

MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

SIEMENS

6ES7416-3ES07-0AB0

SIMATIC S7 400 CPU MODULE

Used with the applicable PLC System configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: Siemens official manufacturer documentation

SIMATIC S7-400 advanced controller

Central processing units

Standard CPUs

1

CPU 414

Ordering data	Article No.		Article No.
RS 485 repeater for PROFIBUS Transmission rate up to 12 Mbps; 24 V DC; IP20 enclosure	6ES7972-0AA02-0XA0	IE FC RJ45 plugs RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables	
PROFINET bus components			
IE FC TP standard cable GP 2x2 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/IE FC RJ45 Plug; PROFINET-compatible; with UL approval Sold by the meter	6XV1840-2AH10	IE FC RJ45 Plug 180 180° cable outlet • 1 unit • 10 units • 50 units	6GK1901-1BB10-2AA0 6GK1901-1BB10-2AB0 6GK1901-1BB10-2AE0
FO standard cable GP (50/125) Standard cable, splittable, UL approval, sold by the meter	6XV1873-2A	PROFIBUS/PROFINET bus components For establishing MPI/PROFIBUS/PROFINET communication	See catalogs IK PI, CA 01
SCALANCE X204-2 Industrial Ethernet Switch Industrial Ethernet Switches with integral SNMP access, Web diagnostics, copper cable diagnostics and PROFINET diagnostics for configuring line, star and ring topologies; four 10/100 Mbps RJ45 ports and two FO ports	6GK5204-2BB10-2AA3		

Overview

CPU 416-2, CPU 416-3 and CPU 416-3 PN/DP

- High-performance CPUs in the high-end performance range
- Applicable for plants with high requirements in the high-end performance range
- Integrated PROFINET functions in CPU 416-3 PN/DP

Technical specifications

Article number	6ES7416-2XP07-0AB0 CPU 416-2, MPI, PROFIBUS, 8 MB	6ES7416-3XS07-0AB0 CPU 416-3, 16 MB, 3 INTERFACES	6ES7416-3ES07-0AB0 CPU416-3 PN/DP, 16 MB, 3 INTERFACES
General information			
Product type designation	CPU 416-2	CPU 416-3	CPU416-3 PN/DP
Engineering with			
• Programming package	STEP 7 V5.4 or higher with HSP 261	STEP 7 V5.4 or higher with HSP 261	STEP 7 V5.5 or higher with HSP 262
Supply voltage			
Rated value (DC)			
• 24 V DC	No; Power supply via system power supply	No; Power supply via system power supply	No; Power supply via system power supply
Power loss			
Power loss, typ.	4.5 W	5.5 W	6.5 W
Memory			
Work memory			
• integrated	8 Mbyte	16 Mbyte	16 Mbyte
• integrated (for program)	4 Mbyte	8 Mbyte	8 Mbyte
• integrated (for data)	4 Mbyte	8 Mbyte	8 Mbyte
Load memory			
• expandable FEPRM, max.	64 Mbyte	64 Mbyte	64 Mbyte
• integrated RAM, max.	1 Mbyte	1 Mbyte	1 Mbyte
• expandable RAM, max.	64 Mbyte	64 Mbyte	64 Mbyte
CPU processing times			
for bit operations, typ.	12.5 ns	12.5 ns	12.5 ns
for word operations, typ.	12.5 ns	12.5 ns	12.5 ns
for fixed point arithmetic, typ.	12.5 ns	12.5 ns	12.5 ns
for floating point arithmetic, typ.	25 ns	25 ns	25 ns
Counters, timers and their retentivity			
S7 counter			
• Number	2 048	2 048	2 048
IEC counter			
• present	Yes	Yes	Yes
S7 times			
• Number	2 048	2 048	2 048
IEC timer			
• present	Yes	Yes	Yes
Data areas and their retentivity			
Flag			
• Number, max.	16 kbyte; Size of bit memory address area	16 kbyte; Size of bit memory address area	16 kbyte; Size of bit memory address area

