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Data sheet 6ES7416-2XK04-0AB0

	********** Replacement part ********* SIMATIC S7-400, CPU 416-2 Central processing unit with: work memory 2.8 MB, (1.4 MB code, 1.4 MB data), 1st interface MPI/DP 12 Mbit/s, 2nd interface PROFIBUS DP
General information	
Product type designation	CPU 416-2
Firmware version	V4.0
Product function	
● Isochronous mode	Yes
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	40 µs
Supply voltage	
Rated value (DC)	Power supply via system power supply
Input current	
from backplane bus 5 V DC, typ.	1 A
from backplane bus 5 V DC, max.	1.2 A
from backplane bus 24 V DC, max.	Total current consumption of the components connected to the MPI/DP interfaces, but no more than 150 mA per interface
Power loss	
Power loss, typ.	4.5 W
Storage	
Type of memory	RAM
Work memory	
● integrated (for program)	1 400 kbyte
● integrated (for data)	1 400 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.	550 µA
● Backup current, max.	1 539 µA
● Backup time, max.	144 d
● Feeding of external backup voltage to CPU	5 V DC to 15 V DC
CPU processing times	
for bit operations, typ.	0.04 µs
for word operations, typ.	0.04 µs
for fixed point arithmetic, typ.	0.04 µs
for floating point arithmetic, typ.	0.12 µs
CPU-blocks	
DB	

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● Number, max.	4 095; DB 0 reserved
● Size, max.	64 kbyte
FB	
● Number, max.	2 048
● Size, max.	64 kbyte
FC	
● Number, max.	2 048
● Size, max.	64 kbyte
OB	
● Number, max.	see instruction list
● Size, max.	64 kbyte
● Number of time alarm OBs	8
● Number of delay alarm OBs	4
● Number of cyclic interrupt OBs	9
● Number of process alarm OBs	8
● Number of multicomputing OBs	1
Nesting depth	
● per priority class	24
● additional within an error OB	2
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
S7 timer	
● 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	SFB
Data areas and their retentivity	
Retentive data area (incl. timers, counters, flags), max.	Total working and load memory (with backup battery)
Flag	
● Size, max.	16 kbyte
● Retentivity available	Yes; MB 0 to MB 16383
● Retentivity preset	MB 0 to MB 15
● Number of clock memories	8; 1 memory byte
Local data	
● adjustable, max.	32 kbyte
● preset	16 kbyte
Address area	
I/O address area	
● Inputs	16 kbyte
● Outputs	16 kbyte
Process image	
● Inputs, adjustable	16 kbyte
● Outputs, adjustable	16 kbyte

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● Inputs, default	512 byte
● Outputs, default	512 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	131 072
— of which central	131 072
● Outputs	131 072
— of which central	131 072
Analog channels	
● Inputs	8 192
— of which central	8 192
● Outputs	8 192
— of which central	8 192
Hardware configuration	
Number of expansion units, max.	21; of which 6 ER with K-bus
connectable OPs	63 without message processing, 12 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	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.
● 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 on
● Deviation per day (unbuffered), max.	8.6 s; Power off
Operating hours counter	
● Number	8
● Number/Number range	0 to 7
● Range of values	0 to 32767 hours
● Granularity	1 h
● retentive	Yes
Clock synchronization	
● supported	Yes
● to MPI, master	Yes
● on MPI, device	Yes
● to DP, master	Yes
● on DP, device	Yes
● in AS, master	Yes
● in AS, device	Yes

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1. Interface	
Interface type	MPI/PROFIBUS DP
Isolated	Yes
Interface types	
● RS 485	Yes
● Output current of the interface, max.	150 mA
Protocols	
● MPI	Yes
● PROFIBUS DP master	Yes
● PROFIBUS DP device	Yes
MPI	
● Number of connections	44
● Transmission rate, max.	12 Mbit/s
Services	
— PG/OP communication	Yes
— Routing	Yes
— Global data communication	Yes
— S7 basic communication	Yes
— S7 communication	Yes
PROFIBUS DP master	
● Number of connections, max.	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
● max. number of DP devices	32
Services	
— PG/OP communication	Yes
— Routing	Yes
— Global data communication	Yes
— S7 basic communication	Yes
— S7 communication	Yes
— Equidistance	Yes
— SYNC/FREEZE	Yes
— activation/deactivation of DP devices	Yes
— Direct data exchange (slave-to-slave communication)	Yes
Address area	
— Inputs, max.	2 kbyte
— Outputs, max.	2 kbyte
User data per DP device	
— Inputs, max.	244 byte
— Outputs, max.	244 byte
— Slots, max.	244
— per slot, max.	128 byte
PROFIBUS DP device	
● GSD file	http://www.siemens.com/profibus-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
— Routing	Yes
Transfer memory	
— Inputs	244 byte
— Outputs	244 byte
2. Interface	
Interface type	PROFIBUS DP
Isolated	Yes
Interface types	

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● 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.	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
● max. number of DP devices	125
Services	
— PG/OP communication	Yes
— Routing	Yes
— Global data communication	Yes
— S7 basic communication	Yes
— S7 communication	Yes
— Equidistance	Yes
— SYNC/FREEZE	Yes
— activation/deactivation of DP devices	Yes
— Direct data exchange (slave-to-slave communication)	Yes
Address area	
— Inputs, max.	8 kbyte
— Outputs, max.	8 kbyte
User data per DP device	
— Inputs, max.	244 byte
— Outputs, max.	244 byte
— Slots, max.	244
— per slot, max.	128 byte
PROFIBUS DP device	
● 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
Transfer memory	
— Inputs	244 byte
— Outputs	244 byte
Protocols	
SIMATIC communication	
● S7 routing	Yes
Isochronous mode	
Equidistance	Yes
payload per isochronous device, max.	244 byte
shortest clock pulse	1 ms
max. cycle	32 ms
Communication functions	
PG/OP communication	Yes
● Number of connectable OPs with message processing	12
● Number of connectable OPs without message processing	63
Global data communication	
● supported	Yes
● Number of GD loops, max.	16
● Number of GD packets, transmitter, max.	16
● Number of GD packets, receiver, max.	32
● Size of GD packets, max.	64 byte
● Size of GD packet (of which consistent), max.	1 variable
S7 basic communication	

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● 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
Number of connections	
● overall	64
● 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.	12
Symbol-related messages	Yes
Program alarms	Yes
simultaneously active Alarm_S blocks, max.	200; ALARM_S/SQ blocks or ALARM_D/DQ blocks
Alarm 8-blocks	Yes
● Number of instances for alarm 8 and S7 communication blocks, max.	1 800
● preset, max.	600
Process control messages	Yes
Number of archives that can log on simultaneously (SFB 37 AR_SEND)	32
Number of messages	
● overall, max.	1 024
● in 100 ms grid, max.	128
● in 500 ms grid, max.	512
● in 1000 ms grid, max.	1 024
Number of additional values	
● with 100 ms grid, max.	1
● with 500, 1000 ms grid, max.	10
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.	512
Diagnostic buffer	
● present	Yes
● Number of entries, max.	3 200
— can be set	Yes
— preset	120
Configuration	

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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	8; 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
Weights	
Weight, approx.	720 g

Classifications

	Version	Classification
eClass	16	27-24-22-07
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	For use in hazardous locations

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China RoHS | Manufacturer Declaration | Type Examination Certificate

For use in hazardous locations	Maritime application

Maritime application

CCS (China Classification Society)

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