



SIMATIC S7-400H, CPU 414-5H, central processing unit for S7-400H and S7-400F/FH, 5 interfaces: 1x MPI/DP, 1x DP, 1x PN and 2 for sync modules, 4 MB memory (2 MB data/2 MB program),

General information	
Product type designation	CPU 414-5H PN/DP
HW functional status	1
Firmware version	V6.0
Product function	
<ul style="list-style-type: none"> <li>• Isochronous mode</li> </ul>	No
Engineering with	
<ul style="list-style-type: none"> <li>• Programming package</li> </ul>	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	other
Work memory	
<ul style="list-style-type: none"> <li>• integrated</li> <li>• integrated (for program)</li> <li>• integrated (for data)</li> <li>• expandable</li> </ul>	4 Mbyte 2 Mbyte 2 Mbyte No

1 000 µA

Dealt with in the module data manual with the secondary conditions and the factors of influence

5 V DC to 15 V DC

#### Load memory

- expandable FEPRM
- expandable FEPRM, max.
- integrated RAM, max.
- expandable RAM
- expandable RAM, max.

Yes; with Memory Card (FLASH)

64 Mbyte

512 kbyte

Yes

64 Mbyte

#### Backup

- present
- with battery
- without battery

Yes

Yes; all data

No

#### Battery

##### Backup battery

- Backup current, typ.
- Backup current, max.

180 µA; Valid up to 40°C

Retentive data area (incl. timers, counters, flags), max.	Total working and load memory (with backup battery)
<ul style="list-style-type: none"> <li>• Backup time, max.</li> </ul>	
<ul style="list-style-type: none"> <li>• Feeding of external backup voltage to CPU</li> </ul>	
<b>CPU processing times</b>	
for bit operations, typ.	18.75 ns
for word operations, typ.	18.75 ns
for fixed point arithmetic, typ.	18.75 ns
for floating point arithmetic, typ.	37.5 ns
<b>CPU-blocks</b>	
<b>DB</b>	
<ul style="list-style-type: none"> <li>• Number, max.</li> </ul>	6 000; Number range: 1 to 16000
<ul style="list-style-type: none"> <li>• Size, max.</li> </ul>	64 kbyte
<b>FB</b>	
<ul style="list-style-type: none"> <li>• Number, max.</li> </ul>	3 000; Number range: 0 to 7999
<ul style="list-style-type: none"> <li>• Size, max.</li> </ul>	64 kbyte
<b>FC</b>	
<ul style="list-style-type: none"> <li>• Number, max.</li> </ul>	3 000; Number range: 0 to 7999
<ul style="list-style-type: none"> <li>• Size, max.</li> </ul>	64 kbyte
<b>OB</b>	
<ul style="list-style-type: none"> <li>• Number, max.</li> </ul>	see instruction list
<ul style="list-style-type: none"> <li>• Size, max.</li> </ul>	64 kbyte
<ul style="list-style-type: none"> <li>• Number of free cycle OBs</li> </ul>	1; OB 1
<ul style="list-style-type: none"> <li>• Number of time alarm OBs</li> </ul>	4; OB 10-13
<ul style="list-style-type: none"> <li>• Number of delay alarm OBs</li> </ul>	4; OB 20-23
<ul style="list-style-type: none"> <li>• Number of cyclic interrupt OBs</li> </ul>	4; OB 32-35
<ul style="list-style-type: none"> <li>• Number of process alarm OBs</li> </ul>	4; OB 40-43
<ul style="list-style-type: none"> <li>• Number of DPV1 alarm OBs</li> </ul>	4; OB 40-43
<ul style="list-style-type: none"> <li>• Number of startup OBs</li> </ul>	3; OB 55-57
<ul style="list-style-type: none"> <li>• Number of asynchronous error OBs</li> </ul>	2; OB 100, 102
<ul style="list-style-type: none"> <li>• Number of synchronous error OBs</li> </ul>	9; OB 80-88 2; OB 121, 122
<b>Nesting depth</b>	
<ul style="list-style-type: none"> <li>• per priority class</li> </ul>	24
<ul style="list-style-type: none"> <li>• additional within an error OB</li> </ul>	1
<b>Counters, timers and their retentivity</b>	
<b>S7 counter</b>	
<ul style="list-style-type: none"> <li>• Number</li> </ul>	2 048
<b>Retentivity</b>	
— adjustable	Yes
— preset	Z 0 to Z 7
<b>Counting range</b>	
— lower limit	0
— upper limit	999
<b>IEC counter</b>	

