



SIMATIC S7-400, CPU 412-2 Central processing unit with: Work memory 1 MB, (0.5 MB code; 0.5 MB data) 1st interface MPI/DP 12 Mbit/s, 2nd interface PROFIBUS DP,

General information	
Product type designation	CPU 412-2
HW functional status	01
Firmware version	V7.0
Product function	
<ul style="list-style-type: none"> • Isochronous mode 	Yes; For PROFIBUS only
Engineering with	
<ul style="list-style-type: none"> • Programming package 	STEP 7 V5.4 or higher with HSP 261
CiR - Configuration in RUN	
CiR synchronization time, basic load	100 ms
CiR synchronization time, time per I/O byte	30 µs
Supply voltage	
Rated value (DC)	Power supply via system power supply
Input current	
from backplane bus 5 V DC, typ.	0.9 A
from backplane bus 5 V DC, max.	1.1 A
from backplane bus 24 V DC, max.	300 mA; 150 mA per DP interface
from interface 5 V DC, max.	90 mA; At each DP interface
Power loss	
Power loss, typ.	4.5 W
Storage	
Type of memory	RAM
Work memory	
<ul style="list-style-type: none"> • integrated 	1 Mbyte
<ul style="list-style-type: none"> • integrated (for program) 	512 kbyte
<ul style="list-style-type: none"> • integrated (for data) 	512 kbyte
<ul style="list-style-type: none"> • expandable 	No
Load memory	
<ul style="list-style-type: none"> • expandable FEPR0M 	Yes; with Memory Card (FLASH)
<ul style="list-style-type: none"> • expandable FEPR0M, max. 	64 Mbyte
<ul style="list-style-type: none"> • integrated RAM, max. 	512 kbyte
<ul style="list-style-type: none"> • expandable RAM 	Yes; with Memory Card (RAM)
<ul style="list-style-type: none"> • expandable RAM, max. 	64 Mbyte
Backup	
<ul style="list-style-type: none"> • present 	Yes
<ul style="list-style-type: none"> • with battery 	Yes; all data
<ul style="list-style-type: none"> • without battery 	No
Battery	
Backup battery	

• Backup current, typ.	180 µA; up to 40 °C
• Backup current, max.	850 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.	31.25 ns
for word operations, typ.	31.25 ns
for fixed point arithmetic, typ.	31.25 ns
for floating point arithmetic, typ.	62.5 ns

CPU-blocks

DB

• Number, max.	3 000; Number range: 1 to 16000
• Size, max.	64 kbyte

FB

• Number, max.	1 500; Number range: 0 to 7999
• Size, max.	64 kbyte

FC

• Number, max.	1 500; Number range: 0 to 7999
• Size, max.	64 kbyte

OB

• Number, max.	see instruction list
• Size, max.	64 kbyte
• Number of free cycle OBs	1; OB 1
• Number of time alarm OBs	2; OB 10, 11
• Number of delay alarm OBs	2; OB 20, 21
• Number of cyclic interrupt OBs	2; OB 32, 35 (shortest cycle that can be set = 500 µs)
• Number of process alarm OBs	2; OB 40, 41
• Number of DPV1 alarm OBs	3; OB 55-57
• Number of isochronous mode OBs	2; OB 61-62
• Number of multicomputing OBs	1; OB 60
• Number of background OBs	1; OB 90
• Number of startup OBs	3; OB 100-102
• Number of asynchronous error OBs	9; OB 80-88
• Number of synchronous error OBs	2; OB 121, 122

Nesting depth

• per priority class	24
• additional within an error OB	1

Counters, timers and their retentivity

S7 counter

• Number	2 048
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Retentivity

— can be set	Yes
— preset	Z 0 to Z 7

Counting range

— lower limit	0
— upper limit	999

IEC counter

• present	Yes
• Type	SFB
• Number	Unlimited (limited only by RAM capacity)

S7 timer

• Number	2 048
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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 byte
• Outputs, default	128 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	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	
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	2
• via CP	10; CP 443-5 Extended
• via IM 467	4
• Mixed mode IM + CP permitted	No; IM 467 cannot be used jointly with CP 443-5 Ext. or CP 443-1 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	0
• Via CP	4; Max. 4 in the central controller; no mixed operation of different CP 443-1 types in PROFINET IO mode
Number of operable FMs and CPs (recommended)	
• FM	Limited by number of slots and number of connections

