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SIMATIC S7-400

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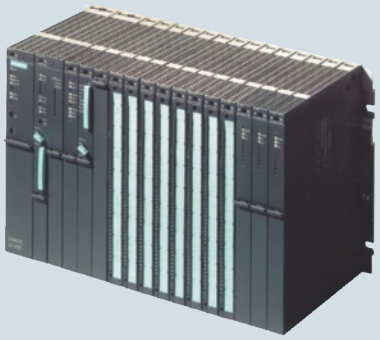

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Brochures

For brochures serving as selection guides for SIMATIC products refer to:

http://www.siemens.com/simatic/printmaterial

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S7-400/S7-400H/S7-400F/FH

Overview

The S7-400 is the most powerful PLC in the family of SIMATIC controllers. It enables successful automation solutions with Totally Integrated Automation (TIA). The S7-400 is an automation platform for system solutions in production and process engineering, and it is characterized primarily by its modularity and performance reserves.

S7-400

- The power PLC for the mid to high-end performance ranges.
- The solution for even the most demanding tasks.
- With a comprehensive range of modules and performance-graded CPUs for optimal adaptation to the automation task.
- Flexible in use through simple implementation of distributed structures; user-friendly connections.
- Optimal communication and networking options.
- User-friendly handling and uncomplicated design without a fan.
- Can be expanded without problems when the tasks increase.
- Multicomputing:
  Simultaneous operation of several CPUs in one S7-400 central controller.
  Multicomputing distributes the overall performance power of an S7-400. For example, complex tasks can be divided into technologies such as open-loop control, computing or communication, and assigned to different CPUs. And every CPU can be assigned its own local I/O.
- Modularity:
  The powerful backplane bus of the S7-400 and the communication interfaces that can be connected direct to the CPU enable high-performance operation of a host of communication lines. This enables, for example, division into one communication path for HMI and programming tasks, one for high-performance and equidistant motion control components, and one for a "normal" I/O fieldbus. Additionally required connections to MES/ERP systems or the Internet can also be implemented.
- Engineering and diagnostics:
  The S7-400 is configured and programmed extremely efficiently together with the SIMATIC Engineering Tools particularly in the case of extensive automation solutions with a high engineering component. For this purpose, high-level languages such as SCL and graphical engineering tools for sequential controls, state graph programs and technology-oriented diagrams are available, for example.

S7-400H

- Fault-tolerant automation system with redundant design.
- For applications with high fail-safety requirements.
  Processes with high restart costs, expensive downtimes, little supervision, and few maintenance options.
- Redundant central functions.
- Increases availability of I/O: switched I/O configuration.
- Also possible to use I/Os with standard availability: single-sided configuration.
- Hot stand-by: automatic reaction-free switching to the standby unit in the event of a fault.
- Configuration with two separate or one divided central rack.
- Connection of switched I/O via redundant PROFIBUS DP.

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Overview (continued)

S7-400F/FH

- Failsafe automation system for plants with increased safety requirements
- Complies with safety requirements to SIL 3 in accordance with IEC 61508, AK6 in accordance with DIN V 19250 and Cat. 4 in accordance with EN 954-1
- If required, also fault tolerant through redundant design
- Without additional wiring of the safety-related I/O:
- Safety-relevant communication via PROFIBUS DP with PROFIsafe profile
- Based on S7-400H and ET 200M with fail-safe modules
- Standard modules for non-safety-related applications can also be used in the automation system
- Isolation module for joint use of fail-safe and standard modules in safety mode in one ET 200M

Technical specifications

General technical data	
Degree of protection	IP20
Ambient temperature	0 to 60 °C
Relative humidity	5 to 95%, no condensation
Atmospheric pressure	1080 to 795 hPa (corresponds to an altitude of 1000 m to 2000 m)
Electromagnetic compatibility	
• Interference immunity	According to EN 61000-6-2
• Emitted interference	According to EN 61000-6-4
Mechanical load	
• Vibration, test according to / tested with	IEC 60068-2-6 (sine) 10 to 58 Hz; constant amplitude 0.075 mm; 58 to 500 Hz; constant acceleration 1 g; duration of oscillation: 10 frequency sweeps per axis in each direction of the three mutually perpendicular axes
• Shock, test according to / tested with	IEC 60068-2-27 Type of shock: Half-sine; strength of the shock 10 g (peak value), duration 6 ms direction of shock: 100 shocks in each of the 3 mutually perpendicular axes.

