

SIMATIC S7-400 advanced controller

Central processing units

High-availability CPUs

CPU 412-5H, CPU 414-5H, CPU 416-5H, CPU 417-5H

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Overview

- CPU for SIMATIC S7-400H and S7-400F/FH
- Can be used in S7-400H high-availability systems
- Can be used with F runtime license as F-capable CPU in S7-400F/FH safety-related systems
- With integrated PROFIBUS DP master and combined MPI/PROFIBUS DP master interface
- With integrated PROFINET interface (2-port switch)
- Features 2 slots for sync modules

Technical specifications

Article number	6ES7412-5HK06-0AB0 CPU412-5H PN/DP, 1MB F. S7-400H/F/FH	6ES7414-5HM06-0AB0 CPU414-5H PN/DP, 4MB F. S7-400H/F/FH	6ES7416-5HS06-0AB0 CPU416-5H PN/DP, 16MB F. S7-400H/F/FH	6ES7417-5HT06-0AB0 CPU417-5H PN/DP, 32MB F. S7-400H/F/FH
Product type designation				
General information				
Engineering with				
• Programming package	As of STEP 7 V5.5 SP2 with HF1	As of STEP 7 V5.5 SP2 with HF1	As of STEP 7 V5.5 SP2 with HF1	As of STEP 7 V5.5 SP2 with HF1
Supply voltage				
Rated value (DC)				
• 24 V DC	No; Power supply via system power supply	No; Power supply via system power supply	No; Power supply via system power supply	No; Power supply via system power supply
Power losses				
Power loss, typ.	7.5 W	7.5 W	7.5 W	7.5 W
Memory				
Work memory				
• Integrated	1 Mbyte	4 Mbyte	16 Mbyte	32 Mbyte
• integrated (for program)	512 kbyte	2 Mbyte	6 Mbyte	16 Mbyte
• integrated (for data)	512 kbyte	2 Mbyte	10 Mbyte	16 Mbyte
Load memory				
• expandable FEPRAM, max.	64 Mbyte	64 Mbyte	64 Mbyte	64 Mbyte
• integrated RAM, max.	512 kbyte	512 kbyte	1 Mbyte	1 Mbyte
• expandable RAM, max.	64 Mbyte	64 Mbyte	64 Mbyte	64 Mbyte
CPU processing times				
for bit operations, typ.	31.25 ns	18.75 ns	12.5 ns	7.5 ns
for word operations, typ.	31.25 ns	18.75 ns	12.5 ns	7.5 ns
for fixed point arithmetic, typ.	31.25 ns	18.75 ns	12.5 ns	7.5 ns
for floating point arithmetic, typ.	62.5 ns	37.5 ns	25 ns	15 ns
Counters, timers and their retentivity				
S7 counter				
• Number	2 048	2 048	2 048	2 048
IEC counter				
• present	Yes	Yes	Yes	Yes
S7 times				
• Number	2 048	2 048	2 048	2 048
IEC timer				
• present	Yes	Yes	Yes	Yes
Data areas and their retentivity				
Flag				
• Number, max.	8 192 byte	8 192 byte	16 384 byte	16 384 byte

