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Data sheet 6ES7412-1XF04-0AB0

SIMATIC S7-400, CPU 412-1 CENTRAL PROCESSING UNIT WITH: 144 KB WORKING MEMORY, (72 KB CODE, 72 KB DATA), INTERFACE MPI/DP 12 MBIT/S



General information	
Firmware version	V4.0
Engineering with	
• Programming package	STEP 7 V5.2 SP1 HF3 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
Supply voltage	
Rated value (DC)	
• 24 V DC	Yes
Input current	
from backplane bus 5 V DC, typ.	0.6 A
from backplane bus 5 V DC, max.	0.7 A
from backplane bus 24 V DC, max.	The CPU uses no current at 24 V, it provides this voltage only at the MPI-/DP interface.
Power loss	
Power loss, typ.	3 W

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Memory	
Work memory	
• integrated (for program)	72 kbyte
• integrated (for data)	72 kbyte
• expandable	No
Load memory	
• expandable FEPROM	Yes; with Memory Card (FLASH)
• expandable FEPROM, max.	64 Mbyte
• integrated RAM, max.	256 kbyte
• expandable RAM	Yes; with Memory Card (RAM)
• expandable RAM, max.	16 Mbyte
Backup	
• present	Yes
• with battery	Yes; all data
• without battery	No
Battery	
Backup battery	
• Backup current, typ.	350 µA
• Backup current, max.	890 µA
• Backup time, max.	226 d
• Feeding of external backup voltage to CPU	5 V DC to 15 V DC
CPU processing times	
for bit operations, typ.	0.1 µs
for word operations, typ.	0.1 µs
for fixed point arithmetic, typ.	0.1 µs
for floating point arithmetic, typ.	0.3 µs
CPU-blocks	
DB	
• Number, max.	512; DB 0 reserved
• Size, max.	64 kbyte
FB	
• Number, max.	256
• Size, max.	64 kbyte
FC	
• Number, max.	256
• Size, max.	64 kbyte
OB	
• Number, max.	see instruction list
• Size, max.	64 kbyte
Nesting depth	
• per priority class	24

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• 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
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

Data areas and their retentivity	
retentive data area in total	Total working and load memory (with backup battery)
Flag	
• Number, max.	4 kbyte
• Retentivity available	Yes; From MB 0 to MB 4095
• Retentivity preset	MB 0 to MB 15
• Number of clock memories	8; 1 memory byte
Data blocks	
• Number, max.	512; DB 0 reserved
• Size, max.	64 kbyte
Local data	
• adjustable, max.	8 byte
• preset	4 byte

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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
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; of which 6 ER with K-bus
connectable OPs	15 without message processing, 8 with message processing
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 cannot be used jointly with CP 443-5 Ext.
• via interface module	0

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• Number of pluggable S5 modules (via adapter capsule in central device), max.	6
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 connections
• CP, LAN	Limited by number of slots and number of connections
• PROFIBUS and Ethernet CPs	14; incl. CP 443-5 Ext. and IM 467
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; Power on
Operating hours counter	
• Number	8
• Number/Number range	0 to 7
• Range of values	0 to 32767 hours
• Granularity	1 hour
• retentive	Yes
Clock synchronization	
• supported	Yes
• to MPI, master	Yes
• to MPI, slave	Yes
• to DP, master	Yes
• to DP, slave	Yes
• in AS, master	Yes
• in AS, slave	Yes

1. 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: 16, DP: 16
Functionality	
• MPI	Yes
• PROFIBUS DP master	Yes
• PROFIBUS DP slave	Yes

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MPI	
• Number of connections	16
• 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
— Global data communication	No
— S7 basic communication	Yes
— S7 communication	Yes
— Equidistance	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	
— 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://www.ad.siemens.de/csi_e/gsd
• 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	
— PG/OP communication	Yes

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— 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 ms
max. cycle	32 ms

Communication functions	
PG/OP communication	Yes
• Number of connectable OPs without message processing	15
• Number of connectable OPs with message processing	8
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.	64 byte
• Size of GD packet (of which consistent), max.	1 variable
S7 basic communication	
• supported	Yes; in MPI mode via: SFC X_SEND, X_RCV, X_GET and X_PUT; in DP master mode via: SFC I_GET and I_PUT
• 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
Standard communication (FMS)	
• supported	Yes; Via CP and loadable FB

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Number of connections	
• overall	16
• 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.	8
Symbol-related messages	Yes
Block related messages	Yes
simultaneously active Alarm-S blocks, max.	70; 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.	512
• in 100 ms grid, max.	0
• in 500 ms grid, max.	256
• in 1000 ms grid, max.	256
Number of additional values	
• per message	1
• 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
• Forcing, variables	Inputs/outputs, bit memories, distributed I/Os
• Number of variables, max.	64
Diagnostic buffer	
• present	Yes

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• Number of entries, max.	200
— adjustable	Yes
— preset	120

Configuration

Configuration software	
• STEP 7	Yes
Programming	
• Command set	see instruction list
• Nesting levels	8
• 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	1 to 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

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Weights	
Weight, approx.	720 g

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