SIMATIC S7-400 advanced controller

Central processing units

Standard CPUs

1

CPU 416**Technical specifications (continued)**

Article number	6ES7416-2XP07-0AB0 CPU 416-2, MPI, PROFIBUS, 8 MB	6ES7416-3XS07-0AB0 CPU 416-3, 16 MB, 3 INTERFACES	6ES7416-3ES07-0AB0 CPU 416-3 PN/DP, 16 MB, 3 INTERFACES
Address area			
I/O address area			
• Inputs	16 kbyte	16 kbyte	16 kbyte
• Outputs	16 kbyte	16 kbyte	16 kbyte
Process image			
• Inputs, adjustable	16 kbyte	16 kbyte	16 kbyte
• Outputs, adjustable	16 kbyte	16 kbyte	16 kbyte
Time of day			
Clock			
• Hardware clock (real-time clock)	Yes	Yes	Yes
Operating hours counter			
• Number	16	16	16
Interfaces			
Interfaces/bus type	1 x MPI/PROFIBUS DP, 1 x PROFIBUS DP	1 x MPI/PROFIBUS DP, 1 x PROFIBUS DP, 1 x PROFIBUS DP (optionally pluggable)	1 x MPI/PROFIBUS DP, 1 x PROFINET (2 ports), 1 x PROFIBUS DP (optionally pluggable)
Number of RS 485 interfaces	2; Combined MPI / PROFIBUS DP and PROFIBUS DP	2; Combined MPI / PROFIBUS DP and PROFIBUS DP	1; Combined MPI / PROFIBUS DP
Number of other interfaces		1; PROFIBUS DP with IF 964-DP (plug-in option; MLFB: 6ES7964-2AA04-0AB0)	1; PROFIBUS DP with IF 964-DP (plug-in option; MLFB: 6ES7964-2AA04-0AB0)
1. Interface			
Interface type	Integrated	Integrated	Integrated
Physics	RS 485 / PROFIBUS + MPI	RS 485 / PROFIBUS + MPI	RS 485 / PROFIBUS + MPI
Functionality			
• MPI	Yes	Yes	Yes
• DP master	Yes	Yes	Yes
• DP slave	Yes	Yes	Yes
DP master			
• Number of DP slaves, max.	32	32	32
2. Interface			
Interface type	Integrated	Integrated	PROFINET
Physics	RS 485 / PROFIBUS	RS 485 / PROFIBUS	Ethernet RJ45
Interface types			
• Number of ports			2
Functionality			
• DP master	Yes	Yes	No
• DP slave	Yes	Yes	No
• PROFINET IO Controller			Yes
• PROFINET IO Device			Yes
• PROFINET CBA			Yes
DP master			
• Number of DP slaves, max.	125	125	
3. Interface			
Interface type		Pluggable interface module (IF), technical data as for 2nd interface	Pluggable interface module (IF)
Plug-in interface modules		IF 964-DP (MLFB: 6ES7964-2AA04-0AB0)	IF 964-DP (MLFB: 6ES7964-2AA04-0AB0)
Physics		RS 485 / PROFIBUS	RS 485 / PROFIBUS
Functionality			
• MPI		No	No
• DP master		Yes	Yes
• DP slave		Yes	Yes
DP master			
• Number of DP slaves, max.		125	125

Technical specifications (continued)