<ul style="list-style-type: none"> <li>• present</li> <li>• Type</li> <li>• Number</li> </ul>	Yes SFB Unlimited (limited only by RAM capacity)
<b>S7 times</b>	
<ul style="list-style-type: none"> <li>• Number</li> </ul>	2 048
<b>Retentivity</b>	
<ul style="list-style-type: none"> <li>— adjustable</li> <li>— preset</li> </ul>	Yes No times retentive
<b>Time range</b>	
<ul style="list-style-type: none"> <li>— lower limit</li> <li>— upper limit</li> </ul>	10 ms 9 990 s
<b>IEC timer</b>	
<ul style="list-style-type: none"> <li>• present</li> <li>• Type</li> <li>• Number</li> </ul>	Yes SFB Unlimited (limited only by RAM capacity)
<b>Flag</b>	
<ul style="list-style-type: none"> <li>• Size, max.</li> <li>• Retentivity available</li> <li>• Retentivity preset</li> <li>• Number of clock memories</li> </ul>	8 192 byte Yes MB 0 to MB 15 8; in 1 memory byte
<b>Local data</b>	
<ul style="list-style-type: none"> <li>• adjustable, max.</li> <li>• preset</li> </ul>	16 kbyte 8 kbyte
<b>Address area</b>	
<b>I/O address area</b>	
<ul style="list-style-type: none"> <li>• Inputs</li> <li>• Outputs</li> </ul>	8 kbyte 8 kbyte
<b>Process image</b>	
<ul style="list-style-type: none"> <li>• Inputs, adjustable</li> <li>• Outputs, adjustable</li> <li>• Inputs, default</li> <li>• Outputs, default</li> <li>• consistent data, max.</li> <li>• Access to consistent data in process image</li> </ul>	8 kbyte 8 kbyte 256 byte 256 byte 244 byte Yes
<b>Subprocess images</b>	
<ul style="list-style-type: none"> <li>• Number of subprocess images, max.</li> </ul>	15
<b>Digital channels</b>	
<ul style="list-style-type: none"> <li>• Inputs               <ul style="list-style-type: none"> <li>— of which central</li> </ul> </li> <li>• Outputs               <ul style="list-style-type: none"> <li>— of which central</li> </ul> </li> </ul>	65 536 65 536 65 536 65 536
<b>Analog channels</b>	

<ul style="list-style-type: none"> <li>• Inputs</li> <li>— of which central</li> <li>• Outputs</li> <li>— of which central</li> </ul>	<p>4 096</p> <p>4 096</p> <p>4 096</p> <p>4 096</p>
<b>Hardware configuration</b>	
Number of expansion units, max.	21
connectable OPs	63
Multicomputing	No
<b>Interface modules</b>	
<ul style="list-style-type: none"> <li>• Number of connectable IMs (total), max.</li> <li>• Number of connectable IM 460s, max.</li> <li>• Number of connectable IM 463s, max.</li> </ul>	<p>6</p> <p>6</p> <p>4; Single mode only</p>
<b>Number of DP masters</b>	
<ul style="list-style-type: none"> <li>• integrated</li> <li>• via CP</li> <li>• Mixed mode IM + CP permitted</li> <li>• via interface module</li> </ul>	<p>2</p> <p>10; CP 443-5 Extended</p> <p>No</p> <p>0</p>
<b>Number of IO Controllers</b>	
<ul style="list-style-type: none"> <li>• integrated</li> <li>• via CP</li> </ul>	<p>1</p> <p>0</p>
<b>Number of operable FMs and CPs (recommended)</b>	
<ul style="list-style-type: none"> <li>• FM</li> <li>• CP, PtP</li> <li>• PROFIBUS and Ethernet CPs</li> </ul>	<p>See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections</p> <p>See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections</p> <p>14; Of which max. 10 CP as DP master</p>
<b>Slots</b>	
<ul style="list-style-type: none"> <li>• required slots</li> </ul>	2
<b>Time of day</b>	
<b>Clock</b>	
<ul style="list-style-type: none"> <li>• Hardware clock (real-time)</li> <li>• retentive and synchronizable</li> <li>• Resolution</li> <li>• Deviation per day (buffered), max.</li> </ul>	<p>Yes</p> <p>Yes</p> <p>1 ms</p> <p>1.7 s; Power off</p>

