Data sheet

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	
• Isochronous mode	Yes; For PROFIBUS only
Engineering with	
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)	
• 24 V DC	No; 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

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from interfece E.V.D.C. may	00 mA. At each DD interface
from interface 5 V DC, max.	90 mA; At each DP interface
Power loss	
Power loss, typ.	4.5 W
Power loss, max.	5.5 W
Memory	
Type of memory	RAM
Work memory	
• integrated	1 Mbyte
integrated (for program)	512 kbyte
• integrated (for data)	512 kbyte
• expandable	No
Load memory	
expandable FEPROM	Yes; with Memory Card (FLASH)
• expandable FEPROM, 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.	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



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FC	
Number, max.	1 500; Number range: 0 to 7999
• Size, max.	64 kbyte
ОВ	
• 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
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	
• present	Yes
• Type	SFB
• Number	Unlimited (limited only by RAM capacity)
S7 times	
Number	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	
• present	Yes
• Type	SFB
• Number	Unlimited (limited only by RAM capacity)
Data areas and their retentivity	
retentive data area in total	Total working and load memory (with backup battery)
Flag	
Number, 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

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Outputs

Analog channels

• Inputs

Outputs

- of which central

— of which central



32 768

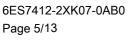
32 768

2 048

2 048

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
• CP, PtP	CP 440: Limited by number of slots; CP 441: Limited by number of slots and number of connections
PROFIBUS and Ethernet CPs	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 2^31 - 1 hours

Granularity	1 h
•	Yes
• retentive Clock synchronization	165
• supported	Yes
• to MPI, master	Yes
• to MPI, slave	Yes
	Yes
• to DP, master	Yes
• to DP, slave	Yes
• in AS, master	Yes
• in AS, slave	
on Ethernet via NTP	No; Via CP
• to IF 964 DP	No
Time difference in system when synchronizing via	200 ms
● MPI, max.	200 IIIS
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	Integrated
Physics	RS 485 / PROFIBUS + MPI
Isolated	Yes
Power supply to interface (15 to 30 V DC), max.	150 mA
Protocols	
• MPI	Yes
 PROFIBUS DP master 	Yes
 PROFIBUS DP slave 	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	V
— 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



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connection resources on the line is reduced by 1

 Transmission rate, max. 	12 Mbit/s
• Number of DP slaves, max.	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 slaves 	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 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
ROFIBUS DP slave	
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

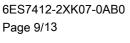


Yes
No
No
244 byte
244 byte

2. Interface	
Interface type	Integrated
Physics	RS 485 / PROFIBUS
Isolated	Yes
Power supply to interface (15 to 30 V DC), max.	150 mA
Number of connection resources	16
Protocols	
 PROFIBUS DP master 	Yes
 PROFIBUS DP slave 	Yes
PROFIBUS DP master	
Number of connections, max.	16
Transmission rate, max.	12 Mbit/s
Number of DP slaves, max.	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 slaves 	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 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	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
- Carpate	
Protocols	
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 without message	47
processing	
Number of connectable OPs with message	47; When using Alarm_S/SQ and Alarm_D/DQ
processing	
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.

• Size of GD packet (of which consistent), max.

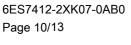


54 byte

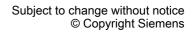
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1 variable

S7 basic communication	
• supported	Yes
User data per job, max.	76 byte
User data per job (of which consistent), max.	1 variable
S7 communication	1 Vallable
• 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	102 Syte, 1 variable
• 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
est 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
— adjustable	Yes
— preset	120
Service data	
• can be read out	
	Yes
Standards, approvals, certificates	Yes
	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 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	





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— 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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last modified:

