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 μΑ
Backup time, max.	Dealt with in the module data manual with the secondary conditions and the factors of influence
 Feeding of external backup voltage to CPU 	5 V DC to 15 V DC
CPU processing times	0.720.0.10.720
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
ОВ	
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
	OFF
• Type	SFB
Number	SFB Unlimited (limited only by RAM capacity)
Number S7 times	Unlimited (limited only by RAM capacity)
Number S7 times Number	
Number S7 times Number Retentivity	Unlimited (limited only by RAM capacity) 2 048
Number S7 times Number Retentivity — adjustable	Unlimited (limited only by RAM capacity) 2 048 Yes
Number S7 times Number Retentivity — adjustable — preset	Unlimited (limited only by RAM capacity) 2 048
Number S7 times Number Retentivity adjustable preset Time range	Unlimited (limited only by RAM capacity) 2 048 Yes No times retentive
 Number S7 times Number Retentivity — adjustable — preset Time range — lower limit 	Unlimited (limited only by RAM capacity) 2 048 Yes No times retentive 10 ms
 Number S7 times Number Retentivity — adjustable — preset Time range — lower limit — upper limit 	Unlimited (limited only by RAM capacity) 2 048 Yes No times retentive
Number S7 times Number Retentivity adjustable preset Time range lower limit upper limit IEC timer	Unlimited (limited only by RAM capacity) 2 048 Yes No times retentive 10 ms 9 990 s
● Number S7 times ● Number Retentivity — adjustable — preset Time range — lower limit — upper limit IEC timer ● present	Unlimited (limited only by RAM capacity) 2 048 Yes No times retentive 10 ms 9 990 s Yes
 Number S7 times Number Retentivity — adjustable — preset Time range — lower limit — upper limit IEC timer present Type 	Unlimited (limited only by RAM capacity) 2 048 Yes No times retentive 10 ms 9 990 s Yes SFB
● Number S7 times ● Number Retentivity — adjustable — preset Time range — lower limit — upper limit IEC timer ● present	Unlimited (limited only by RAM capacity) 2 048 Yes No times retentive 10 ms 9 990 s Yes

Flag	0.400 h. t-
• 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
Hardware configuration	
Number of expansion units, max.	21
connectable OPs	47
Multicomputing	No
Interface modules	
Number of connectable IMs (total), max.	6
Number of connectable IM 460s, max.	6
Number of connectable IM 463s, max.	4; Single mode only
Number of DP masters	, . , ,
• integrated	2
• via CP	10; CP 443-5 Extended
Mixed mode IM + CP permitted	No
via interface module	0
Number of IO Controllers	
Number of IO Controllers • integrated	1
• integrated	1
integrated via CP	1 0
• integrated	0
 integrated via CP Number of operable FMs and CPs (recommended) 	
 integrated via CP Number of operable FMs and CPs (recommended) 	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
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Coperating house souther	Deviation per day (unbuffered), max.	8.6 s; Power on
Number 16		0.0 0,1 0.00 0.11
Number/furniber range Range of values SFCs. 2, 3 and 4:0 to 32767 hours SFC 101: 0 to 2*31-1 hours SFCs. 2, 3 and 4:0 to 32767 hours SFC 101: 0 to 2*31-1 hours SFCs. 2, 3 and 4:0 to 32767 hours SFC 101: 0 to 2*31-1 hours setartive Ves vicentive Ves vicentive Ves vicentive Ves vicentive Ves vicentive	_ · _ ·	16
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Ferentive Yes Clock synchronization Supported Yes In MPI, master In MPI, fevice Yes In DP, master In AS, device In AS, master In AS, device In AS, device In AS, master In AS, device In AS, master In AS, device In AS, master In AS, device In AS, device In AS, master In AS, device In AS, device AS, defert In AS, device AS, def	-	
Clock synchronization • supported • to MPI, master • to MPI, master • to MPI, device • to DP, master • to DP, device •	•	
*supported * to MPI, master * to MPI, master * to MPI, device * to DP, master * to SP, device * in AS, master * in AS, device * on Efferent via NTP * Yes, As client **Time difference in system when synchronizing via * Efferent, max. * MPI, max. * DO ms **Interfaces **Number of RS 485 interfaces **Number of RS 485 interfaces **Number of RS 485 interfaces **Optical interface **Optical interface **Optical interface **Optical interface **Optical interface type **Soluted **Ves **Interface type **Soluted **Ves **Interface type **Soluted **Ves **Output current of the interface, max. **Interface type **NeTPOORIBUS DP master **PROFIBUS DP master **PROFIBUS DP device **No **MPI **Number of connections **Tamansission rate, max. **Tamansission rate, max. **Jumber of Connections **Tamansission rate, max. **PROFIBUS DP master **PROFIBUS DP master **To communication **No **Soluting **To communication, as client **Soft communication **No **To smarssission rate, max. **Number of connections, max. **Jumber of connections, max.		165
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• to DP, master • on DP, device • in AS, master • in AS, device • on Ethernet via NTP Time difference in system when synchronizing via • Ethernet, max. • Ethernet, max. • MPI, max Interfaces Interface Interface type		
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- S7 basic communication Yes - 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 Yes - S7 communication, as client Yes	<u> </u>	Yes
- S7 communication Yes - S7 communication, as client Yes - S7 communication, as server Yes PROFIBUS DP master • Number of connections, max. • Transmission rate, max. • max. number of DP devices Services - PG/OP communication - Routing - Global data communication - S7 basic communication - S7 communication - S7 communication, as client Yes - Yes - S7 communication, as client Yes - S7 communication, as client Yes - Yes - S7 communication, as client Yes - Yes - S7 communication, as client Yes	 Global data communication 	No
- S7 communication, as client - 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. max. number of DP devices Services - PG/OP communication - Routing - Global data communication - S7 basic communication - S7 communication, as client Yes Yes Yes	 S7 basic communication 	No
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 22 Services PG/OP communication Routing Global data communication S7 basic communication S7 basic communication S7 communication Yes Yes Yes Yes Yes Yes Yes Ye		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 Routing Global data communication S7 basic communication No S7 communication Yes S7 communication, as client Yes	 S7 communication, as client 	Yes
 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. Mbit/s max. number of DP devices Services — PG/OP communication — Routing — Global data communication — S7 basic communication — S7 communication — S7 communication, as client Yes 	— S7 communication, as server	Yes
resources on the line is reduced by 1 Transmission rate, max. max. number of DP devices Services PG/OP communication Routing Global data communication S7 basic communication No S7 communication Yes	PROFIBUS DP master	
 Transmission rate, max. max. number of DP devices Services — PG/OP communication — Routing — Global data communication — S7 basic communication — S7 communication, as client 	 Number of connections, max. 	
 max. number of DP devices Services — PG/OP communication — Routing — Global data communication — S7 basic communication — S7 communication, as client Yes 		·
Services - PG/OP communication Yes - Routing Yes - Global data communication No - S7 basic communication No - S7 communication Yes - S7 communication Yes - S7 communication, as client Yes		
 — PG/OP communication — Routing — Global data communication — S7 basic communication — S7 communication — S7 communication — S7 communication — Yes — S7 communication, as client Yes 		32
 Routing Global data communication S7 basic communication No S7 communication Yes S7 communication, as client Yes 		
 Global data communication S7 basic communication No S7 communication Yes S7 communication, as client Yes 		
 S7 basic communication S7 communication S7 communication Yes Yes 	-	
— S7 communication— S7 communication, as clientYes		No
— S7 communication, as client Yes	— S7 basic communication	
	— S7 communication	
	 S7 communication, as client 	Yes
— S7 communication, as server	 S7 communication, as server 	Yes
— Equidistance No	— Equidistance	No
— Isochronous mode No	— Isochronous mode	No
— SYNC/FREEZE No		No

