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 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
— lower limit	0
— upper limit	2 047
— 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	
● Number	2 048
Retentivity	
— adjustable	Yes
— lower limit	0
— upper limit	2 047
— preset	No times retentive
Time range	
— lower limit	10 ms
— upper limit	9 990 s

IEC timer	
● present	Yes
● Type	SFB
● Number	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)
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

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	
● integrated	1
● via CP	0
Number of operable FMs and CPs (recommended)	
● FM	See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections
● CP, PtP	See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections
● PROFIBUS and Ethernet CPs	14; Of which max. 10 CP as DP master
Slots	

● required slots	2

Time of day

Clock

● Hardware clock (real-time)	Yes
● retentive and synchronizable	Yes
● Resolution	1 ms
● Deviation per day (buffered), max.	1.7 s; Power off
● Deviation per day (unbuffered), max.	8.6 s; Power on

Operating hours counter

● Number	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	1 h
● retentive	Yes

Clock synchronization

● supported	Yes
● to MPI, master	Yes
● to MPI, slave	Yes
● to DP, master	Yes
● to DP, slave	Yes
● in AS, master	Yes
● in AS, slave	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 slave	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
● Number of DP slaves, max.	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
— Isochronous mode	No
— SYNC/FREEZE	No
— Activation/deactivation of DP slaves	No
— Direct data exchange (slave-to-slave communication)	No
— DPV1	Yes
Address area	
— Inputs, max.	2 kbyte
— Outputs, max.	2 kbyte
User data per DP slave	
— User data per DP slave, max.	244 byte
— Inputs, max.	244 byte
— Outputs, max.	244 byte
— Slots, max.	244
— per slot, max.	128 byte
PROFIBUS DP slave	
● 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
Number of connection resources	48
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 slave	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 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
— 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
Number of connection resources		16
Interface types		
● RS 485		Yes
● Output current of the interface, max.		150 mA
Protocols		
● PROFIBUS DP master		Yes
● PROFIBUS DP slave		No
PROFIBUS DP master		
● Number of connections, max.		16
● Transmission rate, max.		12 Mbit/s
● Number of DP slaves, max.		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 slaves		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 slave, 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
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	
● Forcing	Yes
● Forcing, variables	Inputs/outputs, bit memories, distributed I/Os
● Number of variables, max.	256
Diagnostic buffer	
● 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
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

last modified:	7/28/2021 [↗]