SIEMENS

Product data sheet 6ES7416-2FN05-0AB0



SIMATIC S7-400, CPU 416F-2,
CENTRAL PROCESSING UNIT WITH: 5.6 MB WORKING MEMORY,
(2.8 MB CODE, 2.8 MB DATA),
1. INTERFACE MPI/DP 12 MBIT/S,
2. INTERFACE PROFIBUS DP APPLICABLE W.
SOFTWARE PACKAGE DISTRIBUTED SAFETY >= V5.2+SP2

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General information	
Hardware product version	03
Firmware version	V5.3
Engineering with	
Programming package	STEP 7 V5.3 SP2 or higher with hardware update, Distributed Safety V5.2 SP2 or higher
CiR - Configuration in RUN	
CiR synchronization time, basic load	100 ms
CiR synchronization time, time per I/O slave	10 µs
Supply voltage	
24 V DC	No ; Power supply via system power supply
Input current	
from CPU, max.	Not relevant for 400 series (300 series set)
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.	4.5 W

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Power loss, max.	5 W
[nicht versorgt: TAK_ABX692_001_000]	
Backup battery	
Battery operation	Not relevant
Backup current, typ.	125 µA ; (up to 40 °C)
Backup current, max.	550 µA
Backup time, max.	See reference manual, module data, Chapter 3.3
Feeding of external backup voltage to CPU	5 to 15 VDC
Feeding of external backup voltage to CPU	5 to 15 VDC
Memory	
Work memory	
integrated	5.6 Mbyte
integrated (for program)	2.8 Mbyte
integrated (for data)	2.8 Mbyte
expandable	No
Load memory	
expandable FEPROM	Yes ; with Memory Card (FLASH)
expandable FEPROM, max.	64 Mbyte
integrated RAM, max.	1 Mbyte
expandable RAM	Yes ; with Memory Card (RAM)
expandable RAM, max.	64 Mbyte
Backup	
present	Yes
with battery	Yes ; all data
without battery	No
CPU processing times	
for bit operations, typ.	30 ns
for word operations, typ.	30 ns
for fixed point arithmetic, typ.	30 ns
for floating point arithmetic, typ.	90 ns
CPU-blocks	
DB	
Number, max.	10000 ; Number range: 1 to 16000
Size, max.	64 kbyte
FB	
Number, max.	5000 ; Number range: 0 to 7999
Size, max.	64 kbyte
FC	

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Number, max.	5000 ; 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	8 ; OB 10-17
Number of delay alarm OBs	4 ; OB 20-23
Number of time interrupt OBs	9 ; OB 30-38 (shortest cycle that can be set = 500 µs)
Number of process alarm OBs	8 ; OB 40-47
Number of DPV1 alarm OBs	3 ; OB 55-57
Number isochronous mode OBs	4 ; OB 61-64
Number of multicomputing OBs	1 ; OB 60
Number of background OBs	1 ; OB 90
Number of startup OBs	2 ; 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	2
Counters, timers and their retentivity	
S7 counter	
Number	2048
Retentivity	
adjustable	Yes
lower limit	0
upper limit	2047
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	2048
Retentivity	

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adjustable	Yes
lower limit	0
upper limit	2047
preset	No times retentive
Time range	
lower limit	10 ms
upper limit	9990 s
IEC timer	
present	Yes
Type	SFB
Number	Unlimited (limited only by RAM capacity)
Data areas and their retentivity	
retentive data area, total	Total working and load memory (with backup battery)
Flag	
Number, max.	16 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)
Data blocks	
Number, max.	10000 ; Number range: 1 to 16000
Size, max.	64 kbyte
Local data	
adjustable, max.	32 kbyte
preset	16 kbyte
Address area	
I/O address area	
Inputs	16 kbyte
Outputs	16 kbyte
of which, distributed	
MPI/DP interface, inputs	2 kbyte
MPI/DP interface, outputs	2 kbyte
DP interface, inputs	8 kbyte
DP interface, outputs	8 kbyte
Process image	
Inputs, adjustable	16 kbyte
Outputs, adjustable	16 kbyte
Inputs, default	512 byte
Outputs, default	512 byte

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consistent data, max.	244 byte
Access to consistent data in process image	Yes
Subprocess images	
Number of subprocess images, max.	15
Digital channels	
Inputs	131072
Outputs	131072
Inputs, of which central	131072
Outputs, of which central	131072
Analog channels	
Inputs	8192
Outputs	8192
Inputs, of which central	8192
Outputs, of which central	8192
Hardware configuration	
Expansion devices, max.	21
connectable OPs	63
Multicomputing	Yes ; 4 CPUs
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
Mixed mode IM + CP permitted	No ; IM 467 not suitable for use with CP 443-5 Ext. and CP443-1 EX4x, EX20, GX20 (in PNIO 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 ; No mixed operation of CP443-1 EX40 and CP443-1 EX 41/EX20/GX20, max. 4 in central controller
Number of operable FMs and CPs (recommended)	
FM	Limited by number of slots and number of connections
CP, point-to-point	CP 440: Limited by number of slots; CP 441: limited by number of connections

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PROFIBUS and Ethernet CPs	14 ; Of which 10 CPs max. or IMs as DP master, 4 PN controller maximum
Time of day	
Clock	
Hardware clock (real-time clock)	Yes
battery-backed 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 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
on Ethernet via NTP	No ; via CP
to IF 964 DP	No
Time difference in system when synchronizing via	
MPI, max.	200 ms
Digital outputs	
integrated channels (DO)	0
Analog inputs	
Integrated channels (AI)	0
Interfaces	
Number of USB interfaces	0
Number of parallel interfaces	0
Number of 20 mA interfaces (TTY)	0
Number of RS 232 interfaces	0
Number of RS 422 interfaces	0
Number of other interfaces	0
1st interface	

