

# SIEMENS

## Product data sheet

**6ES7416-2XN05-0AB0**


SIMATIC S7-400,  
 CPU 416-2 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

General information	
Hardware product version	04
Firmware version	V5.3
Engineering with	
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 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
<b>Power losses</b>	
Power loss, typ.	4.5 W
Power loss, max.	5 W
<b>Backup battery</b>	
Battery operation	Not relevant
Backup current, typ.	125 $\mu$ A ; (up to 40 °C)
Backup current, max.	550 $\mu$ A
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
<b>Memory</b>	
<b>Work memory</b>	
integrated	5.6 Mbyte
integrated (for program)	2.8 Mbyte
integrated (for data)	2.8 Mbyte
expandable	No
<b>Load memory</b>	
expandable FEPRM	Yes ; with Memory Card (FLASH)
expandable FEPRM, max.	64 Mbyte
integrated RAM, max.	1 Mbyte
expandable RAM	Yes ; with Memory Card (RAM)
expandable RAM, max.	64 Mbyte
<b>Backup</b>	
present	Yes
with battery	Yes ; all data
without battery	No
<b>CPU processing times</b>	
for bit operations, min.	30 ns
for word operations, min.	30 ns
for fixed point arithmetic, min.	30 ns
for floating point arithmetic, min.	90 ns
<b>CPU-blocks</b>	

<b>DB</b>	
Number, max.	10000 ; Number range: 1 to 16000
Size, max.	64 kbyte
<b>FB</b>	
Number, max.	5000 ; Number range: 0 to 7999
Size, max.	64 kbyte
<b>FC</b>	
Number, max.	5000 ; Number range: 0 to 7999
Size, max.	64 kbyte
<b>OB</b>	
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 $\mu$ s)
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	3 ; OB 100-102
Number of asynchronous error OBs	9 ; OB 80-88
Number of synchronous error OBs	2 ; OB 121, 122
<b>Nesting depth</b>	
per priority class	24
additional within an error OB	2
<b>Counters, timers and their retentivity</b>	
<b>S7 counter</b>	
Number	2048
<b>Retentivity</b>	
adjustable	Yes
lower limit	0

upper limit	2047
preset	Z 0 to Z 7
<b>Counting range</b>	
lower limit	0
upper limit	999
<b>IEC counter</b>	
present	Yes
Type	SFB
Number	Unlimited (limited only by RAM capacity)
<b>S7 times</b>	
Number	2048
<b>Retentivity</b>	
adjustable	Yes
lower limit	0
upper limit	2047
preset	No times retentive
<b>Time range</b>	
lower limit	10 ms
upper limit	9990 s
<b>IEC timer</b>	
present	Yes
Type	SFB
Number	Unlimited (limited only by RAM capacity)
<b>Data areas and their retentivity</b>	
retentive data area, total	Total working and load memory (with backup battery)
<b>Flag</b>	
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)
<b>Data blocks</b>	
Number, max.	10000 ; Number range: 1 to 16000
Size, max.	64 kbyte

<b>Local data</b>	
adjustable, max.	32 kbyte
preset	16 kbyte
<b>Address area</b>	
<b>I/O address area</b>	
Inputs	16 kbyte
Outputs	16 kbyte
<b>of which, distributed</b>	
MPI/DP interface, inputs	2 kbyte
MPI/DP interface, outputs	2 kbyte
DP interface, inputs	8 kbyte
DP interface, outputs	8 kbyte
<b>Process image</b>	
Inputs, adjustable	16 kbyte
Outputs, adjustable	16 kbyte
Inputs, default	512 byte
Outputs, default	512 byte
consistent data, max.	244 byte
Access to consistent data in process image	Yes
<b>Subprocess images</b>	
Number of subprocess images, max.	15
<b>Digital channels</b>	
Inputs	131072
Outputs	131072
Inputs, of which central	131072
Outputs, of which central	131072
<b>Analog channels</b>	
Inputs	8192
Outputs	8192
Inputs, of which central	8192
Outputs, of which central	8192
<b>Hardware configuration</b>	
Expansion devices, max.	21

