



***** Replacement part ***** SIMATIC S7-400, CPU 412-2 PN Central processing unit with: work memory 1 MB, (0.5 MB code, 0.5 MB data), interfaces 1st interface MPI/DP 12 Mbit/s, (X1), 2nd interface Ethernet/PROFINET (X5)

General information	
Product type designation	CPU 412-2 PN
HW functional status	01
Firmware version	V6.0
Product function	
• Isochronous mode	Yes; Via PROFIBUS DP or PROFINET interface
Engineering with	
• Programming package	STEP 7 V5.5 or higher/iMap V3.0 + iMap STEP 7 Add-on V3.0 SP5 or higher
CiR - Configuration in RUN	
CiR synchronization time, basic load	100 ms
CiR synchronization time, time per I/O byte	30 µs; Time per I/O byte
Supply voltage	
Rated value (DC)	Power supply via system power supply
Input current	
from backplane bus 5 V DC, typ.	1.1 A
from backplane bus 5 V DC, max.	1.3 A
from backplane bus 24 V DC, max.	150 mA; 150 mA per DP interface
from interface 5 V DC, max.	90 mA; At the DP interface
Power loss	
Power loss, typ.	5.5 W
Storage	
Type of memory	RAM
Work memory	
• integrated	1 Mbyte
• integrated (for program)	0.5 Mbyte
• integrated (for data)	0.5 Mbyte
• expandable	No
Load memory	
• expandable FEPRM	Yes; with Memory Card (FLASH)
• expandable FEPRM, max.	64 Mbyte
• integrated RAM, max.	512 kbyte
• expandable RAM	Yes; with Memory Card (RAM)
• expandable RAM, max.	64 Mbyte
Backup	
• present	Yes
• with battery	Yes; all data
• without battery	No
Battery	
Backup battery	

• Backup current, typ. • Backup current, max. • Backup time, max.	125 µA; up to 40 °C 450 µA 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.	75 ns
for word operations, typ.	75 ns
for fixed point arithmetic, typ.	75 ns
for floating point arithmetic, typ.	225 ns
CPU-blocks	
DB	
• Number, max. • Size, max.	3 000; Number range: 1 to 16000 64 kbyte
FB	
• Number, max. • Size, max.	1 500; Number range: 0 to 7999 64 kbyte
FC	
• Number, max. • Size, max.	1 500; Number range: 0 to 7999 64 kbyte
OB	
• 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 isochronous mode OBs • Number of multicomputing OBs • Number of background OBs • Number of startup OBs • Number of asynchronous error OBs • Number of synchronous error OBs	see instruction list 64 kbyte 1; OB 1 2; OB 10, 11 2; OB 20, 21 2; OB 32, 35 (shortest cycle that can be set = 500 µs) 2; OB 40, 41 3; OB 55-57 2; OB 61-62 1; OB 60 1; OB 90 3; OB 100-102 9; OB 80-88 2; OB 121, 122
Nesting depth	
• per priority class • additional within an error OB	24 1
Counters, timers and their retentivity	
S7 counter	
• Number	2 048
Retentivity	
— can be set	Yes
— preset	Z 0 to Z 7
Counting range	
— lower limit	0
— upper limit	999
IEC counter	
• present • Type • Number	Yes SFB Unlimited (limited only by RAM capacity)
S7 timer	
• 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
• 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	
• Size, max.	4 kbyte; Size of bit memory address area
• Retentivity available	Yes
• Retentivity preset	MB 0 to MB 15
• Number of clock memories	8; in 1 memory byte
Local data	
• adjustable, max.	8 kbyte
• preset	4 kbyte
Address area	
I/O address area	
• Inputs	4 kbyte
• Outputs	4 kbyte
Process image	
• Inputs, adjustable	4 kbyte
• Outputs, adjustable	4 kbyte
• Inputs, default	128 kbyte
• Outputs, default	128 kbyte
• consistent data, max.	244 byte
• Access to consistent data in process image	Yes
Subprocess images	
• Number of subprocess images, max.	15
Digital channels	
• Inputs	32 768
— of which central	32 768
• Outputs	32 768
— of which central	32 768
Analog channels	
• Inputs	2 048
— of which central	2 048
• Outputs	2 048
— of which central	2 048
Hardware configuration	
Integrated power supply	No
Number of expansion units, max.	21
connectable OPs	47
Multicomputing	Yes; 4 CPUs max. (with UR1 or UR2)
Interface modules	
• Number of connectable IMs (total), max.	6
• Number of connectable IM 460s, max.	6
• Number of connectable IM 463s, max.	4; IM 463-2
Number of DP masters	
• integrated	1
• via CP	10; CP 443-5 Extended
• via IM 467	4
• Mixed mode IM + CP permitted	No; IM 467 not suitable for use with CP 443-5 Ext. and CP 443-1 EX4x, EX20, GX20 (in PROFINET IO mode)
• via interface module	0
• Number of pluggable S5 modules (via adapter capsule in central device), max.	6
Number of IO Controllers	
• Integrated	1
• Via CP	4; No mixed operation of CP443-1 EX40 and CP443-1 EX 41/EX20/GX20, max. 4 in central controller
Number of operable FMs and CPs (recommended)	