<ul style="list-style-type: none"> <li>• Deviation per day (unbuffered), max.</li> </ul>	8.6 s; Power on
<b>Operating hours counter</b>	
<ul style="list-style-type: none"> <li>• Number</li> <li>• Number/Number range</li> <li>• Range of values</li> <li>• Granularity</li> <li>• retentive</li> </ul>	16 0 to 15 SFCs 2, 3 and 4: 0 to 32767 hours SFC 101: 0 to 2 <sup>31</sup> - 1 hours 1 h Yes
<b>Clock synchronization</b>	
<ul style="list-style-type: none"> <li>• supported</li> <li>• to MPI, master</li> <li>• to MPI, slave</li> <li>• to DP, master</li> <li>• to DP, slave</li> <li>• in AS, master</li> <li>• in AS, slave</li> <li>• on Ethernet via NTP</li> </ul>	Yes Yes Yes Yes Yes Yes Yes Yes; As client
<b>Time difference in system when synchronizing via</b>	
<ul style="list-style-type: none"> <li>• Ethernet, max.</li> <li>• MPI, max.</li> </ul>	10 ms; Via NTP 200 ms
<b>Interfaces</b>	
Number of RS 485 interfaces	2
Number of other interfaces	2; Fiber-optic interface
Optical interface	No
<b>1. Interface</b>	
Interface type	MPI/PROFIBUS DP
Isolated	Yes
<b>Interface types</b>	
<ul style="list-style-type: none"> <li>• RS 485</li> <li>• Output current of the interface, max.</li> </ul>	Yes 150 mA
<b>Protocols</b>	
<ul style="list-style-type: none"> <li>• MPI</li> <li>• PROFIBUS DP master</li> <li>• PROFIBUS DP slave</li> </ul>	Yes Yes No
<b>MPI</b>	
<ul style="list-style-type: none"> <li>• Number of connections</li> <li>• Transmission rate, max.</li> </ul>	32; If a diagnostics repeater is used on the line, the number of connection resources on the line is reduced by 1 12 Mbit/s
<b>Services</b>	
<ul style="list-style-type: none"> <li>— PG/OP communication</li> <li>— Routing</li> <li>— Global data communication</li> <li>— S7 basic communication</li> <li>— S7 communication</li> <li>— S7 communication, as client</li> <li>— S7 communication, as server</li> </ul>	Yes Yes No No Yes Yes

	Yes
<b>PROFIBUS DP master</b>	
<ul style="list-style-type: none"> <li>• Number of connections, max.</li> <li>• Transmission rate, max.</li> <li>• Number of DP slaves, max.</li> </ul>	<p>16; If a diagnostics repeater is used on the line, the number of connection resources on the line is reduced by 1</p> <p>12 Mbit/s</p> <p>32</p>
<b>Services</b>	
— 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	Yes
— Isochronous mode	No
— SYNC/FREEZE	No
— Activation/deactivation of DP slaves	No
— Direct data exchange (slave-to-slave communication)	No
— DPV1	Yes
<b>Address area</b>	
— Inputs, max.	2 kbyte
— Outputs, max.	2 kbyte
<b>User data per DP slave</b>	
— User data per DP slave, max.	244 byte
— Inputs, max.	244 byte
— Outputs, max.	244 byte
— Slots, max.	244
— per slot, max.	128 byte
<b>PROFIBUS DP slave</b>	
<ul style="list-style-type: none"> <li>• Number of connections</li> </ul>	No configuration of CPU as DP slave
<b>2. Interface</b>	
Interface type	PROFINET
Isolated	Yes
automatic detection of transmission rate	Yes; Autosensing
Autonegotiation	Yes
Autocrossing	Yes
Change of IP address at runtime, supported	No
<b>Interface types</b>	
<ul style="list-style-type: none"> <li>• RJ 45 (Ethernet)</li> <li>• Number of ports</li> <li>• integrated switch</li> </ul>	<p>Yes</p> <p>2</p> <p>Yes</p>
<b>Protocols</b>	