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Overview

- The low-cost starter solution for the medium performance range
- Can be used in small and medium-sized systems with requirements of the medium performance range

Technical specifications

	6ES7 412-1XJ05-0AB0 CPU 412-1	6ES7 412-2XJ05-0AB0 CPU 412-2	6ES7 412-2EK06-0AB0 CPU 412-2 PN
General information			
Engineering with			
• Programming package	STEP7 V 5.3 SP2 or higher with HW update	STEP7 V 5.3 SP2 or higher with HW update	STEP7 V5.5 or higher/iMap V3.0 + iMap STEP7 Add-on V3.0 SP5 or higher
Supply voltage			
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 losses			
Power loss, typ.	2.5 W	4.5 W	5.5 W
Memory			
Work memory			
• integrated	288 kbyte	512 kbyte	1 Mbyte
• integrated (for program)	144 kbyte	256 kbyte	0.5 Mbyte
• integrated (for data)	144 kbyte	256 kbyte	0.5 Mbyte
Load memory			
• expandable FEPROM, max.	64 Mbyte	64 Mbyte	64 Mbyte
• integrated RAM, max.	512 kbyte	512 kbyte	512 kbyte
• expandable RAM, max.	64 Mbyte	64 Mbyte	64 Mbyte
CPU processing times			
for bit operations, typ.	75 ns	75 ns	75 ns
for word operations, typ.	75 ns	75 ns	75 ns
for fixed point arithmetic, typ.	75 ns	75 ns	75 ns
for floating point arithmetic, typ.	225 ns	225 ns	225 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

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Technical specifications (continued)

	6ES7 412-1XJ05-0AB0 CPU 412-1	6ES7 412-2XJ05-0AB0 CPU 412-2	6ES7 412-2EK06-0AB0 CPU 412-2 PN
Data areas and their retentivity			
Flag			
• Number, max.	4 kbyte; Size of bit memory address area	4 kbyte; Size of bit memory address area	4 kbyte; Size of bit memory address area
Address area			
I/O address area			
• Inputs	4 kbyte	4 kbyte	4 kbyte
• Outputs	4 kbyte	4 kbyte	4 kbyte
Process image			
• Inputs, adjustable	4 kbyte	4 kbyte	4 kbyte
• Outputs, adjustable	4 kbyte	4 kbyte	4 kbyte
Time of day			
Clock			
• Hardware clock (real-time clock)	Yes	Yes	Yes
Operating hours counter			
• Number	16	16	16
1st interface			
Type of interface	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
2nd interface			
Type of interface		integrated	PROFINET
Physics		RS 485 / PROFIBUS	Ethernet RJ45
Number of ports			2
Functionality			
• DP master		Yes	No
• DP slave		Yes	No
• PROFINET IO Controller			Yes
• PROFINET IO Device			Yes
• PROFINET CBA			Yes
DP master			
• Number of DP slaves, max.		64	
PROFINET IO Controller			
• Max. number of connectable IO devices for RT			256
• Number of IO devices with IRT and the option "high flexibility"			256
• Number of IO Devices with IRT and the option "high performance", max.			64
Isochronous mode			
Isochronous operation (application synchronized up to terminal)	Yes; For PROFIBUS only	Yes; For PROFIBUS only	Yes; Via PROFIBUS DP or PROFINET interface

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Technical specifications (continued)

	6ES7 412-1XJ05-0AB0 CPU 412-1	6ES7 412-2XJ05-0AB0 CPU 412-2	6ES7 412-2EK06-0AB0 CPU 412-2 PN
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
- Number of connections, max.			46
• ISO-on-TCP (RFC1006)	Via CP 443-1 Adv. and loadable FB	Via CP 443-1 and loadable FB	Yes; Via integrated PROFINET interface or CP 443-1 Adv. and loadable FBs
- Number of connections, max.			46
• UDP			Yes; via integrated PROFINET interface and loadable FBs
- Number of connections, max.			46
Web server			
• supported	No	No	Yes
Number of connections			
• overall	32	32	48
Configuration			
programming			
• Programming language			
- LAD	Yes	Yes	Yes
- FBD	Yes	Yes	Yes
- STL	Yes	Yes	Yes
- SCL	Yes	Yes	Yes
- CFC	Yes	Yes	Yes
- GRAPH	Yes	Yes	Yes
- HiGraph®	Yes	Yes	Yes
Know-how protection			
• User program protection/password protection	Yes	Yes	Yes
• Block encryption			Yes; With S7 block Privacy
Dimensions			
Width	25 mm	25 mm	25 mm
Height	290 mm	290 mm	290 mm
Depth	219 mm	219 mm	219 mm
Required slots	1	1	1
Weight			
Weight, approx.	0.7 kg	0.7 kg	750 g

