



SIMATIC S7-400, CPU 412-2 CENTRAL PROCESSING UNIT WITH:
 512 KB WORKING MEMORY, (256 KB CODE, 256 KB DATA), 1.
 INTERFACE MPI/DP 12 MBIT/S, 2. INTERFACE PROFIBUS DP

Figure similar

Product type designation	
General information	
Firmware version	V5.0
Engineering with	
<ul style="list-style-type: none"> Programming package 	STEP7 V 5.3 SP2 or higher with HW update
CiR - Configuration in RUN	
CiR synchronization time, basic load	100 ms
CiR synchronization time, time per I/O byte	200 µs
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 losses	
Power loss, typ.	4 W
Memory	
Type of memory	other
Work memory	
<ul style="list-style-type: none"> Integrated integrated (for program) integrated (for data) expandable 	512 kbyte 256 kbyte 256 kbyte No
Load memory	

• expandable FEPRM	Yes
• expandable FEPRM, max.	64 Mbyte
• integrated RAM, max.	512 kbyte
• expandable RAM	Yes
• expandable RAM, max.	64 Mbyte

Backup	
• present	Yes
• with battery	Yes
• without battery	No

Battery

Backup battery	
• Backup current, typ.	125 µA; Valid up to 40°C
• Backup current, max.	550 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 to 15 VDC

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.	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 time alarm OBs	2
• Number of delay alarm OBs	2
• Number of time interrupt OBs	2
• Number of process alarm OBs	2
• Number isochronous mode OBs	2
• Number of multicomputing OBs	1

Nesting depth	
• per priority class	24

- additional within an error OB

1

Counters, timers and their retentivity

S7 counter	
• Number	2 048
Retentivity	
— can be set	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
S7 times	
• Number	2 048
Retentivity	
— can be set	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
Data areas and their retentivity	
Total retentive data area	Total working and load memory (with backup battery)
Flag	
• Number, max.	4 kbyte
• Retentivity available	Yes
• Retentivity preset	MB 0 to MB 15
• Number of clock memories	8; in 1 memory byte
Data blocks	
• Number, max.	3 000; Number range: 1 to 16000
• Size, max.	64 kbyte
Local data	
• adjustable, max.	8 kbyte
• preset	4 kbyte

Address area	
I/O address area	
• Inputs	4 kbyte
• Outputs	4 kbyte
of which, distributed	
— MPI/DP interface, inputs	2 kbyte
— MPI/DP interface, outputs	2 kbyte
— DP interface, inputs	4 kbyte
— DP interface, 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
— Inputs, of which central	32 768
• Outputs	32 768
— Outputs, of which central	32 768
Analog channels	
• Inputs	2 048
— Inputs, of which central	2 048
• Outputs	2 048
— Outputs, of which central	2 048
Hardware configuration	
Expansion devices, max.	21
connectable OPs	31
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 IM 467	4
• Via CP	10; CP 443-5 Extended

