

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

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.			
• 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.			
• UDP			Yes; via integrated PROFINET interface and loadable FBs 94
- Number of connections, max.			
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**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**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**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

FEPRM 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

MPI cable

For connection of SIMATIC S7 and PG via MPI; length: 5 m

6ES7901-0BF00-0AA0**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**Slot number labels**

1 set (spare part)

6ES7912-0AA00-0AA0**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**SIMATIC Manual Collection update service for 1 year**

Current "Manual Collection" DVD and the three subsequent updates

6ES7998-8XC01-8YE2**PROFIBUS bus components****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

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**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

Article No.

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

Article No.**SIPLUS accessories**

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

Further accessories

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

SIMATIC S7-400 advanced controller

Central processing units

Interface modules

PROFIBUS module IF-964 DP

1

Overview

- To connect distributed I/Os over PROFIBUS DP
- Max. transmission rate 12 Mbit/s
- Electrically isolated RS 485 interface
- Connection via 9-pin sub-D connector
- The following connection options are available for each S7-400 CPU:
 - A PROFIBUS module in the CPUs 414-3, 414(F)-3 PN/DP, 416-3, 416(F)-3 PN/DP
 - Two PROFIBUS modules in the CPU 417-4

Note:

Can only be used with CPUs 6ES7414-3XM07-0AB0, 6ES7414-3EM07-0AB0, 6ES7414-3FM07-0AB0, 6ES7416-3XS07-0AB0, 6ES7416-3ES07-0AB0, 6ES7416-3FS07-0AB0 and 6ES7417-4XT07-0AB0.

Technical specifications

Article number	6ES7964-2AA04-0AB0 INTERFACE MOD. DP-MASTER F. S7-400
Product type designation	
Input current from CPU, max.	150 mA; Current consumption from S7-400 bus: The module uses no current at 24 V, it provides this voltage only at the DP interface. Total current consumption of the components connected to the DP interface, but maximum 150 mA. Current carrying capacity of the isolated 5 V (P5ext) maximum 90 mA, current carrying capacity of the 24 V maximum 150 mA.
Power losses Power loss, typ.	1 W
Interfaces PROFIBUS DP Cable length - Cable length, max.	1 200 m; At 9.6 kbit/s: max. 1200 m; at 12 Mbit/s: max. 100 m
1st interface Physics Isolated	RS 485 Yes
Functionality • DP master • DP slave	Yes; Default setting Yes
DP master • Transmission rate, min. • Transmission rate, max. • Number of DP slaves, max.	9.6 kbit/s 12 Mbit/s 125; depending on the CPU used
Services - PG/OP communication - Equidistance mode support - SYNC/FREEZE - Direct data exchange (slave-to-slave communication)	Yes Yes Yes Yes
Address area - Inputs, max. - Outputs, max.	device-dependent device-dependent
User data per DP slave - Inputs, max. - Outputs, max.	244 byte 244 byte
Communication functions Number of connections • overall	device-dependent
Dimensions Width Height Depth	26 mm 54 mm 130 mm
Weights Weight, approx.	65 g

Ordering data**Article No.**

IF 964-DP interface module
Interface module with integrated PROFIBUS DP master interface

6ES7964-2AA04-0AB0