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Ordering data	Order No.
CPU 412-1 Main memory 288 KB, power supply 24 V DC, MPI/PROFIBUS DP master interface, slot for memory card, incl. slot number labels	**6ES7 412-1XJ05-0AB0**
CPU 412-2 Main memory 512 KB, power supply 24 V DC, MPI/PROFIBUS DP master interface, slot for memory card, incl. slot number labels	**6ES7 412-2XJ05-0AB0**
CPU 412-2 PN Main memory 1 MB, power supply 24 V DC, MPI/PROFIBUS DP master interface, PROFINET interface, slot for memory card, incl. slot number labels	**6ES7 412-2EK06-0AB0**
Memory card RAM	
64 KB	**6ES7 952-0AF00-0AA0**
256 KB	**6ES7 952-1AH00-0AA0**
1 MB	**6ES7 952-1AK00-0AA0**
2 MB	**6ES7 952-1AL00-0AA0**
4 MB	**6ES7 952-1AM00-0AA0**
8 MB	**6ES7 952-1AP00-0AA0**
16 MB	**6ES7 952-1AS00-0AA0**
64 MB	**6ES7 952-1AY00-0AA0**
FEPROM memory card	
64 KB	**6ES7 952-0KF00-0AA0**
256 KB	**6ES7 952-0KH00-0AA0**
1 MB	**6ES7 952-1KK00-0AA0**
2 MB	**6ES7 952-1KL00-0AA0**
4 MB	**6ES7 952-1KM00-0AA0**
8 MB	**6ES7 952-1KP00-0AA0**
16 MB	**6ES7 952-1KS00-0AA0**
32 MB	**6ES7 952-1KT00-0AA0**
64 MB	**6ES7 952-1KY00-0AA0**
MPI cable for connection of SIMATIC S7 and PG via MPI; 5 m in length	**6ES7 901-0BF00-0AA0**
Slot number plates 1 set (spare part)	**6ES7 912-0AA00-0AA0**

	Order No.
SIMATIC Manual Collection Electronic manuals on DVD, multilingual: 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	**6ES7 998-8XC01-8YE0**
SIMATIC Manual Collection update service for 1 year Current "Manual Collection" DVD and the three subsequent updates	**6ES7 998-8XC01-8YE2**
RS 485 bus connector with 90° cable outlet	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6ES7 972-0BA12-0XA0**
With PG interface	**6ES7 972-0BB12-0XA0**
RS 485 bus connector with angled cable outlet	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6ES7 972-0BA42-0XA0**
With PG interface	**6ES7 972-0BB42-0XA0**
RS 485 bus connector with 90° cable outlet for FastConnect connection system	
Max. transfer rate 12 Mbit/s	
Without PG interface	
• 1 unit	**6ES7 972-0BA52-0XA0**
• 100 units	**6ES7 972-0BA52-0XB0**
With PG interface	
• 1 unit	**6ES7 972-0BB52-0XA0**
• 100 units	**6ES7 972-0BB52-0XB0**
RS 485 bus connector with axial cable outlet	
For SIMATIC OP, for connection to PPI, MPI, PROFIBUS	**6GK1 500-0EA02**
PROFIBUS FastConnect bus cable Standard type with special design for quick mounting, 2-core, shielded, sold by the meter, max. delivery unit 1000 m, minimum ordering quantity 20 m	**6XV1 830-0EH10**

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Standard CPUs
CPU 414

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

Technical specifications

	6ES7 414-2XK05-0AB0 CPU 414-2	6ES7 414-3XM05-0AB0 CPU 414-3	6ES7 414-3EM06-0AB0 CPU 414-3 PN/DP
General information			
Engineering with			
• Programming package	STEP7 V 5.3 SP2 or higher with HW update	STEP7 V 5.3 SP2 or higher with HW update	STEP7 V5.5 or higher/iMap V3.0 + iMap STEP7 Add-on V3.0 SP5 or higher
Supply voltage			
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 losses			
Power loss, typ.	4.5 W	5.5 W	6.5 W
Memory			
Work memory			
• integrated	1 Mbyte	2.8 Mbyte	4 Mbyte
• integrated (for program)	0.5 Mbyte	1.4 Mbyte	2 Mbyte
• integrated (for data)	0.5 Mbyte	1.4 Mbyte	2 Mbyte
Load memory			
• expandable FEPROM, max.	64 Mbyte	64 Mbyte	64 Mbyte
• integrated RAM, max.	512 kbyte	512 kbyte	512 kbyte
• expandable RAM, max.	64 Mbyte	64 Mbyte	64 Mbyte
CPU processing times			
for bit operations, typ.	45 ns	45 ns	45 ns
for word operations, typ.	45 ns	45 ns	45 ns
for fixed point arithmetic, typ.	45 ns	45 ns	45 ns
for floating point arithmetic, typ.	135 ns	135 ns	135 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

