µs, 500 µs, 1 dit, 34962, 34963, 34964, 65532, 65533, 65534,	 Point-to-point connection 	No
• Transmission rate, max. 100 Mbit/s Services - - PG/OP communication Yes - S7 communication Yes - Isochronous mode No - Shared device Yes; Single mode only - Prioritized startup No - Number of connectable IO Devices, max. 256; In redundant mode via both interfaces - Number of connectable IO Devices for RT, max. 256 - of which in line, max. 256 - Otivices changing during operation (partner ports), supported No - Device replacement without swap medium Yes - Send cycles 250 µs to 512 ms, minimum value depends on the number of configured user data and the configured single or redundant mode - Updating time 250 µs to 512 ms, minimum value depends on the number of configured user data and the configured single or redundant mode - Uptus, max. 8 kbyte Uptus, max. - Uptus,	Media redundancy	Yes
Services - PG/OP communication Yes - S7 communication Yes - Isochronous mode No - Shared device Yes; Single mode only - Prioritized startup No - Number of connectable IO Devices, max. 256; In redundant mode via both interfaces - of which in line, max. 256 - of which in line, max. 256 - Activation/deactivation of IO Devices No - Io Devices changing during operation (partner ports), supported No - Device replacement without swap medium Yes - Send cycles 250 µs, 500 µs, 1 ms, 2 ms, 4 ms - Updating time 250 µs, 500 µs, 1 ms, 2 ms, 4 ms - Updating time 250 µs to 512 ms, minimum value depends on the number of configured user data and the configured single or redundant mode Address area 250 µs to 512 ms, minimum value depends on the number of configured user data and the configured single or redundant mode Address area 8 kbyte - User data consistency, max. 1 024 byte Open IE communication 46 • Local port numbers used at the system end 0, 20, 21, 25, 102, 135, 161, 34962, 34963, 34964, 65532, 65533, 65534,	PROFINET IO Controller	
	Transmission rate, max.	100 Mbit/s
	Services	
— Isochronous modeNo— Shared deviceYes; Single mode only— Prioritized startupNo— Number of connectable IO Devices, max.256; In redundant mode via both interfaces— Number of connectable IO Devices for RT, max.256— of which in line, max.256— of which in line, max.256— Activation/deactivation of IO DevicesNo— IO Devices changing during operation (partner ports), supportedNo— Device replacement without swap mediumYes— Send cycles250 µs, 500 µs, 1 ms, 2 ms, 4 ms— Updating time250 µs to 512 ms, minimum value depends on the number of configured user data and the configured single or redundant modeAddress area8 kbyte— Upduts, max.8 kbyte— Outputs, max.1024 byte— User data consistency, max.46— Number of connections, max.46— Local port numbers used at the system end0, 20, 21, 25, 102, 135, 161, 34962, 34963, 34964, 65532, 65533, 65534,	— PG/OP communication	Yes
- Shared deviceYes; Single mode only- Prioritized startupNo- Number of connectable IO Devices, max.256; In redundant mode via both interfaces- Number of connectable IO Devices for RT, max.256- of which in line, max.256- of which in line, max.256- Activation/deactivation of IO DevicesNo- IO Devices changing during operation (partner ports), supportedNo- Device replacement without swap mediumYes- Send cycles250 µs, 500 µs, 1 ms, 2 ms, 4 ms- Updating time250 µs to 512 ms, minimum value depends on the number of configured user data and the configured single or redundant modeAddress area1024 byte- Inputs, max.8 kbyte- User data consistency, max.1024 byteOpen IE communication46- Number of connections, max.46- Local port numbers used at the system end0, 20, 21, 25, 102, 135, 161, 34962, 34963, 34964, 65532, 65533, 65534,	— S7 communication	Yes
 Prioritized startup No Number of connectable IO Devices, max. Start and the configured startup No Number of connectable IO Devices for RT, max. Start and the configured start and the configured single or redundant mode Start and the configured single or redundant mode Address area Start and the configured single or redundant mode Start and the configured single or redundant mode	 — Isochronous mode 	No