<ul style="list-style-type: none"> <li>• PROFINET IO Controller</li> <li>• PROFINET IO Device</li> <li>• PROFINET CBA</li> <li>• PROFIBUS DP master</li> <li>• PROFIBUS DP slave</li> <li>• Open IE communication</li> <li>• Web server</li> <li>• Point-to-point connection</li> <li>• Media redundancy</li> </ul>	<p>Yes</p> <p>Yes</p> <p>No</p> <p>No</p> <p>No</p> <p>No</p> <p>Yes</p> <p>No</p> <p>No</p> <p>Yes</p>
<b>PROFINET IO Controller</b>	
<ul style="list-style-type: none"> <li>• Transmission rate, max.</li> </ul>	100 Mbit/s
<b>Services</b>	
<ul style="list-style-type: none"> <li>— PG/OP communication</li> <li>— S7 communication</li> <li>— Isochronous mode</li> <li>— Shared device</li> <li>— Prioritized startup</li> <li>— Number of connectable IO Devices, max.</li> <li>— Number of connectable IO Devices for RT, max.</li> <li>— of which in line, max.</li> <li>— Activation/deactivation of IO Devices</li> <li>— IO Devices changing during operation (partner ports), supported</li> <li>— Device replacement without swap medium</li> <li>— Send cycles</li> <li>— Updating time</li> </ul>	<p>Yes</p> <p>Yes</p> <p>No</p> <p>Yes; Single mode only</p> <p>No</p> <p>256; In redundant mode via both interfaces</p> <p>256</p> <p>256</p> <p>No</p> <p>No</p> <p>Yes</p> <p>250 μs, 500 μs, 1 ms, 2 ms, 4 ms</p> <p>250 μs to 512 ms, minimum value depends on the number of configured user data and the configured single or redundant mode</p>
<b>Address area</b>	
<ul style="list-style-type: none"> <li>— Inputs, max.</li> <li>— Outputs, max.</li> <li>— User data consistency, max.</li> </ul>	<p>8 kbyte</p> <p>8 kbyte</p> <p>1 024 byte</p>
<b>Open IE communication</b>	
<ul style="list-style-type: none"> <li>• Number of connections, max.</li> <li>• Local port numbers used at the system end</li> <li>• Keep-alive function, supported</li> </ul>	<p>62</p> <p>0, 20, 21, 25, 102, 135, 161, 34962, 34963, 34964, 65532, 65533, 65534, 65535</p>
<b>3. Interface</b>	
Interface type	PROFIBUS DP
<b>Interface types</b>	
<ul style="list-style-type: none"> <li>• RS 485</li> <li>• Output current of the interface, max.</li> </ul>	<p>Yes</p> <p>150 mA</p>
<b>Protocols</b>	
<ul style="list-style-type: none"> <li>• PROFIBUS DP master</li> <li>• PROFIBUS DP slave</li> </ul>	<p>Yes</p> <p>No</p>
<b>PROFIBUS DP master</b>	



• Number of connections, max.	16
• Transmission rate, max.	12 Mbit/s
• Number of DP slaves, max.	96
<b>Services</b>	
— PG/OP communication	Yes
— Routing	Yes
— Global data communication	No
— S7 basic communication	No
— S7 communication	No
— S7 communication, as client	Yes
— S7 communication, as server	Yes
— Equidistance	Yes
— Isochronous mode	Yes
— SYNC/FREEZE	No
— Activation/deactivation of DP slaves	No
— Direct data exchange (slave-to-slave communication)	No
— DPV0	No
— DPV1	No
	Yes
	Yes
<b>Address area</b>	
— Inputs, max.	6 kbyte
— Outputs, max.	6 kbyte
<b>User data per DP slave</b>	
— User data per DP slave, max.	244 byte
— Inputs, max.	244 byte
— Outputs, max.	244 byte
— Slots, max.	244
— per slot, max.	128 byte
<b>4. Interface</b>	
Interface type	Pluggable synchronization submodule (FO)
Plug-in interface modules	Synchronization modules 6ES7960-1AA06-0XA0 or 6ES7960-1AB06-0XA0
<b>5. Interface</b>	
Interface type	Pluggable synchronization submodule (FO)
Plug-in interface modules	Synchronization modules 6ES7960-1AA06-0XA0 or 6ES7960-1AB06-0XA0
<b>Protocols</b>	
<b>Redundancy mode</b>	
<b>Media redundancy</b>	
— Switchover time on line break, typ.	200 ms
— Number of stations in the ring, max.	50
<b>SIMATIC communication</b>	
• S7 routing	Yes
<b>Open IE communication</b>	
• TCP/IP	Yes; via integrated PROFINET interface and loadable FBs
— Number of connections, max.	62

- Data length, max.
- several passive connections per port, supported
- ISO-on-TCP (RFC1006)
  - Number of connections, max.
  - Data length, max.
- UDP
  - Number of connections, max.