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Type of interface	integrated
Physics	RS 485 / PROFIBUS + MPI
Isolated	Yes
Power supply to interface (15 to 30 V DC), max.	150 mA
Number of connection resources	MPI: 44, DP: 32
Functionality	
MPI	Yes
DP master	Yes
DP slave	Yes
MPI	
Number of connections	44 ; 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	
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
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
Number of DP slaves, max.	32
Services	
PG/OP communication	Yes
Routing	Yes
Global data communication	No
S7 basic communication	Yes
S7 communication	Yes
S7 communication, as client	Yes
S7 communication, as server	Yes
Equidistance mode support	Yes
Isochronous mode	Yes
SYNC/FREEZE	Yes
Activation/deactivation of DP slaves	Yes
Direct data exchange (slave-to-slave communication)	Yes

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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
DP slave	
Number of connections	32
GSD file	http://support.automation.siemens.com/WW/view/de/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
User data per address area, of which consistent, max.	32 byte
Services	
PG/OP communication	Yes ; with interface active
Routing	Yes ; with interface active
S7 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
2nd interface	
Type of interface	integrated
Physics	RS 485 / PROFIBUS
Isolated	Yes
Power supply to interface (15 to 30 V DC), max.	150 mA
Number of connection resources	32

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Functionality	
DP master	Yes
DP slave	Yes
DP master	
Number of connections, max.	32
Transmission rate, max.	12 Mbit/s
Number of DP slaves, max.	125
Services	
PG/OP communication	Yes
Routing	Yes
Global data communication	No
S7 basic communication	Yes
S7 communication	Yes
S7 communication, as client	Yes
S7 communication, as server	Yes
Equidistance mode support	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.	8 kbyte
Outputs, max.	8 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	32
GSD file	http://support.automation.siemens.com/WW/view/de/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	

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Routing	Yes
Transfer memory	
Inputs	244 byte
Outputs	244 byte
Isochronous mode	
Isochronous operation (application synchronized up to terminal)	Yes ; For PROFIBUS only
Number of DP masters with isochronous mode	2
User data per isochronous slave, max.	244 byte
equidistance	Yes
shortest clock pulse	1 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	63
Number of connectable OPs with message processing	63 ; When using alarm_S and alarm_D
Data record routing	Yes
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.	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
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

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Number of simultaneous AG-SEND/AG-RECV orders per CPU, max.	64/64
Standard communication (FMS)	
supported	Yes ; Via CP and loadable FB
Open IE communication	
ISO-on-TCP (RFC1006)	Via CP 443-1 and loadable FB
Data length, max.	1452 bytes via CP 443-1 Adv.
Web server	
supported	No
Number of connections	
overall	64
usable for PG communication	
reserved for PG communication	1
Adjustable for PG communication, max.	0
usable for OP communication	
reserved for OP communication	1
adjustable for OP communication, max.	0
usable for S7 basic communication	
Reserved for S7 basic communication	0
adjustable for S7 basic communication, max.	0
usable for S7 communication	
reserved for S7 communication	0
Adjustable for S7 communication, max.	0
usable for routing	
Reserved for routing	0
adjustable for routing, max.	0
S7 message functions	
Number of login stations for message functions, max.	63 ; Max. 63 with ALARM_S and ALARM_D (OPs); max. 12 with ALARM_8 and ALARM_P (e.g. WinCC)
Symbol-related messages	Yes
SCAN procedure	Yes
Block related messages	Yes
Process diagnostic messages	Yes
simultaneously active Alarm-S blocks, max.	1000 ; 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.	4000
preset, max.	600
Process control messages	Yes

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Number of archives that can log on simultaneously (SFB 37 AR_SEND)	32
Number of messages	
overall, max.	1024
in 100 ms grid, max.	128
in 500 ms grid, max.	512
in 1000 ms grid, max.	1024
Number of additional values	
with 100 ms grid, max.	1
with 500, 1000 ms grid, max.	10
Test commissioning functions	
Status block	Yes ; Up to 2 simultaneously
Single step	Yes
Number of breakpoints	4
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
Force, variables	Inputs, outputs, bit memories, peripheral inputs, peripheral outputs
Number of variables, max.	512
Diagnostic buffer	
present	Yes
Number of entries, max.	3200
adjustable	Yes
preset	120
EMC	
Emission of radio interference acc. to EN 55 011	
Limit class A, for use in industrial areas	Yes
Limit class B, for use in residential areas	No
Configuration	
Configuration software	
STEP 7	Yes
programming	
Command set	see instruction list
Nesting levels	7
Access to consistent data in process image	Yes

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Programming language	
LAD	Yes
FBD	Yes
STL	Yes
SCL	Yes
CFC	Yes
GRAPH	Yes
HiGraph®	Yes
System functions (SFC)	see instruction list
Number of simultaneously active SFCs	
DPSYC_FR	2
D_ACT_DP	8
RD_REC	8
WR_REC	8
WR_PARM	8
PARM_MOD	1
WR_DPARM	2
DPNRM_DG	8
RDSYSST	8
DP_TOPOL	1
System function blocks (SFB)	see instruction list
Number of simultaneously active SFBs	
RD_REC	8
WR_REC	8
Know-how protection	
User program protection/password protection	Yes
Dimensions	
Width	25 mm
Height	290 mm
Depth	219 mm
Required slots	1
Weight	
Weight, approx.	0.7 kg
Status	Feb 25, 2013

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