 Number of connectable IO Devices, max. Number of connectable IO Devices for RT, max. of which in line, max. Activation/deactivation of IO Devices No IO Devices changing during operation (partner ports), supported Device replacement without swap medium Send cycles Updating time Ves Ves Updating time So 512 ms, minimum value depends on the number of configured user data and the configured single or redundant mode No the configured single or redundant mode No the configured of the configured user data and the configured single or redundant mode Outputs, max. No the configured single or redundant mode No the configured user data consistency, max. No the configured to the configured to the configured user to the configured to the configured to the configured to the configured user data and the configured single or redundant mode Open IE communication Number of connections, max. Local port numbers used at the system end O, 20, 21, 25, 102, 135, 161, 34962, 34963, 34964, 65532, 65533, 65534, 	— Shared device	Yes; Single mode only
 Number of connectable IO Devices for RT, max. of which in line, max. Activation/deactivation of IO Devices Activation/deactivation of IO Devices IO Devices changing during operation (partner ports), supported Device replacement without swap medium Send cycles Updating time Ves Updating time So µs, 500 µs, 1 ms, 2 ms, 4 ms Updating time So µs to 512 ms, minimum value depends on the number of configured user data and the configured single or redundant mode Address area Inputs, max. Notype Outputs, max. User data consistency, max. 1024 byte Open IE communication Number of connections, max. Local port numbers used at the system end 0, 20, 21, 25, 102, 135, 161, 34962, 34963, 34964, 65532, 65533, 65534, 	— Prioritized startup	No
- of which in line, max.256- Activation/deactivation of IO DevicesNo- IO Devices changing during operation (partner ports), supportedNo- Device replacement without swap mediumYes- Device replacement without swap mediumYes- Send cycles250 µs, 500 µs, 1 ms, 2 ms, 4 ms- Updating time250 µs to 512 ms, minimum value depends on the number of configured user data and the configured single or redundant modeAddress area Inputs, max.8 kbyte- Outputs, max.1 024 byte- User data consistency, max.1 024 byteOpen IE communication46• Number of connections, max.46• Local port numbers used at the system end0, 20, 21, 25, 102, 135, 161, 34962, 34964, 65532, 65533, 65534,	 — Number of connectable IO Devices, max. 	256; In redundant mode via both interfaces
 Activation/deactivation of IO Devices IO Devices changing during operation (partner ports), supported Device replacement without swap medium Send cycles Ves Updating time 250 µs , 500 µs , 1 ms, 2 ms, 4 ms 250 µs to 512 ms, minimum value depends on the number of configured user adta and the configured single or redundant mode Address area Inputs, max. No Outputs, max. User data consistency, max. User data consistency, max. No No No Subset of connections, max. Local port numbers used at the system end 0, 20, 21, 25, 102, 135, 161, 34962, 34964, 65532, 65533, 65534, 	 — Number of connectable IO Devices for RT, max. 	256
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ports), supportedYes— Device replacement without swap mediumYes— Send cycles250 µs, 500 µs, 1 ms, 2 ms, 4 ms— Updating time250 µs to 512 ms, minimum value depends on the number of configured user data and the configured single or redundant modeAddress area-— Inputs, max.8 kbyte— Outputs, max.8 kbyte— User data consistency, max.1 024 byteOpen IE communication46• Number of connections, max.0, 20, 21, 25, 102, 135, 161, 34962, 34963, 34964, 65532, 65533, 65534,	 Activation/deactivation of IO Devices 	No
- Device replacement without swap mediumYes- Send cycles250 µs, 500 µs, 1 ms, 2 ms, 4 ms- Updating time250 µs to 512 ms, minimum value depends on the number of configured user data and the configured single or redundant modeAddress area Inputs, max.8 kbyte- Outputs, max.8 kbyte- User data consistency, max.1 024 byteOpen IE communication46• Number of connections, max.0, 20, 21, 25, 102, 135, 161, 34962, 34963, 34964, 65532, 65533, 65534,		No
