



***** 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	
• Isochronous mode	No
Engineering with	
• Programming package	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	
• integrated	768 kbyte
• integrated (for program)	512 kbyte
• integrated (for data)	256 kbyte
• expandable	No
Load memory	
• expandable FEPRAM	Yes
• expandable FEPRAM, max.	64 Mbyte
• integrated RAM, max.	256 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.	190 µA; Valid up to 40°C

• Backup current, max.	660 µA
• 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.	0.075 µs
for word operations, typ.	0.075 µs
for fixed point arithmetic, typ.	0.075 µs
for floating point arithmetic, typ.	0.225 µs

CPU-blocks

DB	
• Number, max.	4 095; Number range: 1 to 4095
• Size, max.	64 kbyte
FB	
• Number, max.	2 048; Number range: 0 to 2047
• Size, max.	64 kbyte
FC	
• Number, max.	2 048; Number range: 0 to 2047
• Size, max.	64 kbyte
OB	
• Size, max.	64 kbyte
• Number of time alarm OBs	4
• Number of delay alarm OBs	4
• Number of cyclic interrupt OBs	4
• Number of process alarm OBs	4

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
— preset	Z 0 to Z 7
Counting range	
— lower limit	0
— upper limit	999

IEC counter	
• present	Yes
• Type	SFB

S7 times	
• Number	2 048
Retentivity	
— adjustable	Yes
— preset	No times retentive
Time range	
— lower limit	10 ms
— upper limit	9 990 s

IEC timer	
• present	Yes
• Type	SFB

Data areas and their retentivity

Retentive data area (incl. timers, counters, flags), max.	Total working and load memory (with backup battery)
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Flag	
• Size, max.	8 kbyte
• 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	15 without message processing, 8 with message processing
Multicomputing	No
Interface modules	
• Number of connectable IMs (total), max.	6
• Number of connectable IM 460s, max.	6
• Number of connectable IM 463s, max.	4; Single mode only
Number of DP masters	
• integrated	1
• via CP	10
• Mixed mode IM + CP permitted	No
• via interface module	0
Number of operable FMs and CPs (recommended)	
• FM	See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections
• CP, PtP	See manual Automation System S7-400H fault-tolerant systems. Limited by number of slots and number of connections
• 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	8
• Number/Number range	0 to 7
• Range of values	0 to 32767 hours
• Granularity	1 h
• retentive	Yes
Clock synchronization	
• 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
Time difference in system when synchronizing via	
• MPI, max.	200 ms

Interfaces

Number of RS 485 interfaces	2
Number of other interfaces	0
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 slave	No

MPI

• Number of connections	16
• Transmission rate, max.	12 Mbit/s

Services

— PG/OP communication	Yes
— Routing	Yes
— Global data communication	No
— S7 basic communication	No
— S7 communication	Yes

PROFIBUS DP master

• Number of connections, max.	16
• 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
— Equidistance	No
— SYNC/FREEZE	No
— Activation/deactivation of DP slaves	No
— Direct data exchange (slave-to-slave communication)	No

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
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3. Interface

Interface type	Pluggable synchronization submodule (FO)
Plug-in interface modules	Synchronization submodule IF 960 6ES7960-1AA04-0XA0

4. Interface

Interface type	Pluggable synchronization submodule (FO)
Plug-in interface modules	Synchronization submodule IF 960 6ES7960-1AA04-0XA0

Protocols	
SIMATIC communication	
• S7 routing	Yes
Isochronous mode	
Equidistance	No
communication functions / header	
PG/OP communication	Yes
• Number of connectable OPs without message processing	15
• Number of connectable OPs with message processing	8
Global data communication	
• supported	No
S7 basic communication	
• communication function / S7 basic communication	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.	24/24
Standard communication (FMS)	
• supported	Yes; Via CP and loadable FB
Number of connections	
• 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
S7 message functions	
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
Test commissioning functions	
Status block	Yes
Single step	Yes
Number of breakpoints	4
Status/control	

<ul style="list-style-type: none"> • Status/control variable • Variables • Number of variables, max. 	Yes Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters 70
Forcing	
<ul style="list-style-type: none"> • Forcing • Forcing, variables • Number of variables, max. 	Yes Inputs/outputs, bit memories, distributed I/Os 256
Diagnostic buffer	
<ul style="list-style-type: none"> • present • Number of entries, max. <ul style="list-style-type: none"> — adjustable — preset 	Yes 3 200 Yes 120
configuration / header	
Configuration software	
<ul style="list-style-type: none"> • STEP 7 	Yes
configuration / programming / header	
<ul style="list-style-type: none"> • Command set • Nesting levels • Access to consistent data in process image • System functions (SFC) • System function blocks (SFB) 	see instruction list 8 Yes see instruction list see instruction list
Programming language	
<ul style="list-style-type: none"> — LAD — FBD — STL — SCL — CFC — GRAPH — HiGraph® 	Yes Yes Yes Yes Yes Yes Yes
configuration / programming / number of simultaneously active SFC / header	
<ul style="list-style-type: none"> — RD_REC — WR_REC — WR_PARM — PARM_MOD — WR_DPARM — DPNRM_DG — RDSYSST — DP_TOPOL 	8 8 8 1 2 8 8 1
configuration / programming / number of simultaneously active SFB / header	
<ul style="list-style-type: none"> — RDREC — WRREC 	8 8
Know-how protection	
<ul style="list-style-type: none"> • User program protection/password protection 	Yes
Dimensions	
Width	50 mm
Height	290 mm
Depth	219 mm
Weights	
Weight, approx.	990 g

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