



SIPLUS S7-400 CPU 416-5H based on 6ES7416-5HS06-0AB0 with conformal coating, -25...+70 °C, central processing unit for S7-400H and S7-400F/FH, 5 interfaces: 1x MPI/DP, 1x DP, 1x PN and 2 for SYNC modules, 16 MB memory (512 KB data/512 KB program)

Figure similar

General information	
Product type designation	CPU 416-5H PN/DP
HW functional status	1
Firmware version	V6.0
based on	6ES7416-5HS06-0AB0
Product function	
<ul style="list-style-type: none"> • Isochronous mode 	No
Engineering with	
<ul style="list-style-type: none"> • 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
Storage	
Type of memory	RAM
Work memory	
<ul style="list-style-type: none"> • integrated 	16 Mbyte
<ul style="list-style-type: none"> • integrated (for program) 	6 kbyte
<ul style="list-style-type: none"> • integrated (for data) 	10 kbyte
<ul style="list-style-type: none"> • expandable 	No
Load memory	
<ul style="list-style-type: none"> • expandable FEPR0M 	Yes; with Memory Card (FLASH)
<ul style="list-style-type: none"> • expandable FEPR0M, max. 	64 Mbyte
<ul style="list-style-type: none"> • integrated RAM, max. 	1 Mbyte
<ul style="list-style-type: none"> • expandable RAM 	Yes
<ul style="list-style-type: none"> • expandable RAM, max. 	64 Mbyte
Backup	
<ul style="list-style-type: none"> • present 	Yes
<ul style="list-style-type: none"> • with battery 	Yes; all data
<ul style="list-style-type: none"> • without battery 	No

Battery	
Backup battery	
<ul style="list-style-type: none"> • Backup current, typ. • Backup current, max. • Backup time, max. 	180 μ A; Valid up to 40°C 1 000 μ A Dealt with in the module data manual with the secondary conditions and the factors of influence
<ul style="list-style-type: none"> • Feeding of external backup voltage to CPU 	5 V DC to 15 V DC
CPU processing times	
for bit operations, typ.	12.5 ns
for word operations, typ.	12.5 ns
for fixed point arithmetic, typ.	12.5 ns
for floating point arithmetic, typ.	25 ns
CPU-blocks	
DB	
<ul style="list-style-type: none"> • Number, max. • Size, max. 	16 000; Number range: 1 to 16000 64 kbyte
FB	
<ul style="list-style-type: none"> • Number, max. • Size, max. 	8 000; Number range: 0 to 7999 64 kbyte
FC	
<ul style="list-style-type: none"> • Number, max. • Size, max. 	8 000; Number range: 0 to 7999 64 kbyte
OB	
<ul style="list-style-type: none"> • Number, max. • Size, max. • Number of free cycle OBs • Number of time alarm OBs • Number of delay alarm OBs • Number of cyclic interrupt OBs • Number of process alarm OBs • Number of DPV1 alarm OBs • Number of startup OBs • Number of asynchronous error OBs • Number of synchronous error OBs 	see instruction list 64 kbyte 1; OB 1 8; OB 10-17 4; OB 20-23 9; OB 30-38 8; OB 40-47 3; OB 55-57 2; OB 100, 102 9; OB 80-88 2; OB 121, 122
Nesting depth	
<ul style="list-style-type: none"> • per priority class • additional within an error OB 	24 2
Counters, timers and their retentivity	
S7 counter	
<ul style="list-style-type: none"> • Number 	2 048
Retentivity	
<ul style="list-style-type: none"> — can be set — preset 	Yes Z 0 to Z 7
Counting range	
<ul style="list-style-type: none"> — lower limit — upper limit 	0 999
IEC counter	
<ul style="list-style-type: none"> • present • Type • Number 	Yes SFB Unlimited (limited only by RAM capacity)
S7 timer	
<ul style="list-style-type: none"> • Number 	2 048
Retentivity	
<ul style="list-style-type: none"> — adjustable — preset 	Yes No times retentive
Time range	
<ul style="list-style-type: none"> — lower limit — upper limit 	10 ms 9 990 s
IEC timer	