Send cycles250 µs, 500 µs, 1 ms, 2 ms, 4 ms Updating time250 µs to 512 ms, minimum value depends on the number of configured user data and the configured single or redundant modeAddress area Inputs, max.8 kbyte Outputs, max.8 kbyte User data consistency, max.1 024 byteOpen IE communication46 Number of connections, max.0, 20, 21, 25, 102, 135, 161, 34962, 34963, 34964, 65532, 65533, 65534,		
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Address area — Inputs, max. 8 kbyte — Outputs, max. 8 kbyte — User data consistency, max. 1 024 byte Open IE communication 46 • Local port numbers used at the system end 0, 20, 21, 25, 102, 135, 161, 34962, 34963, 34964, 65532, 65533, 65534,		
Address area — Inputs, max. 8 kbyte — Outputs, max. 8 kbyte — User data consistency, max. 1 024 byte Open IE communication 46 • Local port numbers used at the system end 0, 20, 21, 25, 102, 135, 161, 34962, 34963, 34964, 65532, 65533, 65534,	— Updating time	250 µs to 512 ms, minimum value depends on the number of configured user data and the configured single or redundant mode
— Inputs, max. 8 kbyte — Outputs, max. 8 kbyte — User data consistency, max. 1 024 byte Open IE communication 46 • Number of connections, max. 46 • Local port numbers used at the system end 0, 20, 21, 25, 102, 135, 161, 34962, 34963, 34964, 65532, 65533, 65534,	Address area	
- Outputs, max. 8 kbyte - User data consistency, max. 1 024 byte Open IE communication 6 • Number of connections, max. 46 • Local port numbers used at the system end 0, 20, 21, 25, 102, 135, 161, 34962, 34963, 34964, 65532, 65533, 65534,		8 kbyte
— User data consistency, max. 1 024 byte Open IE communication 46 • Number of connections, max. 46 • Local port numbers used at the system end 0, 20, 21, 25, 102, 135, 161, 34962, 34963, 34964, 65532, 65533, 65534,	-	•
Open IE communication • Number of connections, max. • Local port numbers used at the system end 0, 20, 21, 25, 102, 135, 161, 34962, 34963, 34964, 65532, 65533, 65534,	-	•
• Number of connections, max. 46 • Local port numbers used at the system end 0, 20, 21, 25, 102, 135, 161, 34962, 34963, 34964, 65532, 65533, 65534,		
• Local port numbers used at the system end 0, 20, 21, 25, 102, 135, 161, 34962, 34963, 34964, 65532, 65533, 65534,	•	46
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Keep-alive function, supported	Yes
3. Interface	
Interface type	PROFIBUS DP
Interface types	
• RS 485	Yes
 Output current of the interface, max. 	150 mA
Protocols	
PROFIBUS DP master	Yes
PROFIBUS DP device	No
PROFIBUS DP master	
 Number of connections, max. 	16
 Transmission rate, max. 	12 Mbit/s
 max. number of DP devices 	64
Services	
— PG/OP communication	Yes
— Routing	Yes
— Global data communication	No
 — S7 basic communication 	No
— S7 communication	Yes
- S7 communication, as client	Yes
 — S7 communication, as server 	Yes
— Equidistance	No
— Isochronous mode	No
- SYNC/FREEZE	No
 activation/deactivation of DP devices 	No
 — Direct data exchange (slave-to-slave communication) 	No
— DPV0	Yes
— DPV1	Yes
Address area	
— Inputs, max.	4 kbyte
— Outputs, max.	4 kbyte
User data per DP slave	
— user data per DP device, max.	244 byte
— Inputs, max.	244 byte
— Outputs, max.	244 byte
— Slots, max.	244
— per slot, max.	128 byte
4. Interface	
Interface type	Pluggable synchronization submodule (FO)
Plug-in interface modules	Synchronization modules 6ES7960-1AA06-0XA0 or 6ES7960-1AB06-0XA0
5. Interface	
Interface type	Pluggable synchronization submodule (FO)
Plug-in interface modules	Synchronization modules 6ES7960-1AA06-0XA0 or 6ES7960-1AB06-0XA0
Protocols	
Redundancy mode	
Media redundancy	
 — Switchover time on line break, typ. 	200 ms
 Number of stations in the ring, max. 	50
SIMATIC communication	
S7 routing	Yes
Open IE communication	
• TCP/IP	Yes; via integrated PROFINET interface and loadable FBs
 Number of connections, max. 	46
— Data length, max.	32 kbyte
 — several passive connections per port, supported 	Yes
ISO-on-TCP (RFC1006)	Yes; Via integrated PROFINET interface or CP 443-1 and loadable FBs
 Number of connections, max. 	46
— Data length, max.	32 kbyte; 1 452 bytes via CP 443-1 Adv.