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Article number	6ES7412-5HK06-0AB0 CPU412-5H PN/DP, 1MB F. S7-400H/F/FH	6ES7414-5HM06-0AB0 CPU414-5H PN/DP, 4MB F. S7-400H/F/FH	6ES7416-5HS06-0AB0 CPU416-5H PN/DP, 16MB F. S7-400H/F/FH	6ES7417-5HT06-0AB0 CPU417-5H PN/DP, 32MB F. S7-400H/F/FH
Address area				
I/O address area				
• Inputs	8 kbyte	8 kbyte	16 kbyte	16 kbyte
• Outputs	8 kbyte	8 kbyte	16 kbyte	16 kbyte
Process image				
• Inputs, adjustable	8 kbyte	8 kbyte	16 kbyte	16 kbyte
• Outputs, adjustable	8 kbyte	8 kbyte	16 kbyte	16 kbyte
Hardware configuration				
Slots				
• Required slots	2	2	2	2
Time of day				
Clock				
• Hardware clock (real-time clock)	Yes	Yes	Yes	Yes
Operating hours counter				
• Number	16	16	16	16
Interfaces				
Number of RS 485 interfaces	2	2	2	2
Number of other interfaces	2; Fiber-optic interface	2; Fiber-optic interface	2; Fiber-optic interface	2; Fiber-optic interface
1st interface				
Interface type	Integrated	Integrated	Integrated	Integrated
Physics	RS 485 / PROFIBUS + MPI	RS 485 / PROFIBUS + MPI	RS 485 / PROFIBUS + MPI	RS 485 / PROFIBUS + MPI
Functionality				
• MPI	Yes	Yes	Yes	Yes
• DP master	Yes	Yes	Yes	Yes
• DP slave	No	No	No	No
DP master				
• Number of DP slaves, max.	32	32	32	32
2nd interface				
Interface type	PROFINET	PROFINET	PROFINET	PROFINET
Physics	Ethernet RJ45	Ethernet RJ45	Ethernet RJ45	Ethernet RJ45
Number of ports	2	2	2	2
Functionality				
• DP master	No	No	No	No
• DP slave	No	No	No	No
• PROFINET IO Controller	Yes	Yes	Yes	Yes
• PROFINET IO Device	No	No	No	No
• PROFINET CBA	No	No	No	No
PROFINET IO Controller				
• Max. number of connectable IO devices for RT	256	256	256	256
3rd interface				
Interface type	Integrated	Integrated	Integrated	Integrated
Physics	RS 485 / PROFIBUS	RS 485 / PROFIBUS	RS 485 / PROFIBUS	RS 485 / PROFIBUS
Functionality				
• DP master	Yes	Yes	Yes	Yes
• DP slave	No	No	No	No
DP master				
• Number of DP slaves, max.	64	96	125	125
4th interface				
Interface type	Pluggable synchronization submodule (FO)	Pluggable synchronization submodule (FO)	Pluggable synchronization submodule (FO)	Pluggable synchronization submodule (FO)
Plug-in interface modules	Synchronization modules 6ES7960-1AA06-0XA0 or 6ES7960-1AB06-0XA0	Synchronization modules 6ES7960-1AA06-0XA0 or 6ES7960-1AB06-0XA0	Synchronization modules 6ES7960-1AA06-0XA0 or 6ES7960-1AB06-0XA0	Synchronization modules 6ES7960-1AA06-0XA0 or 6ES7960-1AB06-0XA0

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Technical specifications (continued)

Article number	6ES7412-5HK06-0AB0 CPU412-5H PN/DP, 1MB F. S7-400H/F/FH	6ES7414-5HM06-0AB0 CPU414-5H PN/DP, 4MB F. S7-400H/F/FH	6ES7416-5HS06-0AB0 CPU416-5H PN/DP, 16MB F. S7-400H/F/FH	6ES7417-5HT06-0AB0 CPU417-5H PN/DP, 32MB F. S7-400H/F/FH
5. Interface				
Interface type	Pluggable synchronization submodule (FO)	Pluggable synchronization submodule (FO)	Pluggable synchronization submodule (FO)	Pluggable synchronization submodule (FO)
Plug-in interface modules	Synchronization modules 6ES7960-1AA06-0XA0 or 6ES7960-1AB06-0XA0	Synchronization modules 6ES7960-1AA06-0XA0 or 6ES7960-1AB06-0XA0	Synchronization modules 6ES7960-1AA06-0XA0 or 6ES7960-1AB06-0XA0	Synchronization modules 6ES7960-1AA06-0XA0 or 6ES7960-1AB06-0XA0
Isochronous mode				
Isochronous operation (application synchronized up to terminal)	No	No	No	No
Communication functions				
PG/OP communication	Yes	Yes	Yes	Yes
Data record routing	Yes	Yes	Yes	Yes
S7 routing	Yes	Yes	Yes	Yes
Global data communication				
• supported	No	No	No	No
S7 basic communication				
• supported	No	No	No	No
S7 communication				
• supported	Yes	Yes	Yes	Yes
S5-compatible communication				
• supported	Yes; (via CP max. 10 and FC AG_SEND and FC AG_RECV)	Yes; (via CP max. 10 and FC AG_SEND and FC AG_RECV)	Yes; (via CP max. 10 and FC AG_SEND and FC AG_RECV)	Yes; (via CP max. 10 and FC AG_SEND and FC AG_RECV)
Standard communication (FMS)				
• supported	Yes; Via CP and loadable FB	Yes; Via CP and loadable FB	Yes; Via CP and loadable FB	Yes; Via CP and loadable FB
Open IE communication				
• TCP/IP	Yes; via integrated PROFINET interface and loadable FBs	Yes; via integrated PROFINET interface and loadable FBs	Yes; via integrated PROFINET interface and loadable FBs	Yes; via integrated PROFINET interface and loadable FBs
- Number of connections, max.	46	62	94	118
• ISO-on-TCP (RFC1006)	Yes; Via integrated PROFINET interface or CP 443-1 and loadable FBs	Yes; Via integrated PROFINET interface or CP 443-1 and loadable FBs	Yes; Via integrated PROFINET interface or CP 443-1 and loadable FBs	Yes; Via integrated PROFINET interface or CP 443-1 and loadable FBs
- Number of connections, max.	46	62	94	118
• UDP	Yes; via integrated PROFINET interface and loadable FBs	Yes; via integrated PROFINET interface and loadable FBs	Yes; via integrated PROFINET interface and loadable FBs	Yes; via integrated PROFINET interface and loadable FBs
- Number of connections, max.	46	62	94	118
Web server				
• supported	No	No	No	No
Number of connections				
• overall	48	64	96	120
Configuration				
Programming				
Programming language				
- LAD	Yes	Yes	Yes	Yes
- FBD	Yes	Yes	Yes	Yes
- STL	Yes	Yes	Yes	Yes
- SCL	Yes	Yes	Yes	Yes
- CFC	Yes	Yes	Yes	Yes
- GRAPH	Yes	Yes	Yes	Yes
- HiGraph®	Yes	Yes	Yes	Yes
Know-how protection				
• User program protection/password protection	Yes	Yes	Yes	Yes
• Block encryption	Yes; With S7 block Privacy	Yes; With S7 block Privacy	Yes; With S7 block Privacy	Yes; With S7 block Privacy
Dimensions				
Width	50 mm	50 mm	50 mm	50 mm
Height	290 mm	290 mm	290 mm	290 mm
Depth	219 mm	219 mm	219 mm	219 mm
Weights				
Weight, approx.	995 g	995 g	995 g	995 g