Article number	6ES7416-2XP07-0AB0 CPU 416-2, MPI, PROFIBUS, 8 MB	6ES7416-3XS07-0AB0 CPU 416-3, 16 MB, 3 INTERFACES	6ES7416-3ES07-0AB0 CPU416-3 PN/DP, 16 MB, 3 INTERFACES
Isochronous mode			
Isochronous operation (application synchronized up to terminal)	Yes; For PROFIBUS only	Yes; For PROFIBUS only	Yes; Via PROFIBUS DP or PROFINET interface
Communication functions			
PG/OP communication	Yes	Yes	Yes
Data record routing	Yes	Yes	Yes
Global data communication			
• supported	Yes	Yes	Yes
S7 basic communication			
• supported	Yes	Yes	Yes
S7 communication			
• supported	Yes	Yes	Yes
S5 compatible communication			
• supported	Yes; Via FC AG_SEND and AG_RECV, max. via 10 CP 443-1 or 443-5	Yes; Via FC AG_SEND and AG_RECV, max. via 10 CP 443-1 or 443-5	Yes; Via FC AG_SEND and AG_RECV, max. via 10 CP 443-1 or 443-5
Standard communication (FMS)			
• supported	Yes; Via CP and loadable FB	Yes; Via CP and loadable FB	Yes; Via CP and loadable FB
Open IE communication			
• TCP/IP			Yes; via integrated PROFINET interface and loadable FBs 94
- Number of connections, max.			94
• ISO-on-TCP (RFC1006)	Via CP 443-1 and loadable FB	Via CP 443-1 and loadable FB	Yes; Via integrated PROFINET interface or CP 443-1 and loadable FBs 94
- Number of connections, max.			94
• UDP			Yes; via integrated PROFINET interface and loadable FBs 94
- Number of connections, max.			94
Web server			
• supported	No	No	Yes
Number of connections			
• overall	96	96	96
Standards, approvals, certificates			
Use in hazardous areas			
• ATEX	ATEX II 3 G Ex nA IIC T4 Gc	ATEX II 3 G Ex nA IIC T4 Gc	ATEX II 3 G Ex nA IIC T4 Gc
Ambient conditions			
Ambient temperature during operation			
• min.	0 °C	0 °C	0 °C
• max.	60 °C	60 °C	60 °C
Configuration			
Know-how protection			
• User program protection/password protection	Yes	Yes	Yes
• Block encryption	Yes; With S7 block Privacy	Yes; With S7 block Privacy	Yes; With S7 block Privacy
Dimensions			
Width	25 mm	50 mm	50 mm
Height	290 mm	290 mm	290 mm
Depth	219 mm	219 mm	219 mm
Weights			
Weight, approx.	700 g	900 g	900 g

SIMATIC S7-400 advanced controller

Central processing units
Standard CPUs

CPU 416

1

Ordering data	Article No.		Article No.
CPU 416-2 Work memory 8 MB, power supply 24 V DC, MPI/PROFIBUS DP master interface, PROFIBUS DP master interface, slot for memory card, incl. slot number labels	6ES7416-2XP07-0AB0	IF 964-DP interface module For connecting an additional DP line; for CPU 414-3, CPU 414-3 PN/DP, CPU 416-3, CPU 416-3 PN/DP, CPU 417-4	6ES7964-2AA04-0AB0
CPU 416-3 Work memory 16 MB, power supply 24 V DC, MPI/PROFIBUS DP master interface, PROFIBUS DP master interface, module slot for 1 IF module, slot for memory card, incl. slot number labels	6ES7416-3XS07-0AB0	Slot number labels 1 set (spare part)	6ES7912-0AA00-0AA0
CPU 416-3 PN/DP Work memory 16 MB, power supply 24 V DC, MPI/PROFIBUS DP master interface, PROFINET interface, PROFIBUS DP master interface, module slot for 1 IF module, slot for memory card, incl. slot number labels	6ES7416-3ES07-0AB0	SIMATIC Manual Collection Electronic manuals on DVD, multi-language: LOGO!, SIMADYN, SIMATIC bus components, SIMATIC C7, SIMATIC distributed I/O, SIMATIC HMI, SIMATIC Sensors, SIMATIC NET, SIMATIC PC-based Automation, SIMATIC PCS 7, SIMATIC PG/PC, SIMATIC S7, SIMATIC Software, SIMATIC TDC	6ES7998-8XC01-8YE0
RAM memory card • 64 KB • 256 KB • 1 MB • 2 MB • 4 MB • 8 MB • 16 MB • 64 MB	6ES7952-0AF00-0AA0 6ES7952-1AH00-0AA0 6ES7952-1AK00-0AA0 6ES7952-1AL00-0AA0 6ES7952-1AM00-0AA0 6ES7952-1AP00-0AA0 6ES7952-1AS00-0AA0 6ES7952-1AY00-0AA0	SIMATIC Manual Collection update service for 1 year Current "Manual Collection" DVD and the three subsequent updates	6ES7998-8XC01-8YE2
FEPROM memory card • 64 KB • 256 KB • 1 MB • 2 MB • 4 MB • 8 MB • 16 MB • 32 MB • 64 MB	6ES7952-0KF00-0AA0 6ES7952-0KH00-0AA0 6ES7952-1KK00-0AA0 6ES7952-1KL00-0AA0 6ES7952-1KM00-0AA0 6ES7952-1KP00-0AA0 6ES7952-1KS00-0AA0 6ES7952-1KT00-0AA0 6ES7952-1KY00-0AA0	PROFIBUS bus components	
MPI cable For connection of SIMATIC S7 and PG via MPI; length: 5 m	6ES7901-0BF00-0AA0	RS 485 bus connector with 90° cable outlet Max. transfer rate 12 Mbps • Without PG interface • With PG interface	6ES7972-0BA12-0XA0 6ES7972-0BB12-0XA0
		RS 485 bus connector with angled cable outlet Max. transfer rate 12 Mbps • Without PG interface • With PG interface	6ES7972-0BA42-0XA0 6ES7972-0BB42-0XA0
		RS 485 bus connector with 90° cable outlet for FastConnect connection system Max. transfer rate 12 Mbps • Without PG interface - 1 unit - 100 units • With PG interface - 1 unit - 100 units	6ES7972-0BA52-0XA0 6ES7972-0BA52-0XB0 6ES7972-0BB52-0XA0 6ES7972-0BB52-0XB0