• UDP	Yes; via integrated PROFINET interface and loadable FBs
 — Number of connections, max. 	46

— Data length, max.	1 472 byte
Web server	
supported	No
Isochronous mode	
Equidistance	No
communication functions / header	
PG/OP communication	Yes
 Number of connectable OPs without message processing 	47
Number of connectable OPs with message processing	47; When using Alarm_S/SQ and Alarm_D/DQ
Data record routing	Yes
Global data communication	
supported	No
S7 basic communication	
supported	No
S7 communication	
 supported 	Yes
• as server	Yes
• as client	Yes
 User data per job, max. 	64 kbyte
 User data per job (of which consistent), max. 	462 byte; 1 variable
S5 compatible communication	
 supported 	Yes; (via CP max. 10 and FC AG_SEND and FC AG_RECV)
 User data per job, max. 	8 kbyte
 User data per job (of which consistent), max. 	240 byte
Number of simultaneous AG-SEND/AG-RECV orders per	64/64
CPU, max.	
Standard communication (FMS)	Vee: Vie CD and leadable ED
supported Number of connections	Yes; Via CP and loadable FB
overall	48
usable for PG communication	+0
reserved for PG communication	1
— adjustable for PG communication, max.	0
usable for OP communication	0
— reserved for OP communication	1
— adjustable for OP communication, max.	0
usable for S7 basic communication	•
 — reserved for S7 basic communication 	0
— adjustable for S7 basic communication, max.	0
usable for S7 communication	
- reserved for S7 communication	0
- adjustable for S7 communication, max.	0
usable for routing	
— reserved for routing	0
— adjustable for routing, max.	0
S7 message functions	
Number of login stations for message functions, max.	47; Max. 47 with Alarm_S/SQ and Alarm_D/DQ (OPs); max. 8 with Alarm, Alarm_8, Alarm_8P, Notify and Notify_8 (e.g. WinCC)
Symbol-related messages	No
SCAN procedure	No
Program alarms	Yes
Process diagnostic messages	Yes
simultaneously active Alarm-S blocks, max.	250; Simultaneously active alarm_S/SQ blocks or alarm_D/DQ blocks
Alarm 8-blocks	Yes
 Number of instances for alarm 8 and S7 communication blocks, max. 	600
• preset, max.	300
Process control messages	Yes
Number of archives that can log on simultaneously (SFB 37 AR_SEND)	16
Test commissioning functions	
Status block	Yes

Single step	Yes
Number of breakpoints	16
Status/control	
Status/control variable	Yes; Up to 16 variable tables
Variables	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters
Number of variables, max.	70
Forcing	10
• Forcing	Yes
Forcing, variables	Inputs/outputs, bit memories, distributed I/Os
Number of variables, max.	256
Diagnostic buffer	200
• present	Yes
Number of entries, max.	3 200
— adjustable	Yes
— preset	120
Service data	120
• can be read out	Yes
EMC	1 65
Emission of radio interference acc. to EN 55 011	
Limit class A, for use in industrial areas	Yes
	No
Limit class B, for use in residential areas configuration / header	
configuration / header	
Configuration software	Vec
• STEP 7	Yes
configuration / programming / header	ene instruction list
Command set	see instruction list
Nesting levels	7
Access to consistent data in process image	Yes
• System functions (SFC)	see instruction list
System function blocks (SFB)	see instruction list
Programming language	N
— LAD	Yes
— FBD	Yes
— STL	Yes
— SCL	Yes
- CFC	Yes
— GRAPH	Yes
— HiGraph®	Yes
configuration / programming / number of simultaneously activ	
- RD_REC	8
- WR_REC	8
- WR_PARM	8
- PARM_MOD	1
- WR_DPARM	2
— DPNRM_DG	8
- RDSYSST	8
- DP_TOPOL	1
configuration / programming / number of simultaneously activ	
- RDREC	8
— WRREC	8
Know-how protection	
User program protection/password protection	Yes
Block encryption	Yes; With S7 block Privacy
Dimensions	
Width	50 mm
Height	290 mm
Depth	219 mm
Weights	
Weight, approx.	995 g
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