- FM
- CP, PtP
- PROFIBUS and Ethernet CPs

Limited by number of slots and number of connections
 CP 440: Limited by number of slots; CP 441: Limited by number of slots and number of connections
 14; In total max. 10 CPs as DP master and PROFINET controller, of which up to 10 IMs or CPs as DP master and up to 4 CPs as PROFINET controller

Slots

- required slots

1

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; For 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 2³¹ - 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
- MPI, max. 200 ms

Interfaces

Interfaces/bus type	1 x MPI/PROFIBUS DP, 1 x PROFINET (2 ports)
Number of RS 485 interfaces	1
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 device Yes

MPI

- Number of connections 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

Services

- PG/OP communication Yes
- Routing Yes
- Global data communication Yes
- S7 basic communication Yes
- S7 communication Yes
- S7 communication, as client Yes
- S7 communication, as server Yes

PROFIBUS DP master

• Number of connections, max.	16; 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	Yes
— S7 communication	Yes
— S7 communication, as client	Yes
— S7 communication, as server	Yes
— Equidistance	Yes
— Isochronous mode	Yes
— SYNC/FREEZE	Yes
— activation/deactivation of DP devices	Yes
— Direct data exchange (slave-to-slave communication)	Yes
— 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	16
• GSD file	http://support.automation.siemens.com/WW/view/en/113652
• Transmission rate, max.	12 Mbit/s
• automatic baud rate search	No
• Address area, max.	32; Virtual slots
• User data per address area, max.	32 byte
— of which consistent, max.	32 byte
Services	
— PG/OP communication	Yes; with interface active
— Routing	Yes; with interface active
— Global data communication	No
— S7 basic communication	No
— S7 communication	Yes
— S7 communication, as client	Yes
— S7 communication, as server	Yes
— Direct data exchange (slave-to-slave communication)	No
— DPV1	No
Transfer memory	
— Inputs	244 byte
— Outputs	244 byte
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	Yes; Assignment by higher-level IO-Controller or by the user program with SFB104 "IP_CONF"
Interface types	
• RJ 45 (Ethernet)	Yes

• Number of ports	2
• integrated switch	Yes
Protocols	
• PROFINET IO Controller	Yes
• PROFINET IO device	Yes
• PROFINET CBA	Yes
• PROFIBUS DP master	No
• PROFIBUS DP device	No
• Open IE communication	Yes
• Web server	Yes
• 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	Yes; Only with IRT and the High Performance option
— Shared device	Yes
— Prioritized startup	Yes
— Number of IO devices with prioritized startup, max.	32
— Number of connectable IO Devices, max.	256
— Of which IO devices with IRT, max.	64
— of which in line, max.	64
— Number of IO Devices with IRT and the option "high flexibility"	256
— of which in line, max.	61
— Number of connectable IO Devices for RT, max.	256
— of which in line, max.	256
— Activation/deactivation of IO Devices	Yes
— Number of IO Devices that can be simultaneously activated/deactivated, max.	8
— IO Devices changing during operation (partner ports), supported	Yes
— Number of IO Devices per tool, max.	8; 8 parallel calls of the SFC 12 "D_ACT_DP" possible per line. Max. 32 IO Devices changing during operation (partner ports) are supported
— Device replacement without swap medium	Yes
— Send cycles	250 µs, 500 µs, 1 ms, 2 ms, 4 ms additionally with IRT with high performance: 250 µs to 4 ms in 125 µs frame
— Updating time	250 µs to 512 ms; minimum value depends on preset communication share for PROFINET IO, on the number of IO Devices and on the amount of configured user data, see PROFINET system description
Address area	
— Inputs, max.	4 kbyte
— Outputs, max.	4 kbyte
— User data consistency, max.	1 024 byte
PROFINET IO Device	
Services	
— PG/OP communication	Yes
— S7 communication	Yes
— Isochronous mode	No
— IRT	Yes
— Prioritized startup	Yes
— Shared device	Yes
— Number of IO Controllers with shared device, max.	2
Transfer memory	
— Inputs, max.	1 440 byte; Per IO Controller with shared device
— Outputs, max.	1 440 byte; Per IO Controller with shared device
Submodules	
— Number, max.	64
— User data per submodule, max.	1 024 byte