SIMATIC S7-400 advanced controllerCentral processing units
Standard CPUs

CPU 416

1

Ordering data	Article No.		Article No.
RS 485 bus connector with axial cable outlet For SIMATIC OP, for connection to PPI, MPI, PROFIBUS	6GK1500-0EA02	SCALANCE X204-2 Industrial Ethernet Switch Industrial Ethernet Switches with integral SNMP access, Web diagnostics, copper cable diagnostics and PROFINET diagnostics for configuring line, star and ring topologies; four 10/100 Mbps RJ45 ports and two FO ports	6GK5204-2BB10-2AA3
PROFIBUS FastConnect bus cable Standard type with special design for fast mounting, 2-core, shielded, sold by the meter; max. delivery unit 1 000 m, minimum ordering quantity 20 m	6XV1830-0EH10	IE FC RJ45 plugs RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables	
RS 485 repeater for PROFIBUS Transmission rate up to 12 Mbps; 24 V DC; IP20 enclosure	6ES7972-0AA02-0XA0	IE FC RJ45 Plug 180 180° cable outlet • 1 unit • 10 units • 50 units	6GK1901-1BB10-2AA0 6GK1901-1BB10-2AB0 6GK1901-1BB10-2AE0
PROFINET bus components		PROFIBUS/PROFINET bus components For establishing MPI/PROFIBUS/PROFINET communication	See catalogs IK PI, CA 01
IE FC TP standard cable GP 2x2 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug; PROFINET-compatible; with UL approval Sold by the meter	6XV1840-2AH10		
FO standard cable GP (50/125) Standard cable, splittable, UL approval, sold by the meter	6XV1873-2A		

SIMATIC S7-400 advanced controller

Central processing units

SIPLUS S7-400 standard CPUs

SIPLUS S7-400 CPU 414

1

Overview

- CPUs for high demands in the mid-level performance range
- Applicable for plants with additional demands on programming scope and processing speed
- Integrated PROFINET functions in CPU 414-3 PN/DP

Note:

SIPLUS extreme products are based on SIMATIC standard products. The contents listed here were taken from the respective standard products. SIPLUS extreme-specific information was added.

For further technical documentation on SIPLUS, see:

www.siemens.com/siplus-extreme

Technical specifications

Article number	6AG1414-3EM07-7AB0
Based on	6ES7414-3EM07-0AB0 SIPLUS S7-400 CPU 414-3 PN/DP V7
Ambient conditions	
Ambient temperature in operation	
• Min.	-25 °C; = Tmin
• max.	70 °C; = Tmax
Extended ambient conditions	
• Relative to ambient temperature-atmospheric pressure-installation altitude	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)
Relative humidity	
- With condensation, max.	100 %; Relative humidity, incl. condensation / frost permitted (no commissioning under condensation conditions)
Resistance	
- against biologically active substances / conformity with EN 60721-3-3	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!
- against chemically active substances / conformity with EN 60721-3-3	Yes; Class 3C4 incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!
- against mechanically active substances / conformity with EN 60721-3-3	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!