	N.
activation/deactivation of DP devices	No
 — Direct data exchange (slave-to-slave communication) 	No
— DPV1	Yes
Address area	Tes
	2 kbyte
— Inputs, max.	
— Outputs, max.	2 kbyte
User data per DP device	044 h. 4-
— user data per DP device, max.	244 byte
— Inputs, max.	244 byte
— Outputs, max.	244 byte
— Slots, max.	244
— per slot, max.	128 byte
1st interface / PROFIBUS DP device / header	N C C CON DD I
Number of connections	No configuration of CPU as DP slave
2. Interface	
Interface type	PROFINET
Isolated	Yes
automatic detection of transmission rate	Yes; Autosensing
Autonegotiation	Yes
Autocrossing	Yes
Change of IP address at runtime, supported	No
Interface types	
• RJ 45 (Ethernet)	Yes
 Number of ports 	2
integrated switch	Yes
Protocols	
PROFINET IO Controller	Yes
PROFINET IO Device	No
PROFINET CBA	No
 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	
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
 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	$250~\mu s$ 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
— User data consistency, max.	1 024 byte
Open IE communication	
 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,
	65535

Keep-alive function, supported	Yes
3. Interface	
Interface type	PROFIBUS DP
Interface types	1 101 1003 01
• RS 485	Yes
	150 mA
Output current of the interface, max. Protocols	150 IIIA
Protocols	Voc
PROFIBUS DP master PROFIBUS DP devices	Yes
PROFIBUS DP device	No
PROFIBUS DP master	40
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 device	
 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	Gymenionization modules of 57300-18400-0840 of 0557300-14600-0840
Redundancy mode	
Media redundancy	000
Switchover time on line break, typ.	200 ms
— Number of stations in the ring, max.	50
SIMATIC communication	N.
• S7 routing	Yes
Open IE communication	V
• 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 with message processing 	47; When using Alarm_S/SQ and Alarm_D/DQ
 Number of connectable OPs without message processing 	47
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)	V V 00 11 111 50
• supported	Yes; Via CP and loadable FB
Number of connections	40
• overall	48
usable for PG communication	4
— reserved for PG communication	1
— adjustable for PG communication, max.	0
 usable for OP communication reserved for OP communication 	4
adjustable for OP communication, max.	1
usable for S7 basic communication	O
reserved for S7 basic communication	0
adjustable for S7 basic communication, max.	0
usable for S7 communication	O
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

Cinale sten	Voe
Single step	Yes
Number of breakpoints	16
Status/control	Van Hata 40 variable tables
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	
• Forcing	Yes
Forcing, variables	Inputs/outputs, bit memories, distributed I/Os
Number of variables, max.	256
Diagnostic buffer	V
• present	Yes
Number of entries, max.	3 200
— adjustable	Yes
— preset	120
Service data	
• can be read out	Yes
EMC	
Emission of radio interference acc. to EN 55 011	
Limit class A, for use in industrial areas	Yes
Limit class B, for use in residential areas	No
configuration / header	
Configuration software	
• STEP 7	Yes
configuration / programming / header	
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	
— LAD	Yes
— FBD	Yes
— STL	Yes
— SCL	Yes
— CFC	Yes
— GRAPH	Yes
— HiGraph®	Yes
configuration / programming / number of simultaneously activ	ve SFC / header
— 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	ve SFB / header
— 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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