



\*\*\*\*\* Replacement part \*\*\*\*\* SIMATIC S7-400H, CPU 412-3H  
 Central processing unit for S7-400H and S7-400F/FH, 3 interfaces: 1  
 MPI/DP and 2 for sync modules, 768 KB memory (256 KB data/512 KB  
 program)

General information	
Product type designation	CPU 412-3H PN/DP
HW functional status	1
Firmware version	V4.5
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>	STEP 7 V5.3 SP2 or higher with HW update
CiR - Configuration in RUN	
CiR synchronization time, basic load	150 ms
CiR synchronization time, time per I/O byte	40 µs
Supply voltage	
Rated value (DC)	Power supply via system power supply
Input current	
from backplane bus 5 V DC, typ.	1.2 A
from backplane bus 5 V DC, max.	1.5 A
from backplane bus 24 V DC, max.	150 mA; Per DP interface
from interface 5 V DC, max.	90 mA; At each DP interface
Power loss	
Power loss, typ.	5.5 W
Memory	
Type of memory	RAM
Work memory	
<ul style="list-style-type: none"> <li>• integrated</li> </ul>	768 kbyte
<ul style="list-style-type: none"> <li>• integrated (for program)</li> </ul>	512 kbyte
<ul style="list-style-type: none"> <li>• integrated (for data)</li> </ul>	256 kbyte
<ul style="list-style-type: none"> <li>• expandable</li> </ul>	No
Load memory	
<ul style="list-style-type: none"> <li>• expandable FEPRM</li> </ul>	Yes
<ul style="list-style-type: none"> <li>• expandable FEPRM, max.</li> </ul>	64 Mbyte
<ul style="list-style-type: none"> <li>• integrated RAM, max.</li> </ul>	256 kbyte
<ul style="list-style-type: none"> <li>• expandable RAM</li> </ul>	Yes
<ul style="list-style-type: none"> <li>• expandable RAM, max.</li> </ul>	64 Mbyte
Backup	
<ul style="list-style-type: none"> <li>• present</li> </ul>	Yes
<ul style="list-style-type: none"> <li>• with battery</li> </ul>	Yes; all data
<ul style="list-style-type: none"> <li>• without battery</li> </ul>	No

Battery	
Backup battery	
<ul style="list-style-type: none"> <li>• Backup current, typ.</li> <li>• Backup current, max.</li> <li>• Backup time, max.</li> </ul>	190 $\mu$ A; Valid up to 40°C 660 $\mu$ A Dealt with in the module data manual with the secondary conditions and the factors of influence
<ul style="list-style-type: none"> <li>• Feeding of external backup voltage to CPU</li> </ul>	5 V DC to 15 V DC
CPU processing times	
for bit operations, typ.	0.075 $\mu$ s
for word operations, typ.	0.075 $\mu$ s
for fixed point arithmetic, typ.	0.075 $\mu$ s
for floating point arithmetic, typ.	0.225 $\mu$ s
CPU-blocks	
DB	
<ul style="list-style-type: none"> <li>• Number, max.</li> <li>• Size, max.</li> </ul>	4 095; Number range: 1 to 4095 64 kbyte
FB	
<ul style="list-style-type: none"> <li>• Number, max.</li> <li>• Size, max.</li> </ul>	2 048; Number range: 0 to 2047 64 kbyte
FC	
<ul style="list-style-type: none"> <li>• Number, max.</li> <li>• Size, max.</li> </ul>	2 048; Number range: 0 to 2047 64 kbyte
OB	
<ul style="list-style-type: none"> <li>• Size, max.</li> <li>• Number of time alarm OBs</li> <li>• Number of delay alarm OBs</li> <li>• Number of cyclic interrupt OBs</li> <li>• Number of process alarm OBs</li> </ul>	64 kbyte 4 4 4 4
Nesting depth	
<ul style="list-style-type: none"> <li>• per priority class</li> <li>• additional within an error OB</li> </ul>	24 1
Counters, timers and their retentivity	
S7 counter	
<ul style="list-style-type: none"> <li>• Number</li> </ul>	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	
<ul style="list-style-type: none"> <li>• present</li> <li>• Type</li> </ul>	Yes SFB
S7 times	
<ul style="list-style-type: none"> <li>• Number</li> </ul>	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	
<ul style="list-style-type: none"> <li>• present</li> <li>• Type</li> </ul>	Yes SFB

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"> <li>• Size, max.</li> <li>• Retentivity available</li> <li>• Retentivity preset</li> <li>• Number of clock memories</li> </ul>	8 kbyte Yes MB 0 to MB 15 8; in 1 memory byte
Local data	
<ul style="list-style-type: none"> <li>• adjustable, max.</li> <li>• preset</li> </ul>	16 kbyte 8 kbyte
Address area	
I/O address area	
<ul style="list-style-type: none"> <li>• Inputs</li> <li>• Outputs</li> </ul>	8 kbyte 8 kbyte
Process image	
<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
Subprocess images	
<ul style="list-style-type: none"> <li>• Number of subprocess images, max.</li> </ul>	15
Digital channels	
<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
Analog channels	
<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>	4 096 4 096 4 096 4 096
Hardware configuration	
Number of expansion units, max.	21
connectable OPs	15 without message processing, 8 with message processing
Multicomputing	No
Interface modules	
<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>	6 6 4; Single mode only
Number of DP masters	
<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>	1 10 No 0
Number of operable FMs and CPs (recommended)	
<ul style="list-style-type: none"> <li>• FM</li> <li>• CP, PtP</li> <li>• PROFIBUS and Ethernet CPs</li> </ul>	See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections 14; Of which max. 10 CP as DP master
Slots	
<ul style="list-style-type: none"> <li>• required slots</li> </ul>	2
Time of day	
Clock	
<ul style="list-style-type: none"> <li>• Hardware clock (real-time)</li> <li>• retentive and synchronizable</li> </ul>	Yes Yes

