SIEMENS

Product data sheet 6ES7414-3EM06-0AB0

SIMATIC S7-400,
CPU 414-3 PN/DP CENTRAL PROCESSING UNIT
WITH: 4 MB WORKING MEMORY,
(2 MB KB CODE, 2 MB DATA),
INTERFACES: 1. IF MPI/DP 12 MBIT/S (X1),
2. IF ETHERNET/PROFINET (X5),
3. IF IF964-DP PLUGABLE (IF1)

General information	
Hardware product version	01
Firmware version	V6.0
Engineering with	
Programming package	STEP7 V5.5 or higher/iMap V3.0 + iMap STEP7 Add-on V3.0 SP5 or higher
CiR - Configuration in RUN	
CiR synchronization time, basic load	100 ms
CiR synchronization time, time per I/O slave	15 µs ; Time per I/O byte
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.	1.3 A
from backplane bus 5 V DC, max.	1.5 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.	6.5 W
Power loss, max.	7.5 W
Backup battery	
Battery operation	Not relevant
Backup current, typ.	125 µA ; (up to 40 °C)
Backup current, max.	450 µA
Backup time, max.	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
Feeding of external backup voltage to CPU	5 to 15 VDC
Memory	
Work memory	
integrated	4 Mbyte
integrated (for program)	2 Mbyte
integrated (for data)	2 Mbyte
expandable	No
Load memory	
expandable FEPROM	Yes ; with Memory Card (FLASH)
expandable FEPROM, max.	64 Mbyte
integrated RAM, max.	512 kbyte
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, min.	45 ns
for word operations, min.	45 ns
for fixed point arithmetic, min.	45 ns
for floating point arithmetic, min.	135 ns
CPU-blocks	

DB	
Number, max.	6000 ; Number range: 1 to 16000
Size, max.	64 kbyte
FB	
Number, max.	3000 ; Number range: 0 to 7999
Size, max.	64 kbyte
FC	
Number, max.	3000 ; 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	4 ; OB 10-13
Number of delay alarm OBs	4 ; OB 20-23
Number of time interrupt OBs	4 ; OB 32, 33, 34, 35 (shortest cycle that can be set = 500 µs)
Number of process alarm OBs	4 ; OB 40-43
Number of DPV1 alarm OBs	3 ; OB 55-57
Number isochronous mode OBs	3 ; OB 61-63
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
Nesting depth	
per priority class	24
additional within an error OB	1
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	
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.	8 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.	6000 ; Number range: 1 to 16000
Size, max.	64 kbyte

Local data	
adjustable, max.	16 kbyte
preset	8 kbyte
Address area	
I/O address area	
Inputs	8 kbyte
Outputs	8 kbyte
of which, distributed	
MPI/DP interface, inputs	2 kbyte
MPI/DP interface, outputs	2 kbyte
DP interface, inputs	6 kbyte
DP interface, outputs	6 kbyte
PN interface, inputs	8 kbyte
PN interface, outputs	8 kbyte
Process image	
Inputs, adjustable	8 kbyte
Outputs, adjustable	8 kbyte
Inputs, default	256 byte
Outputs, default	256 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	65536
Outputs	65536
Inputs, of which central	65536
Outputs, of which central	65536
Analog channels	
Inputs	4096
Outputs	4096
Inputs, of which central	4096
Outputs, of which central	4096

Hardware configuration	
Expansion devices, max.	21
connectable OPs	63
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 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	1 ; IF 964-DP
Number of pluggable S5 modules (via adapter capsule in central device), max.	6
Number of IO Controllers	
integrated	1
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 slots and number of connections
PROFIBUS and Ethernet CPs	14 ; In total max. 10 CPs as DP master and PN controller, of which up to 10 IMs or CPs as DP master and up to 4 CPs as PN controller
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	Yes ; as client
to IF 964 DP	Yes
Time difference in system when synchronizing via	
Ethernet, max.	10 ms
MPI, max.	200 ms
Digital outputs	
integrated channels (DO)	0
Analog inputs	
Integrated channels (AI)	0
Interfaces	
Interfaces	1 x MPI/PROFIBUS DP, 1 x PROFINET (2 ports), 1 x PROFIBUS DP (optionally pluggable)
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	