Ordering data**Article No.**

SIPLUS S7-400 CPU 414-3 PN/DP CPU with main memory 4 MB (2 MB code and 2 MB data), 3 interfaces: 1x MPI/DP, PN each and for IF964-DP (plug-in) Extended temperature range and exposure to media	6AG1414-3EM07-7AB0
Accessories	
Memory Card RAM	see SIPLUS S7-400 CPU 412, page 1/21
IF 964-DP interface module For connecting an additional DP line; for SIPLUS CPU 414-3 PN/DP, CPU 416-3, CPU 416-3 PN/DP, CPU 417-4	6AG1964-2AA04-7AB0
RS 485 bus connector with 90° cable outlet	see SIPLUS S7-400 CPU 412, page 1/21
RS 485 bus connector with angled cable outlet	see SIPLUS S7-400 CPU 412, page 1/21
RS 485 bus connector with axial cable outlet	see SIPLUS S7-400 CPU 412, page 1/21

Article No.

RS 485 repeater for PROFIBUS Transfer rate up to 12 Mbit/s; 24 V DC; IP20 enclosure Extended temperature range and exposure to media	6AG1972-0AA02-7XA0
SIPLUS SCALANCE X204-2 Industrial Ethernet Switch with integral SNMP access, Web diagnostics, copper cable diagnostics and PROFINET diagnostics for configuring line, star and ring topologies; four 10/100 Mbit/s RJ45 ports and two FO ports Extended temperature range and exposure to media	6AG1204-2BB10-4AA3
IE FC RJ45 Plug 180 180° cable outlet; 1 unit Extended temperature range and exposure to media	6AG1901-1BB10-7AA0
Further accessories	see SIMATIC S7-400 CPU 414, page 1/11

SIMATIC S7-400 advanced controller

Central processing units
SIPLUS S7-400 standard CPUs

SIPLUS S7-400 CPU 416

1

Overview

High-performance CPUs in the high-end performance range

- Applicable for plants with high requirements in the high-end performance range
- Integrated PROFINET functions in CPU 416-3 PN/DP

Note:

SIPLUS extreme products are based on SIMATIC standard products. The contents listed here were taken from the respective standard products. SIPLUS extreme-specific information was added.

For technical documentation on SIPLUS, see:
www.siemens.com/siplus-extreme

Technical specifications

Article number	6AG1416-3XR05-4AB0	6AG1416-3ES07-7AB0
Based on	6ES7416-3XR05-0AB0 SIPLUS S7-400 CPU416-3	6ES7416-3ES07-0AB0 SIPLUS S7-400 CPU 416-3 PN/DP V7
Ambient conditions		
Ambient temperature in operation		
• Min.	0 °C; = Tmin	-25 °C; = Tmin
• max.	60 °C; = Tmax	70 °C; = Tmax
Extended ambient conditions		
• Relative to ambient temperature-atmospheric pressure-installation altitude	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)	Tmin ... Tmax at 1080 hPa ... 795 hPa (-1000 m ... +2000 m) // Tmin ... (Tmax - 10K) at 795 hPa ... 658 hPa (+2000 m ... +3500 m) // Tmin ... (Tmax - 20K) at 658 hPa ... 540 hPa (+3500 m ... +5000 m)
Relative humidity		
- With condensation, max.	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)	100 %; Relative humidity, incl. condensation / frost permitted (no commissioning under condensation conditions)
Resistance		
- against biologically active substances / conformity with EN 60721-3-3	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna). The supplied connector covers must remain on the unused interfaces during operation!
- against chemically active substances / conformity with EN 60721-3-3	Yes; Class 3C4 (RH < 75 %) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!
- against mechanically active substances / conformity with EN 60721-3-3	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!

Ordering data**Article No.****Article No.****SIPLUS S7-400 CPU 416-3**

CPU with main memory 11.2 MB
(5.6 MB code and 5.6 MB data),
3 interfaces: 1x MPI/DP, DP each
and module slot for 1 IF module

Exposure to media

6AG1416-3XR05-4AB0**SIPLUS S7-400 CPU 416-3 PN/DP**

CPU with main memory 16 MB
(8 MB code and 8 MB data),
3 interfaces: 1x MPI/DP, PN each
and module slot for 1 IF module

Extended temperature range and
exposure to media

6AG1416-3ES07-7AB0**SIPLUS accessories**

see SIPLUS S7-400
CPU 414, page 1/22

Further accessories

see SIMATIC S7-400
CPU 416, page 1/16