



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)	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
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 EEPROM	Yes; with Memory Card (FLASH)
• expandable EEPROM, 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
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 multicompacting 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
— 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
— preset	No times retentive
Time range	
— lower limit	10 ms
— upper limit	9 990 s
IEC timer	
• present	Yes

- Type
- Number

SFB
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	
<ul style="list-style-type: none"> • Size, max. • Retentivity available • Retentivity preset • Number of clock memories 	4 kbyte; Size of bit memory address area Yes MB 0 to MB 15 8; in 1 memory byte
Local data	
<ul style="list-style-type: none"> • adjustable, max. • preset 	8 kbyte 4 kbyte
Address area	
I/O address area	
<ul style="list-style-type: none"> • Inputs • Outputs 	4 kbyte 4 kbyte
Process image	
<ul style="list-style-type: none"> • Inputs, adjustable • Outputs, adjustable • Inputs, default • Outputs, default • consistent data, max. • Access to consistent data in process image 	4 kbyte 4 kbyte 128 byte 128 byte 244 byte Yes
Subprocess images	
<ul style="list-style-type: none"> • Number of subprocess images, max. 	15
Digital channels	
<ul style="list-style-type: none"> • Inputs — of which central • Outputs — of which central 	32 768 32 768 32 768 32 768
Analog channels	
<ul style="list-style-type: none"> • Inputs — of which central • Outputs — of which central 	2 048 2 048 2 048 2 048
Hardware configuration	
Number of expansion units, max.	21
connectable OPs	47
Multicomputing	Yes; 4 CPUs max. (with UR1 or UR2)
Interface modules	
<ul style="list-style-type: none"> • Number of connectable IMs (total), max. • Number of connectable IM 460s, max. • Number of connectable IM 463s, max. 	6 6 4; IM 463-2
Number of DP masters	
<ul style="list-style-type: none"> • integrated • via CP • via IM 467 • Mixed mode IM + CP permitted • via interface module • Number of pluggable S5 modules (via adapter capsule in central device), max. 	2 10; CP 443-5 Extended 4 No; IM 467 cannot be used jointly with CP 443-5 Ext. or CP 443-1 in PROFINET IO mode 0 6
Number of IO Controllers	
<ul style="list-style-type: none"> • integrated • via CP 	0 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)	
<ul style="list-style-type: none"> • 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	<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. 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 • to MPI, slave • to DP, master • to DP, slave • in AS, master • in AS, slave • on Ethernet via NTP • to IF 964 DP 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Yes 150 mA 	
Protocols		
<ul style="list-style-type: none"> • MPI • PROFIBUS DP master • PROFIBUS DP slave 	<ul style="list-style-type: none"> Yes Yes Yes 	
MPI		
<ul style="list-style-type: none"> • Number of connections • Transmission rate, max. 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Yes Yes Yes Yes Yes Yes Yes 	
PROFIBUS DP master		
<ul style="list-style-type: none"> • Number of connections, max. • Transmission rate, max. • Number of DP slaves, max. 	<ul style="list-style-type: none"> 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 32 	
Services		
<ul style="list-style-type: none"> — PG/OP communication — Routing — Global data communication 	<ul style="list-style-type: none"> Yes Yes; S7 routing 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
PROFIBUS 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
— 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 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
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 / header	
PG/OP communication	
• Number of connectable OPs without message processing	47
• Number of connectable OPs with message processing	47; When using Alarm_S/SQ and Alarm_D/DQ
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	
• communication function / S7 basic communication	Yes
• User data per job, max.	76 byte
• User data per job (of which consistent), max.	1 variable
S7 communication	