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: 32, DP: 16
Functionality	
MPI	Yes
DP master	Yes
DP slave	Yes
MPI	
Number of connections	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	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.	16 ; 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
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
Services	
PG/OP communication	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	http://support.automation.siemens.com/WW/view/de/113652
Transmission rate, max.	12 Mbit/s

Automatic baud rate search	No
Transfer memory	
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
2nd interface	
Type of interface	PROFINET
Physics	Ethernet RJ45
Isolated	Yes
Integrated switch	Yes
Number of ports	2
Automatic detection of transmission speed	Yes ; Autosensing
Autonegotiation	Yes
Autocrossing	Yes
Media redundancy	
supported	Yes
Switchover time on line break, typically	200 ms
Number of stations in the ring, max.	50
Change of IP address at runtime, supported	Yes ; Assignment by higher-level IO-Controller or by the user program with SFB104 "IP_CONF"
Number of connection resources	64
Functionality	
DP master	No
DP slave	No
PROFINET IO Controller	Yes
PROFINET IO Device	Yes
PROFINET CBA	Yes
Open IE communication	Yes
Web server	Yes
Number of HTTP clients	5
Local Operating Network	No

PROFINET IO Controller	
Services	
PG/OP communication	Yes
S7 routing	Yes
S7 communication	Yes
Isochronous mode	Yes ; Only with IRT and the High Performance option
Open IE communication	Yes
Transmission rate, max.	100 Mbit/s
Number of connectable IO devices, max.	256
Max. number of connectable IO devices for RT	256
of which in line, max.	256
Number of IO devices with IRT and the option "high flexibility"	256
of which in line, max.	61
Number of IO Devices with IRT and the option "high performance", max.	64
of which in line, max.	64
Shared device, supported	Yes
Prioritized startup supported	Yes
Number of IO Devices, max.	32
Activation/deactivation of IO Devices	Yes
Maximum number of IO devices that can be activated/deactivated at the same time.	8
IO Devices changing during operation (partner ports), supported	Yes
Max. number of IO devices per tool	8 ; 8 parallel calls of the SFC 12 "D_ACT_DP" possible per line. Max. 32 IO Devices changing during operation (partner ports) are supported.
Device replacement without swap medium	Yes
Send cycles	250 µs, 500 µs, 1 ms, 2 ms, 4 ms additionally with IRT with high performance: 250 µs to 4 ms in 125 µs frame
Updating time	250 µs to 512 ms; minimum value depends on preset communication share for PROFINET IO, on the number of IO Devices and on the amount of configured user data, see PROFINET system description
Address area	

Inputs, max.	8 kbyte
Outputs, max.	8 kbyte
User data per address area, max.	
User data consistency, max.	1024 byte
PROFINET IO Device	
Services	
PG/OP communication	Yes
S7 routing	Yes
S7 communication	Yes
Isochronous mode	No
Open IE communication	Yes
IRT, supported	Yes
Prioritized startup supported	Yes
Shared device, supported	Yes
Number of IO controllers with shared device, max.	2
Transfer memory	
Inputs, max.	1440 byte ; Per IO Controller with shared device
Outputs, max.	1440 byte ; Per IO Controller with shared device
Submodules	
Number, max.	64
User data per submodule, max.	1024 byte
PROFINET CBA	
acyclic transmission	Yes
Cyclic transmission	Yes
Open IE communication	
Open IE communication, supported	Yes
Number of connections, max.	62
Local port numbers used at the system end	0, 20, 21, 25, 80, 102, 135, 161, 34962, 34963, 34964, 65532, 65533, 65534, 65535
Keep-alive function, supported	Yes
3rd interface	
Type of interface	Pluggable interface module (IF)
Plug-in interface modules	IF 964-DP (MLFB: 6ES7964-2AA04-0AB0)