• Resolution	1 ms
• Deviation per day (buffered), max.	1.7 s; Power off
• Deviation per day (unbuffered), max.	8.6 s; Power on
<b>Operating hours counter</b>	
• Number	8
• Number/Number range	0 to 7
• Range of values	0 to 32767 hours
• Granularity	1 h
• retentive	Yes
<b>Clock synchronization</b>	
• 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
<b>Time difference in system when synchronizing via</b>	
• MPI, max.	200 ms
<b>Interfaces</b>	
Number of RS 485 interfaces	2
Number of other interfaces	0
Optical interface	No
<b>1. Interface</b>	
Interface type	MPI/PROFIBUS DP
Isolated	Yes
<b>Interface types</b>	
• RS 485	Yes
• Output current of the interface, max.	150 mA
<b>Protocols</b>	
• MPI	Yes
• PROFIBUS DP master	Yes
• PROFIBUS DP slave	No
<b>MPI</b>	
• Number of connections	16
• Transmission rate, max.	12 Mbit/s
<b>Services</b>	
— PG/OP communication	Yes
— Routing	Yes
— Global data communication	No
— S7 basic communication	No
— S7 communication	Yes
<b>PROFIBUS DP master</b>	
• Number of connections, max.	16
• Transmission rate, max.	12 Mbit/s
• Number of DP slaves, max.	32
<b>Services</b>	
— PG/OP communication	Yes
— Routing	Yes
— Global data communication	No
— S7 basic communication	No
— S7 communication	Yes
— Equidistance	No
— SYNC/FREEZE	No
— Activation/deactivation of DP slaves	No
— Direct data exchange (slave-to-slave communication)	No
<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>	
• Number of connections	No configuration of CPU as DP slave
<b>3. Interface</b>	
Interface type	Pluggable synchronization submodule (FO)
Plug-in interface modules	Synchronization submodule IF 960 6ES7960-1AA04-0XA0
<b>4. Interface</b>	
Interface type	Pluggable synchronization submodule (FO)
Plug-in interface modules	Synchronization submodule IF 960 6ES7960-1AA04-0XA0
<b>Protocols</b>	
<b>SIMATIC communication</b>	
• S7 routing	Yes
<b>Isochronous mode</b>	
Equidistance	No
<b>Communication functions</b>	
<b>PG/OP communication</b>	
• Number of connectable OPs without message processing	15
• Number of connectable OPs with message processing	8
<b>Global data communication</b>	
• supported	No
<b>S7 basic communication</b>	
• supported	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.	24/24
<b>Standard communication (FMS)</b>	
• supported	Yes; Via CP and loadable FB
<b>Number of connections</b>	
• overall	16
• 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
<b>S7 message functions</b>	
Number of login stations for message functions, max.	8
Symbol-related messages	No
Program alarms	Yes
simultaneously active Alarm-S blocks, max.	100
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
<b>Test commissioning functions</b>	
Status block	Yes
Single step	Yes
Number of breakpoints	4
<b>Status/control</b>	
• Status/control variable	Yes
• Variables	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters
• Number of variables, max.	70
<b>Forcing</b>	
• Forcing	Yes
• Forcing, variables	Inputs/outputs, bit memories, distributed I/Os
• Number of variables, max.	256
<b>Diagnostic buffer</b>	
• present	Yes
• Number of entries, max.	3 200
— adjustable	Yes
— preset	120
<b>Configuration</b>	
<b>Configuration software</b>	
• STEP 7	Yes
<b>Programming</b>	
• Command set	see instruction list
• Nesting levels	8
• Access to consistent data in process image	Yes
• System functions (SFC)	see instruction list
• System function blocks (SFB)	see instruction list
<b>Programming language</b>	
— LAD	Yes
— FBD	Yes
— STL	Yes
— SCL	Yes
— CFC	Yes
— GRAPH	Yes
— HiGraph®	Yes
<b>Number of simultaneously active SFCs</b>	
— RD_REC	8
— WR_REC	8
— WR_PARM	8
— PARM_MOD	1
— WR_DPARM	2
— DPNRM_DG	8
— RDSYSST	8

— DP_TOPOL	1
<b>Number of simultaneously active SFBs</b>	
— RDREC	8
— WRREC	8
<b>Know-how protection</b>	
• User program protection/password protection	Yes
<b>Dimensions</b>	
Width	50 mm
Height	290 mm
Depth	219 mm
<b>Weights</b>	
Weight, approx.	990 g
<b>last modified:</b>	7/28/2021 