<ul style="list-style-type: none"> • CP, PtP • PROFIBUS and Ethernet CPs 	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	
<ul style="list-style-type: none"> • required slots 	1
Time of day	
Clock	
<ul style="list-style-type: none"> • Hardware clock (real-time) • retentive and synchronizable • Resolution • Deviation per day (buffered), max. • Deviation per day (unbuffered), max. 	Yes Yes 1 ms 1.7 s; Power off 8.6 s; For power On
Operating hours counter	
<ul style="list-style-type: none"> • Number • Number/Number range • Range of values • Granularity • retentive 	16 0 to 15 SFCs 2, 3 and 4: 0 to 32767 hours SFC 101: 0 to 2 ³¹ - 1 hours 1 h Yes
Clock synchronization	
<ul style="list-style-type: none"> • supported • to MPI, master • on MPI, device • to DP, master • on DP, device • in AS, master • in AS, device • on Ethernet via NTP • to IF 964 DP 	Yes Yes Yes Yes Yes Yes Yes No; Via CP No
Time difference in system when synchronizing via	
<ul style="list-style-type: none"> • MPI, max. 	200 ms
Interfaces	
Interfaces/bus type	1 x MPI/PROFIBUS DP, 1 x PROFIBUS DP
Number of RS 485 interfaces	2; Combined MPI / PROFIBUS DP and PROFIBUS DP
1. Interface	
Interface type	MPI/PROFIBUS DP
Isolated	Yes
Interface types	
<ul style="list-style-type: none"> • RS 485 • Output current of the interface, max. 	Yes 150 mA
Protocols	
<ul style="list-style-type: none"> • MPI • PROFIBUS DP master • PROFIBUS DP device 	Yes Yes Yes
MPI	
<ul style="list-style-type: none"> • Number of connections • Transmission rate, max. 	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
Services	
<ul style="list-style-type: none"> — PG/OP communication — Routing — Global data communication — S7 basic communication — S7 communication — S7 communication, as client — S7 communication, as server 	Yes Yes Yes Yes Yes Yes Yes
PROFIBUS DP master	
<ul style="list-style-type: none"> • Number of connections, max. • Transmission rate, max. 	16; If a diagnostics repeater is used on the line, the number of connection resources on the line is reduced by 1 12 Mbit/s

• max. number of DP devices	32
Services	
— PG/OP communication	Yes
— Routing	Yes; S7 routing
— 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	PROFIBUS DP
Isolated	Yes
Interface types	
• RS 485	Yes
• Output current of the interface, max.	150 mA
Protocols	
• PROFIBUS DP master	Yes
• PROFIBUS DP device	Yes
PROFIBUS DP master	
• Number of connections, max.	16
• Transmission rate, max.	12 Mbit/s

• max. number of DP devices	64
Services	
— PG/OP communication	Yes
— Routing	Yes; S7 routing
— 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.	4 kbyte
— Outputs, max.	4 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
• Address area, max.	32
• User data per address area, max.	32 byte
— of which consistent, max.	32 byte
Services	
— Routing	Yes; with interface active
Transfer memory	
— Inputs	244 byte
— Outputs	244 byte
Protocols	
SIMATIC communication	
• S7 routing	Yes
Open IE communication	
• ISO-on-TCP (RFC1006)	Via CP 443-1 and loadable FB
— Data length, max.	1 452 bytes via CP 443-1 Adv.
Web server	
• supported	No
Isochronous mode	
Equidistance	Yes
Number of DP masters with isochronous mode	2
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	Yes
• Number of connectable OPs with message processing	47; When using Alarm_S/SQ and Alarm_D/DQ
• Number of connectable OPs without message processing	47
Data record routing	Yes
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	Yes; Via FC AG_SEND and AG_RECV, max. via 10 CP 443-1 or 443-5
• 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	48
• usable for PG communication	47
— reserved for PG communication	1
— adjustable for PG communication, max.	0
• usable for OP communication	47
— reserved for OP communication	1
— adjustable for OP communication, max.	0
• usable for S7 basic communication	46
— reserved for S7 basic communication	0
— adjustable for S7 basic communication, max.	0
• usable for S7 communication	46
— reserved for S7 communication	0
— adjustable for S7 communication, max.	0
• usable for routing	23
— reserved for routing	0
— adjustable for routing, max.	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, peripheral inputs, peripheral outputs
• Number of variables, max.	64
Diagnostic buffer	
• present	Yes
• Number of entries, max.	3 200
— can be set	Yes
— preset	120
Service data	
• Can be read out	Yes
Standards, approvals, certificates	
CE mark	Yes
CSA approval	Yes
UL approval	Yes
cULus	Yes
FM approval	Yes
RCM (formerly C-TICK)	Yes
KC approval	Yes
EAC (formerly Gost-R)	Yes
Use in hazardous areas	
• ATEX	ATEX II 3G Ex nA IIC T4 Gc
Ambient conditions	
Ambient temperature during operation	
• min.	0 °C
• max.	60 °C
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; SFC 11; per interface
— D_ACT_DP	8; SFC 12; per interface
— RD_REC	8; SFC 59; per interface
— WR_REC	8; SFC 58; per interface
— WR_PARM	8; SFC 55; per interface

— PARM_MOD	1; SFC 57; per interface
— WR_DPARM	2; SFC 56; per interface
— DPNRM_DG	8; SFC 13; per interface
— RDSYSST	8; SFC 51
— DP_TOPOL	1; SFC 103; per interface

Number of simultaneously active SFBs

— RDREC	8; SFB 52; per interface, but not more than 32 across all external interfaces
— WRREC	8; SFB 53; per interface, but not more than 32 across all external interfaces

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.	700 g
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Classifications

	Version	Classification
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

For use in hazardous locations

[Miscellaneous](#)



[FM](#)



For use in hazardous locations

Maritime application

[Type Examination Certificate](#)



Maritime application

Environment

[NK / Nippon Kaiji Kyokai](#)



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



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