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High-availability CPUs

CPU 412-5H, CPU 414-5H, CPU 416-5H, CPU 417-5H

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Ordering data	Article No.		Article No.	
CPU 412-5H For S7-400H and S7-400F/FH; 1 MB RAM, 1 combined MPI/ PROFIBUS DP master interface, 1 PROFIBUS DP interface, 2 PROFINET interfaces (switches), 2 slots for sync modules, slot for memory card, incl. slot number labels	6ES7412-5HK06-0AB0		CPU 417-5H For S7-400H and S7-400F/FH; 32 MB RAM, 1 combined MPI/ PROFIBUS DP master interface, 1 PROFIBUS DP interface, 2 PROFINET interfaces (switches), 2 slots for sync modules, slot for memory card, incl. slot number labels	6ES7417-5HT06-0AB0
CPU 412-5H system bundle Not assembled, consisting of: UR2-H rack, 2 x PS 405/407 power supply units, 2 x CPU 412-5H, 4 x sync modules (for max. 10 m), 2 x fiber optic cables for sync modules (1 m), 4 x backup batteries; two additional memory cards required (to be ordered separately) • CPU 412-5H system bundle, 120/230 V AC, 10 A • CPU 412-5H system bundle, 24/48/60 V DC, 10 A	6ES7400-0HR01-4AB0 6ES7400-0HR51-4AB0		CPU 417-5H system bundle Not assembled, consisting of: UR2-H rack, 2 x PS 405/407 power supply units, 2 x CPU 417-5H, 4 x sync modules (for max. 10 m), 2 x fiber optic cables for sync mod- ules (1 m), 4 x backup batteries; two additional memory cards required (to be ordered separately) • CPU 417-5H system bundle, 120/230 V AC, 10 A • CPU 417-5H system bundle, 24/48/60 V DC, 10 A	6ES7400-0HR04-4AB0 6ES7400-0HR54-4AB0
CPU 414-5H For S7-400H and S7-400F/FH; 4 MB RAM, 1 combined MPI/ PROFIBUS DP master interface, 1 PROFIBUS DP interface, 2 PROFINET interfaces (switches), 2 slots for sync modules, slot for memory card, incl. slot number labels	6ES7414-5HM06-0AB0		Memory card RAM 1 MB 2 MB 4 MB 8 MB 16 MB 64 MB	6ES7952-1AK00-0AA0 6ES7952-1AL00-0AA0 6ES7952-1AM00-0AA0 6ES7952-1AP00-0AA0 6ES7952-1AS00-0AA0 6ES7952-1AY00-0AA0
CPU 414-5H system bundle Not assembled, consisting of: UR2-H rack, 2 x PS 405/407 power supply units, 2 x CPU 414-5H, 4 x sync modules (for max. 10 m), 2 x fiber optic cables for sync mod- ules (1 m), 4 x backup batteries; additional two memory cards required (to be ordered separately) • CPU 414-5H system bundle, 120/230 V AC, 10 A • CPU 414-5H system bundle, 24/48/60 V DC, 10 A	6ES7400-0HR02-4AB0 6ES7400-0HR52-4AB0		FEPROM memory card 1 MB 2 MB 4 MB 8 MB 16 MB 32 MB 64 MB	6ES7952-1KK00-0AA0 6ES7952-1KL00-0AA0 6ES7952-1KM00-0AA0 6ES7952-1KP00-0AA0 6ES7952-1KS00-0AA0 6ES7952-1KT00-0AA0 6ES7952-1KY00-0AA0
CPU 416-5H For S7-400H and S7-400F/FH; 16 MB RAM, 1 combined MPI/ PROFIBUS DP master interface, 1 PROFIBUS DP interface, 2 PROFINET interfaces (switches), 2 slots for sync modules, slot for memory card, incl. slot number labels	6ES7416-5HS06-0AB0		MPI cable For connection of SIMATIC S7 and PG via MPI; 5 m in length	6ES7901-0BF00-0AA0
CPU 416-5H system bundle Not assembled, consisting of: UR2-H rack, 2 x PS 405/407 power supply units, 2 x CPU 416-5H, 4 x sync modules (for max. 10 m), 2 x fiber optic cables for sync mod- ules (1 m), 4 x backup batteries; two additional memory cards required (to be ordered separately) • CPU 416-5H system bundle, 120/230 V AC, 10 A • CPU 416-5H system bundle, 24/48/60 V DC, 10 A	6ES7400-0HR03-4AB0 6ES7400-0HR53-4AB0		Slot number plates 1 set (spare part)	6ES7912-0AA00-0AA0
			S7 F Systems RT License For processing safety-related user programs, for one S7-400H-based system each with CPU 412-5H, CPU 414-5H, CPU 416-5H or CPU 417-5H	6ES7833-1CC00-6YX0
			S7 F Systems V6.1 Programming and configuring envi- ronment for creating and operating safety-related STEP 7 programs for an S7-400H-based target system, floating license for 1 user, runs with Windows XP Prof SP2, Windows XP Prof SP2/SP3, Windows Server 2003 SP2 2 languages (English, German) Type of delivery: Certificate of License as well as software and electronic documenta- tion on CD	6ES7833-1CC02-0YA5