Physics	RS 485 / PROFIBUS
Isolated	Yes
Power supply to interface (15 to 30 V DC), max.	150 mA
Automatic detection of transmission speed	No
Number of connection resources	16
Functionality	
MPI	No
DP master	Yes
DP slave	Yes
DP master	
Number of connections, max.	16
Services	
PG/OP communication	Yes
Routing	Yes ; S7 routing
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
DPV0	Yes
DPV1	Yes
Transmission rate, max.	12 Mbit/s
Transmission rate, min.	9.6 kbit/s
Number of DP slaves, max.	96
Address area	
Inputs, max.	6 kbyte
Outputs, max.	6 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
Services	
PG/OP communication	Yes
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	http://support.automation.siemens.com/WW/view/de/113652
Transmission rate, max.	12 Mbit/s
Automatic baud rate search	No
Transfer memory	
Inputs	244 byte
Outputs	244 byte
Address areas, max.	32 ; Virtual slots
User data per address area, max.	32 byte
User data per address area, of which consistent, max.	32 byte
Isochronous mode	
Isochronous operation (application synchronized up to terminal)	Yes ; Via PROFIBUS DP or PROFINET interface
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/SQ and Alarm_D/DQ
Data record routing	Yes
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
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
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	
TCP/IP	Yes ; via integrated PROFINET interface and loadable FBs
Number of connections, max.	62
Data length, max.	32 kbyte
Several passive connections per port, supported	Yes
ISO-on-TCP (RFC1006)	Yes ; Via integrated PROFINET interface or CP 443-1 Adv. and loadable FBs
Number of connections, max.	62
Data length, max.	32 kbyte ; 1452 bytes via CP 443-1 Adv.
UDP	Yes ; via integrated PROFINET interface and loadable FBs
Number of connections, max.	62
Data length, max.	1472 byte
Web server	
supported	Yes
Number of HTTP clients	5
User-defined websites	Yes
PROFINET CBA (at set setpoint communication load)	
Setpoint for the CPU communication load	20 %
Number of remote interconnection partners	32
Number of functions, master/slave	150
Total of all Master/Slave connections	4500
Data length of all incoming connections master/slave, max.	45000 byte
Data length of all outgoing connections master/slave, max.	45000 byte
Number of device-internal and PROFIBUS interconnections	1000
Data length of device-internal und PROFIBUS interconnections, max.	16000 byte
Data length per connection, max.	2000 byte
Remote interconnections with acyclic transmission	

Sampling frequency: Sampling time, min.	200 ms ; Depending on preset communication load, number of interconnections and data length used
Number of incoming interconnections	250
Number of outgoing interconnections	250
Data length of all incoming interconnections, max.	8000 byte
Data length of all outgoing interconnections, max.	8000 byte
Data length per connection, max.	2000 byte
Remote interconnections with cyclic transmission	
Transmission frequency: Transmission interval, min.	1 ms ; Depending on preset communication load, number of interconnections and data length used
Number of incoming interconnections	300
Number of outgoing interconnections	300
Data length of all incoming interconnections, max.	4800 byte
Data length of all outgoing interconnections, max.	4800 byte
Data length per connection, max.	450 byte
HMI variables via PROFINET (acyclic)	
Number of stations that can log on for HMI variables (PN OPC/iMap)	2x PN OPC/1x iMap
HMI variable updating	500 ms
Number of HMI variables	1000
Data length of all HMI variables, max.	32000 byte
PROFIBUS proxy functionality	
supported	Yes ; 32 PROFIBUS slaves max. connectable
Data length per connection, max.	240 byte ; Slave-dependent
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/SQ and Alarm_D/DQ (OPs); max. 8 with Alarm, Alarm_8, Alarm_8P, Notify and Notify_8 (e.g. WinCC)
Symbol-related messages	Yes
SCAN procedure	Yes
Number of messages	
overall, max.	512
in 100 ms grid, max.	128
in 500 ms grid, max.	256
in 1000 ms grid, max.	512
Number of additional values	
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.	400 ; 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.	1200
preset, max.	300
Process control messages	Yes
Number of archives that can log on simultaneously (SFB 37 AR_SEND)	16

Test commissioning functions	
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, distributed I/Os
Number of variables, max.	256
Status block	Yes ; Up to 16 simultaneously
Single step	Yes
Number of breakpoints	16
Diagnostic buffer	
present	Yes
Number of entries, max.	3200
adjustable	Yes
preset	120
Service data	
Can be read out	Yes
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	
Programming language	
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
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
Block encryption	Yes ; With S7 block Privacy
Dimensions	
Width	50 mm
Height	290 mm
Depth	219 mm
Required slots	2
Weight	
Weight, approx.	900 g
Status	Jul 17, 2012