<ul style="list-style-type: none"> • present 	Yes
<ul style="list-style-type: none"> • Type 	SFB
<ul style="list-style-type: none"> • 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	
<ul style="list-style-type: none"> • Size, max. 	16 384 byte
<ul style="list-style-type: none"> • Retentivity available 	Yes
<ul style="list-style-type: none"> • Retentivity preset 	MB 0 to MB 15
<ul style="list-style-type: none"> • Number of clock memories 	8; in 1 memory byte
Local data	
<ul style="list-style-type: none"> • adjustable, max. 	64 kbyte
<ul style="list-style-type: none"> • preset 	32 kbyte
Address area	
I/O address area	
<ul style="list-style-type: none"> • Inputs 	16 kbyte
<ul style="list-style-type: none"> • Outputs 	16 kbyte
Process image	
<ul style="list-style-type: none"> • Inputs, adjustable 	8 kbyte
<ul style="list-style-type: none"> • Outputs, adjustable 	8 kbyte
<ul style="list-style-type: none"> • Inputs, default 	1 024 byte
<ul style="list-style-type: none"> • Outputs, default 	1 024 byte
<ul style="list-style-type: none"> • consistent data, max. 	244 byte
<ul style="list-style-type: none"> • Access to consistent data in process image 	Yes
Subprocess images	
<ul style="list-style-type: none"> • Number of subprocess images, max. 	15
Digital channels	
<ul style="list-style-type: none"> • Inputs 	131 072
<ul style="list-style-type: none"> — of which central 	131 072
<ul style="list-style-type: none"> • Outputs 	131 072
<ul style="list-style-type: none"> — of which central 	131 072
Analog channels	
<ul style="list-style-type: none"> • Inputs 	8 192
<ul style="list-style-type: none"> — of which central 	8 192
<ul style="list-style-type: none"> • Outputs 	8 192
<ul style="list-style-type: none"> — of which central 	8 192
Hardware configuration	
Number of expansion units, max.	21
connectable OPs	95
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	

• 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
• 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	44; 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.	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
• 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
— Isochronous mode	No
— SYNC/FREEZE	No
— activation/deactivation of DP devices	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 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
PROFIBUS DP device	
• 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 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
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.	32
• Transmission rate, max.	12 Mbit/s
• max. number of DP devices	125
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.	8 kbyte
— Outputs, max.	8 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 6AG1960-1AA06-7XA0 or 6AG1960-1AB06-7XA0
5. Interface	
Interface type	Pluggable synchronization submodule (FO)
Plug-in interface modules	Synchronization modules 6AG1960-1AA06-7XA0 or 6AG1960-1AB06-7XA0
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.	94
— 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.	94
— 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.	94
— Data length, max.	1 472 byte
Web server	
• supported	No
Isochronous mode	
Equidistance	No
Communication functions	
PG/OP communication	Yes
• Number of connectable OPs with message processing	95; When using Alarm_S/SQ and Alarm_D/DQ
• Number of connectable OPs without message processing	95
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	96
• 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.	95; 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.	1 000; 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.	10 000
• preset, max.	1 200
Process control messages	Yes
Number of archives that can log on simultaneously (SFB 37 AR_SEND)	64
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.	512
Diagnostic buffer	
• present	Yes
• Number of entries, max.	3 200
— can be set	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
Ambient conditions	
Ambient temperature during operation	
• min.	-25 °C; = Tmin
• max.	70 °C; = Tmax; @ 60°C for UL/ATEX/FM and safety-related application
Ambient temperature during storage/transportation	
• min.	-40 °C
• max.	70 °C
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	5 000 m
• 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	
• 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	
— 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

Classifications

	Version	Classification
eClass	14	27-24-22-07
eClass	12	27-24-22-07
eClass	9.1	27-24-22-07
eClass	9	27-24-22-07
eClass	8	27-24-22-07
eClass	7.1	27-24-22-07
eClass	6	27-24-22-07
ETIM	10	EC000236
ETIM	9	EC000236
ETIM	8	EC000236
ETIM	7	EC000236
IDEA	4	3565
UNSPSC	15	32-15-17-05

Approvals / Certificates

General Product Approval

[Manufacturer Declaration](#)



[China RoHS](#)



[China RoHS](#)

EMV

For use in hazardous locations



[CCC-Ex](#)



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