<ul style="list-style-type: none"> Mixed mode IM + CP permitted 	No; IM 467 cannot be used with CP 443-5 Ext., IM 467 cannot be used with CP 443-1 EX40 in PROFINET IO mode
<ul style="list-style-type: none"> via interface module 	0
<ul style="list-style-type: none"> Number of pluggable S5 modules (via adapter capsule in central device), max. 	6
Number of IO Controllers	
<ul style="list-style-type: none"> Via CP 	Via CP 443-1 EX 41 in PROFINET mode; max. 4 in central controller
Number of operable FMs and CPs (recommended)	
<ul style="list-style-type: none"> FM 	Limited by number of slots and number of connections
<ul style="list-style-type: none"> CP, point-to-point 	Limited by number of slots and number of connections
<ul style="list-style-type: none"> PROFIBUS and Ethernet CPs 	14; Of which 10 CP or IM max. as DP master and 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 clock) 	Yes
<ul style="list-style-type: none"> battery-backed and synchronizable 	Yes
<ul style="list-style-type: none"> Resolution 	1 ms
<ul style="list-style-type: none"> Deviation per day (buffered), max. 	1.7 s; Power off
<ul style="list-style-type: none"> Deviation per day (unbuffered) max. 	8.6 s; For power On
Operating hours counter	
<ul style="list-style-type: none"> Number 	8
<ul style="list-style-type: none"> Number/Number range 	0 to 7
<ul style="list-style-type: none"> Range of values 	0 to 32767 hours
<ul style="list-style-type: none"> Granularity 	1 hour
<ul style="list-style-type: none"> retentive 	Yes
Clock synchronization	
<ul style="list-style-type: none"> supported 	Yes
<ul style="list-style-type: none"> to MPI, master 	Yes
<ul style="list-style-type: none"> to MPI, slave 	Yes
<ul style="list-style-type: none"> to DP, master 	Yes
<ul style="list-style-type: none"> to DP, slave 	Yes
<ul style="list-style-type: none"> in AS, master 	Yes
<ul style="list-style-type: none"> in AS, slave 	Yes
<ul style="list-style-type: none"> on Ethernet via NTP 	Via CP
Time difference in system when synchronizing via	
<ul style="list-style-type: none"> MPI, max. 	200 ms
Interfaces	
Number of RS 485 interfaces	2
Number of other interfaces	0

1st 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	MPI: 32, DP: 16
Functionality	
• MPI	Yes
• DP master	Yes
• DP slave	Yes
MPI	
• Number of connections	32
• Transmission rate, max.	12 Mbit/s
Services	
— PG/OP communication	Yes
— Routing	Yes
— Global data communication	Yes
— S7 basic communication	Yes
— S7 communication	Yes
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
— S7 basic communication	Yes
— S7 communication	Yes
— Equidistance mode support	Yes
— SYNC/FREEZE	Yes
— Activation/deactivation of DP slaves	Yes
— Direct data exchange (slave-to-slave communication)	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
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
• User data per address area, of which consistent, max.	32 byte
Services	
— PG/OP communication	Yes
— Routing	Yes
Transfer memory	
— Inputs	244 byte
— Outputs	244 byte
2nd 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
Functionality	
• DP master	Yes
• DP slave	Yes
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
— Global data communication	No
— S7 basic communication	Yes
— S7 communication	Yes
— Equidistance mode support	Yes
— SYNC/FREEZE	Yes
— Activation/deactivation of DP slaves	Yes
— Direct data exchange (slave-to-slave communication)	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
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
• User data per address area, of which consistent, max.	32 byte
Services	
— Routing	Yes
Transfer memory	
— Inputs	244 byte
— Outputs	244 byte
Isochronous mode	
Isochronous operation (application synchronized up to terminal)	Yes
User data per isochronous slave, max.	244 byte
equidistance	Yes
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 processing	31
• Number of connectable OPs with message processing	31; When using alarm_S and alarm_D
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
• 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
Open IE communication	
• ISO-on-TCP (RFC1006)	Via CP 443-1 Adv. and loadable FB
— Data length, max.	1452
Web server	
• supported	No; Via CP
Number of connections	
• overall	32
• usable for PG communication	
— reserved for PG communication	1
• usable for OP communication	
— reserved for OP communication	1
S7 message functions	
Number of login stations for message functions, max.	31; Max. 31 with alarm_S and alarm_D (OP's); max. 8 with alarm_8 and alarm_P (e.g. WinCC)
Symbol-related messages	Yes
Block related messages	Yes
simultaneously active Alarm-S blocks, max.	70
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.	512
• 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
Single step	Yes
Number of breakpoints	4
Status/control	
• Status/control variable	Yes
• Variables	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters
• Number of variables, max.	70
Forcing	
• Forcing	Yes
• Force, 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
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	4
— 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

Dimensions

Width	25 mm
Height	290 mm
Depth	219 mm

Weights

Weight, approx.	720 g
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last modified: 12.03.2015