32 kbyte
Yes
Yes; Via integrated PROFINET interface or CP 443-1 and loadable FBs
62
32 kbyte; 1 452 bytes via CP 443-1 Adv.
Yes; via integrated PROFINET interface and loadable FBs
62



Status block	Yes
— Data length, max.	1 472 byte
<b>Web server</b>	
• supported	No
<b>Isochronous mode</b>	
Equidistance	No
<b>communication functions / header</b>	
PG/OP communication	Yes
• Number of connectable OPs without message processing	63
• Number of connectable OPs with message processing	63; When using Alarm_S/SQ and Alarm_D/DQ
Data record routing	Yes
<b>Global data communication</b>	
• supported	No
<b>S7 basic communication</b>	
• communication function / S7 basic communication	No
<b>S7 communication</b>	
• 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
<b>S5 compatible communication</b>	
• 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
<b>Standard communication (FMS)</b>	
• supported	Yes; Via CP and loadable FB
<b>Number of connections</b>	
• overall	64
• usable for PG communication	
— reserved for PG communication	
— adjustable for PG communication, max.	1
• usable for OP communication	0
— reserved for OP communication	
— adjustable for OP communication, max.	
• usable for S7 basic communication	1
— reserved for S7 basic communication	
— 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	0
— reserved for routing	

— adjustable for routing, max.

0  
0  
0  
0

### S7 message functions

Number of login stations for message functions, max.	63; Max. 63 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.	400; Simultaneously active alarm_S/SQ blocks or alarm_D/DQ blocks
Alarm 8-blocks	Yes
<ul style="list-style-type: none"> <li>Number of instances for alarm 8 and S7 communication blocks, max.</li> <li>preset, max.</li> </ul>	2 500 900
Process control messages	Yes
Number of archives that can log on simultaneously (SFB 37 AR_SEND)	16
Single step	Yes
Number of breakpoints	16

### Status/control

<ul style="list-style-type: none"> <li>Status/control variable</li> <li>Variables</li> <li>Number of variables, max.</li> </ul>	Yes; Up to 16 variable tables Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 70
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### Forcing

<ul style="list-style-type: none"> <li>Forcing</li> <li>Forcing, variables</li> <li>Number of variables, max.</li> </ul>	Yes Inputs/outputs, bit memories, distributed I/Os 256
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### Diagnostic buffer

<ul style="list-style-type: none"> <li>present</li> <li>Number of entries, max.</li> <li>— adjustable</li> <li>— preset</li> </ul>	Yes 3 200 Yes 120
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### Service data

<ul style="list-style-type: none"> <li>can be read out</li> </ul>	Yes
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### EMC

Emission of radio interference acc. to EN 55 011

<ul style="list-style-type: none"> <li>Limit class A, for use in industrial areas</li> <li>Limit class B, for use in residential areas</li> </ul>	Yes No
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### configuration / header

Configuration software

<ul style="list-style-type: none"> <li>STEP 7</li> </ul>	Yes
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configuration / programming / header

<ul style="list-style-type: none"> <li>• Command set</li> <li>• Nesting levels</li> <li>• Access to consistent data in process image</li> <li>• System functions (SFC)</li> <li>• System function blocks (SFB)</li> </ul>	<p>see instruction list</p> <p>7</p> <p>Yes</p> <p>see instruction list</p> <p>see instruction list</p>
<b>Programming language</b>	
— LAD	Yes
— FBD	Yes
— STL	Yes
— SCL	Yes
— CFC	Yes
— GRAPH	Yes
— HiGraph®	Yes
<b>configuration / programming / number of simultaneously active SFC / header</b>	
— RD_REC	8
— WR_REC	8
— WR_PARM	8
— PARM_MOD	8
— WR_DPARM	1
— DPNRM_DG	2
— RDSYSST	8
— DP_TOPOL	8
	1
<b>configuration / programming / number of simultaneously active SFB / header</b>	
— RDREC	8
— WRREC	8
<b>Know-how protection</b>	
<ul style="list-style-type: none"> <li>• User program protection/password protection</li> <li>• Block encryption</li> </ul>	<p>Yes</p> <p>Yes; With S7 block Privacy</p>
<b>Dimensions</b>	
Width	50 mm
Height	290 mm
Depth	219 mm
<b>Weights</b>	
Weight, approx.	995 g
<b>last modified:</b>	9/7/2023