

SIPLUS S7-400 CPU 412-5H -25...+70°C with conformal coating based on 6ES7412-5HK06-0AB0 . 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)



Figure similar

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)	
• 24 V DC	No; 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 FEPRM	Yes; with Memory Card (FLASH)
• expandable FEPRM, 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 μ A; Valid up to 40°C
• Backup current, max.	1 000 μ A
• 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 in total	Total working and load memory (with backup battery)
Flag	
• Number, 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	
<ul style="list-style-type: none"> Number of connectable IMs (total), max. 	6
<ul style="list-style-type: none"> Number of connectable IM 460s, max. 	6
<ul style="list-style-type: none"> Number of connectable IM 463s, max. 	4; Single mode only
Number of DP masters	
<ul style="list-style-type: none"> integrated 	2
<ul style="list-style-type: none"> via CP 	10; CP 443-5 Extended
<ul style="list-style-type: none"> Mixed mode IM + CP permitted 	No
<ul style="list-style-type: none"> via interface module 	0
Number of IO Controllers	
<ul style="list-style-type: none"> integrated 	1
<ul style="list-style-type: none"> via CP 	0
Number of operable FMs and CPs (recommended)	
<ul style="list-style-type: none"> FM 	See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections
<ul style="list-style-type: none"> CP, PtP 	See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections
<ul style="list-style-type: none"> PROFIBUS and Ethernet CPs 	14; Of which max. 10 CP as DP master
Slots	
<ul style="list-style-type: none"> required slots 	2
Time of day	
Clock	
<ul style="list-style-type: none"> Hardware clock (real-time) 	Yes
<ul style="list-style-type: none"> retentive and synchronizable 	Yes
<ul style="list-style-type: none"> Resolution 	1 ms
<ul style="list-style-type: none"> Deviation per day (buffered), max. 	1.7 s; Power off
<ul style="list-style-type: none"> Deviation per day (unbuffered), max. 	8.6 s; Power on
Operating hours counter	
<ul style="list-style-type: none"> Number 	16
<ul style="list-style-type: none"> Number/Number range 	0 to 15
<ul style="list-style-type: none"> Range of values 	SFCs 2, 3 and 4: 0 to 32767 hours SFC 101: 0 to 2 ³¹ - 1 hours
<ul style="list-style-type: none"> Granularity 	1 h
<ul style="list-style-type: none"> retentive 	Yes
Clock synchronization	
<ul style="list-style-type: none"> supported 	Yes
<ul style="list-style-type: none"> to MPI, master 	Yes
<ul style="list-style-type: none"> to MPI, slave 	Yes
<ul style="list-style-type: none"> 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	Integrated
Physics	RS 485 / PROFIBUS + MPI
Isolated	Yes
Power supply to interface (15 to 30 V DC), 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
Physics	Ethernet RJ45
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

• 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 routing	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	Integrated
Physics	RS 485 / PROFIBUS
Power supply to interface (15 to 30 V DC), max.	150 mA
Number of connection resources	16
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
Communication functions	
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 CPU, max.	64/64
Standard communication (FMS)	

• supported	Yes; Via CP and loadable FB
Number of connections	
• overall	48
• usable for PG communication	
— reserved for PG communication	1
— adjustable for PG communication, max.	0
• usable for OP communication	
— 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

<ul style="list-style-type: none"> • Variables 	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters
<ul style="list-style-type: none"> • Number of variables, max. 	70
Forcing	
<ul style="list-style-type: none"> • Forcing 	Yes
<ul style="list-style-type: none"> • Forcing, variables 	Inputs/outputs, bit memories, distributed I/Os
<ul style="list-style-type: none"> • Number of variables, max. 	256
Diagnostic buffer	
<ul style="list-style-type: none"> • present 	Yes
<ul style="list-style-type: none"> • Number of entries, max. 	3 200
<ul style="list-style-type: none"> — adjustable 	Yes
<ul style="list-style-type: none"> — preset 	120
Service data	
<ul style="list-style-type: none"> • can be read out 	Yes
EMC	
Emission of radio interference acc. to EN 55 011	
<ul style="list-style-type: none"> • Limit class A, for use in industrial areas 	Yes
<ul style="list-style-type: none"> • Limit class B, for use in residential areas 	No
Standards, approvals, certificates	
CE mark	Yes
Ambient conditions	
Ambient temperature during operation	
<ul style="list-style-type: none"> • min. 	-25 °C; = Tmin
<ul style="list-style-type: none"> • max. 	70 °C; = Tmax; @ 60°C for UL/ATEX/FM and safety-related application
Ambient temperature during storage/transportation	
<ul style="list-style-type: none"> • min. 	-40 °C
<ul style="list-style-type: none"> • max. 	70 °C
Altitude during operation relating to sea level	
<ul style="list-style-type: none"> • Installation altitude above sea level, max. 	5 000 m
<ul style="list-style-type: none"> • Ambient air temperature-barometric pressure-altitude 	Tmin ... Tmax at 1 140 hPa ... 795 hPa (-1 000 m ... +2 000 m) // Tmin ... (Tmax - 10 K) at 795 hPa ... 658 hPa (+2 000 m ... +3 500 m) // Tmin ... (Tmax - 20 K) at 658 hPa ... 540 hPa (+3 500 m ... +5 000 m); with "F-System" applications max. +2 000 m above sea level permissible
Relative humidity	
<ul style="list-style-type: none"> • With condensation, tested in accordance with IEC 60068-2-38, max. 	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)
Resistance	
Use in stationary industrial systems	
<ul style="list-style-type: none"> — to biologically active substances according to EN 60721-3-3 	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna); Class 3B3 on request

— to chemically active substances according to EN 60721-3-3	Yes; Class 3C4 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *
— to mechanically active substances according to EN 60721-3-3	Yes; Class 3S4 incl. sand, dust, *
Use on ships/at sea	
— to biologically active substances according to EN 60721-3-6	Yes; Class 6B2 mold and fungal spores (excluding fauna); Class 6B3 on request
— to chemically active substances according to EN 60721-3-6	Yes; Class 6C3 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *
— to mechanically active substances according to EN 60721-3-6	Yes; Class 6S3 incl. sand, dust; *
Usage in industrial process technology	
— Against chemically active substances acc. to EN 60654-4	Yes; Class 3 (excluding trichlorethylene)
— Environmental conditions for process, measuring and control systems acc. to ANSI/ISA-71.04	Yes; Level GX group A/B (excluding trichlorethylene; harmful gas concentrations up to the limits of EN 60721-3-3 class 3C4 permissible); level LC3 (salt spray) and level LB3 (oil)
Remark	
— Note regarding classification of environmental conditions acc. to EN 60721, EN 60654-4 and ANSI/ISA-71.04	* The supplied plug covers must remain in place over the unused interfaces during operation!
Conformal coating	
• Coatings for printed circuit board assemblies acc. to EN 61086	Yes; Class 2 for high reliability
• Protection against fouling acc. to EN 60664-3	Yes; Type 1 protection
• Military testing according to MIL-I-46058C, Amendment 7	Yes; Discoloration of coating possible during service life
• Qualification and Performance of Electrical Insulating Compound for Printed Board Assemblies according to IPC-CC-830A	Yes; Conformal coating, Class A
Configuration	
Configuration software	
• STEP 7	Yes
Programming	
• 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
Number of simultaneously active SFCs	
— RD_REC	8
— WR_REC	8
— WR_PARM	8
— PARM_MOD	1
— WR_DPARM	2
— DPNRM_DG	8
— RDSYSST	8
— DP_TOPOL	1
Number of simultaneously active SFBs	
— 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
last modified:	10/09/2020