connectable OPs	63
Multicomputing	Yes ; 4 CPUs max. (with UR1 or UR2)
<b>Interface modules</b>	
Number of connectable IMs (total), max.	6
Number of connectable IM 460s, max.	6
Number of connectable IM 463s, max.	4 ; IM 463-2
<b>Number of DP masters</b>	
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
<b>Number of IO Controllers</b>	
integrated	0
via CP	4 ; No mixed operation of CP443-1 EX40 and CP443-1 EX 41/EX20/GX20, max. 4 in central controller
<b>Number of operable FMs and CPs (recommended)</b>	
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
PROFIBUS and Ethernet CPs	14 ; Of which 10 CPs max. or IMs as DP master, 4 PN controller maximum
<b>Time of day</b>	
<b>Clock</b>	
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
<b>Operating hours counter</b>	
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 <sup>31</sup> - 1 hours
Granularity	1 hour
retentive	Yes
<b>Clock synchronization</b>	
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
<b>Time difference in system when synchronizing via</b>	
MPI, max.	200 ms
<b>Digital outputs</b>	
integrated channels (DO)	0
<b>Analog inputs</b>	
Integrated channels (AI)	0
<b>Interfaces</b>	
Interfaces	1 x MPI/PROFIBUS DP, 1 x PROFIBUS DP
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
<b>1st interface</b>	
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
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
Transmission rate, max.	12 Mbit/s
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
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
Transmission rate, max.	12 Mbit/s
Number of DP slaves, max.	32
<b>Address area</b>	
Inputs, max.	2 kbyte
Outputs, max.	2 kbyte
<b>User data per DP slave</b>	
User data per DP slave, max.	244 byte
Inputs, max.	244 byte
Outputs, max.	244 byte
Slots, max.	244
per slot, max.	128 byte
<b>DP slave</b>	
Number of connections	32
<b>Services</b>	
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
GSD file	<a href="http://support.automation.siemens.com/WW/view/de/113652">http://support.automation.siemens.com/WW/view/de/113652</a>
Transmission rate, max.	12 Mbit/s
Automatic baud rate search	No
<b>Transfer memory</b>	
Inputs	244 byte
Outputs	244 byte
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
<b>2nd interface</b>	
Type of interface	integrated
Physics	RS 485 / PROFIBUS
Isolated	Yes
Power supply to interface (15 to 30 V DC), max.	150 mA
<b>Media redundancy</b>	
Number of connection resources	32
<b>Functionality</b>	
DP master	Yes
DP slave	Yes
<b>DP master</b>	
Number of connections, max.	32
<b>Services</b>	
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
Transmission rate, max.	12 Mbit/s
Number of DP slaves, max.	125
<b>Address area</b>	
Inputs, max.	8 kbyte

Outputs, max.	8 kbyte
<b>User data per DP slave</b>	
User data per DP slave, max.	244 byte
Inputs, max.	244 byte
Outputs, max.	244 byte
Slots, max.	244
per slot, max.	128 byte
<b>DP slave</b>	
Number of connections	32
<b>Services</b>	
Routing	Yes
GSD file	<a href="http://support.automation.siemens.com/WW/view/de/13652">http://support.automation.siemens.com/WW/view/de/13652</a>
Transmission rate, max.	12 Mbit/s
<b>Transfer memory</b>	
Inputs	244 byte
Outputs	244 byte
Address area, max.	32
User data per address area, max.	32 byte
User data per address area, of which consistent, max.	32 byte
<b>Isochronous mode</b>	
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
<b>Communication functions</b>	
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
<b>Global data communication</b>	
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
<b>S7 basic communication</b>	
supported	Yes
User data per job, max.	76 byte
User data per job (of which consistent), max.	1 variable
<b>S7 communication</b>	
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
<b>S5-compatible communication</b>	
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
Number of simultaneous AG-SEND/AG-RECV orders per CPU, max.	64/64
<b>Standard communication (FMS)</b>	
supported	Yes ; Via CP and loadable FB
<b>Open IE communication</b>	
ISO-on-TCP (RFC1006)	Via CP 443-1 and loadable FB
Data length, max.	1452 bytes via CP 443-1 Adv.
<b>Web server</b>	
supported	No
<b>Number of connections</b>	
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
<b>S7 message functions</b>	
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
<b>Number of messages</b>	
overall, max.	1024
in 100 ms grid, max.	128
in 500 ms grid, max.	512
in 1000 ms grid, max.	1024
<b>Number of additional values</b>	
with 100 ms grid, max.	1
with 500, 1000 ms grid, max.	10
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
Number of archives that can log on simultaneously (SFB 37 AR_SEND)	32
<b>Test commissioning functions</b>	
<b>Status/control</b>	
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
<b>Forcing</b>	
Forcing	Yes
Force, variables	Inputs, outputs, bit memories, peripheral inputs, peripheral outputs
Number of variables, max.	512
Status block	Yes ; Up to 2 simultaneously
Single step	Yes
Number of breakpoints	4
<b>Diagnostic buffer</b>	
present	Yes
Number of entries, max.	3200
adjustable	Yes
preset	120
<b>EMC</b>	
<b>Emission of radio interference acc. to EN 55 011</b>	
Limit class A, for use in industrial areas	Yes
Limit class B, for use in residential areas	No
<b>Configuration</b>	
<b>Configuration software</b>	
STEP 7	Yes
<b>programming</b>	
<b>Programming language</b>	

LAD	Yes
FBD	Yes
STL	Yes
SCL	Yes
CFC	Yes
GRAPH	Yes
HiGraph®	Yes
Command set	see instruction list
Nesting levels	7
Access to consistent data in process image	Yes
System functions (SFC)	see instruction list
<b>Number of simultaneously active SFCs</b>	
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
<b>Number of simultaneously active SFBs</b>	
RD_REC	8
WR_REC	8
<b>Know-how protection</b>	
User program protection/password protection	Yes
<b>Dimensions</b>	
Width	25 mm
Height	290 mm
Depth	219 mm
Required slots	1

Weight

Weight, approx.

0.7 kg

Status

Jul 17, 2012