PROFINET CBA	
• acyclic transmission	Yes
• cyclic transmission	Yes
Open IE communication	
• Number of connections, max.	46
• Local port numbers used at the system end	0, 20, 21, 25, 80, 102, 135, 161, 34962, 34963, 34964, 65532, 65533, 65534, 65535
• Keep-alive function, supported	Yes
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.	46
— 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 Adv. and loadable FBs
— Number of connections, max.	46
— 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.	46
— Data length, max.	1 472 byte
Web server	
• supported	Yes
• User-defined websites	Yes
• Number of HTTP clients	5
Isochronous mode	
Equidistance	Yes
Number of DP masters with isochronous mode	1
User data per isochronous slave, max.	244 byte
shortest clock pulse	1.5 ms; 0.5 ms without use of SFC 126, 127
max. cycle	32 ms
Communication functions	
PG/OP communication	
• Number of connectable OPs with message processing	Yes
• Number of connectable OPs without message processing	47; When using Alarm_S/SQ and Alarm_D/DQ
Data record routing	47
Global data communication	
• supported	Yes
• Number of GD loops, max.	8
• Number of GD packets, transmitter, max.	8
• Number of GD packets, receiver, max.	16
• Size of GD packets, max.	54 byte
• Size of GD packet (of which consistent), max.	1 variable
S7 basic communication	
• supported	Yes
• User data per job, max.	76 byte
• User data per job (of which consistent), max.	1 variable
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 • User data per job, max. • User data per job (of which consistent), max. • Number of simultaneous AG-SEND/AG-RECV orders per CPU, max.	Yes; Via FC AG_SEND and AG_RECV, max. via 10 CP 443-1 or 443-5 8 kbyte 240 byte 24/24
Standard communication (FMS)	
• supported	Yes; Via CP and loadable FB
PROFINET CBA (at set setpoint communication load)	
• Setpoint for the CPU communication load • Number of remote interconnection partners • number of master/device functions • total of all master/device connections • data length of all incoming master/device connections, max. • data length of all outgoing master/device connections, max. • Number of device-internal and PROFIBUS interconnections • Data length of device-internal und PROFIBUS interconnections, max. • Data length per connection, max.	20 % 32 150 4 500 45 000 byte 45 000 byte 1 000 16 000 byte 2 000 byte
Remote interconnections with cyclic transmission	
— Transmission frequency: Transmission interval, min. — Number of incoming interconnections — Number of outgoing interconnections — Data length of all incoming interconnections, max. — Data length of all outgoing interconnections, max. — Data length per connection, max.	1 ms; Depending on preset communication load, number of interconnections and data length used 300 300 4 800 byte 4 800 byte 450 byte
HMI variables via PROFINET (acyclic)	
— Number of stations that can log on for HMI variables (PN OPC/iMap) — HMI variable updating — Number of HMI variables — Data length of all HMI variables, max.	2x PN OPC/1x iMap 500 ms 1 000 32 000 byte
PROFIBUS proxy functionality	
— supported — Data length per connection, max.	Yes; 32 PROFIBUS slaves max. connectable 240 byte; Slave-dependent
Number of connections	
• overall • usable for PG communication — reserved for PG communication — adjustable for PG communication, max. • usable for OP communication — reserved for OP communication — adjustable for OP communication, max. • usable for S7 basic communication — reserved for S7 basic communication — adjustable for S7 basic communication, max. • usable for S7 communication — reserved for S7 communication — adjustable for S7 communication, max. • usable for routing — reserved for routing — adjustable for routing, max.	48 1 0 1 0 0 0 0 0 0 0
S7 message functions	
Number of login stations for message functions, max.	47; 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	Yes
SCAN procedure	Yes
Program alarms	Yes

Process diagnostic messages	Yes
simultaneously active Alarm_S blocks, max.	250; 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.	300
• preset, max.	150
Process control messages	Yes
Number of archives that can log on simultaneously (SFB 37 AR_SEND)	4
Number of messages	
• overall, max.	256
• in 100 ms grid, max.	0
• in 500 ms grid, max.	256
• in 1000 ms grid, max.	256
Number of additional values	
• with 100 ms grid, max.	0
• with 500, 1000 ms grid, max.	1
Test commissioning functions	
Status block	Yes; Up to 16 simultaneously
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; Status/control
Forcing	
• Forcing	Yes
• Forcing, variables	Inputs/outputs, bit memories, distributed I/Os
• Number of variables, max.	64
Diagnostic buffer	
• present	Yes
• Number of entries, max.	400
— 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
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	
— DPSYC_FR	2

— D_ACT_DP	8				
— 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	25 mm				
Height	290 mm				
Depth	219 mm				
Weights					
Weight, approx.	750 g				
Classifications					
		Version	Classification		
	eClass	16	27-24-22-07		
	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					
		Miscellaneous			China RoHS
General Product Approval	EMV	For use in hazardous locations			
Manufacturer Declaration					FM
For use in hazardous locations		Maritime application			



IECEX

[Type Examination Certificate](#)



ATEX



Maritime application



[CCS \(China Classification Society\)](#)

last modified:

7/16/2026