SIMATIC S7-400 advanced controller

Central processing units

SIPLUS S7-400 high-availability CPUs

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SIPLUS S7-400 CPU 414H**Overview**

CPU for SIMATIC S7-400H and S7-400F/FH

- Usable in high-availability systems such as the S7-400H
- Usable with F runtime license as F-capable CPU in S7-400F/FH safety-related systems
- With integral PROFIBUS DP master interface
- Features 2 slots for sync modules

Note:

SIPLUS extreme products are based on SIMATIC standard products. The contents listed here were taken from the respective standard products. SIPLUS extreme specific information was added.

Technical specifications

Article number	6AG1414-5HM06-7AB0
Based on	6ES7414-5HM06-0AB0 SIPLUS S7-400 CPU 414-5H
Ambient conditions	
Ambient temperature in operation	
• Min.	-25 °C
• max.	70 °C; For "F-Systems" applications max. +60 °C permissible
Extended ambient conditions	
• Relative to ambient temperature-atmospheric pressure-installation altitude	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m). For "F-Systems" applications max. +2000 m above sea level permissible
Relative humidity	
- With condensation, max.	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)
Resistance	
- against biologically active substances / conformity with EN 60721-3-3	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!
- against chemically active substances / conformity with EN 60721-3-3	Yes; Class 3C4 (RH < 75 %) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!
- against mechanically active substances / conformity with EN 60721-3-3	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!

Ordering data**Article No.****SIPLUS S7-400 CPU 414-5H**

CPU for S7-400H with 4 MB RAM (2 MB code and 2 MB data);
5 interfaces: 1x MPI/DP, DP, PN each and 2 slots for sync modules

Extended temperature range and exposure to media

6AG1414-5HM06-7AB0**Accessories****Memory Card RAM**

Exposure to media

- 2 MB

Extended temperature range and exposure to media

- 4 MB
- 8 MB
- 16 MB
- 64 MB

6AG1952-1AL00-4AA0

6AG1952-1AM00-7AA0
6AG1952-1AP00-7AA0
6AG1952-1AS00-7AA0
6AG1952-1AY00-7AA0

FEPRAM memory card

Exposure to media

- 32 MB

6AG1952-1KT00-4AA0**RS 485 bus connector with 90° cable outlet**

Max. transfer rate 12 Mbit/s

Extended temperature range and exposure to media

- Without PG interface
- With PG interface

6AG1972-0BA12-2XA0
6AG1972-0BB12-2XA0

Article No.**RS 485 bus connector with angled cable outlet**

Max. transmission rate 12 Mbit/s

Extended temperature range and exposure to media

- Without PG interface
- With PG interface

6AG1972-0BA42-7XA0
6AG1972-0BB42-7XA0

RS 485 bus connector with axial cable outlet

For SIPLUS OP, for connection to PPI, MPI, PROFIBUS

Extended temperature range and exposure to media

6AG1500-0EA02-2AA0**RS 485 repeater for PROFIBUS**

Transfer rate up to 12 Mbit/s;
24 V DC; IP20 enclosure

Extended temperature range and exposure to media

6AG1972-0AA02-7XA0**Additional accessories**

see SIMATIC S7-400 CPU 414-5H, page 1/37