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Technical specifications (continued)

	6ES7 414-2XK05-0AB0 CPU 414-2	6ES7 414-3XM05-0AB0 CPU 414-3	6ES7 414-3EM06-0AB0 CPU 414-3 PN/DP
Data areas and their retentivity			
Flag			
• Number, max.	8 kbyte; Size of bit memory address area	8 kbyte; Size of bit memory address area	8 kbyte; Size of bit memory address area
Address area			
I/O address area			
• Inputs	8 kbyte	8 kbyte	8 kbyte
• Outputs	8 kbyte	8 kbyte	8 kbyte
Process image			
• Inputs, adjustable	8 kbyte	8 kbyte	8 kbyte
• Outputs, adjustable	8 kbyte	8 kbyte	8 kbyte
Time of day			
Clock			
• Hardware clock (real-time clock)	Yes	Yes	Yes
Operating hours counter			
• Number	16	16	16
1st interface			
Type of interface	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
2nd interface			
Type of interface	integrated	integrated	PROFINET
Physics	RS 485 / PROFIBUS	RS 485 / PROFIBUS	Ethernet RJ45
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.	96	96	
PROFINET IO Controller			
• Max. number of connectable IO devices for RT			256
• Number of IO devices with IRT and the option "high flexibility"			256
• Number of IO Devices with IRT and the option "high performance", max.			64
3rd interface			
Type of interface		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.		96	96

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Technical specifications (continued)

	6ES7 414-2XK05-0AB0 CPU 414-2	6ES7 414-3XM05-0AB0 CPU 414-3	6ES7 414-3EM06-0AB0 CPU 414-3 PN/DP
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
- Number of connections, max.			62
• 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 Adv. and loadable FBs
- Number of connections, max.			62
• UDP			Yes; via integrated PROFINET interface and loadable FBs
- Number of connections, max.			62
Web server			
• supported	No	No	Yes
Number of connections			
• overall	32	32	64
Configuration			
programming			
• Programming language			
- LAD	Yes	Yes	Yes
- FBD	Yes	Yes	Yes
- STL	Yes	Yes	Yes
- SCL	Yes	Yes	Yes
- CFC	Yes	Yes	Yes
- GRAPH	Yes	Yes	Yes
- HiGraph®	Yes	Yes	Yes
Know-how protection			
• User program protection/password protection	Yes	Yes	Yes
• Block encryption			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
Required slots	1	2	2
Weight			
Weight, approx.	0.7 kg	0.9 kg	900 g

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Ordering data	Order No.
CPU 414-2 Main memory 1 MB, power supply 24 V DC, MPI/PROFIBUS DP master interface, slot for memory card, incl. slot number labels	**6ES7 414-2XK05-0AB0**
CPU 414-3 Main memory 2.8 MB, power supply 24 V DC, MPI/PROFIBUS DP master interface, PROFIBUS DP master interface, slot for memory card, module slots for 1 IF module, incl. slot number labels	**6ES7 414-3XM05-0AB0**
CPU 414-3 PN/DP Main memory 4 MB, power supply 24 V DC, MPI/PROFIBUS DP master interface, PROFINET interface, slot for memory card, module slot for 1 IF module, incl. slot number labels	**6ES7 414-3EM06-0AB0**
Memory card RAM	
64 KB	**6ES7 952-0AF00-0AA0**
256 KB	**6ES7 952-1AH00-0AA0**
1 MB	**6ES7 952-1AK00-0AA0**
2 MB	**6ES7 952-1AL00-0AA0**
4 MB	**6ES7 952-1AM00-0AA0**
8 MB	**6ES7 952-1AP00-0AA0**
16 MB	**6ES7 952-1AS00-0AA0**
64 MB	**6ES7 952-1AY00-0AA0**
FEPROM memory card	
64 KB	**6ES7 952-0KF00-0AA0**
256 KB	**6ES7 952-0KH00-0AA0**
1 MB	**6ES7 952-1KK00-0AA0**
2 MB	**6ES7 952-1KL00-0AA0**
4 MB	**6ES7 952-1KM00-0AA0**
8 MB	**6ES7 952-1KP00-0AA0**
16 MB	**6ES7 952-1KS00-0AA0**
32 MB	**6ES7 952-1KT00-0AA0**
64 MB	**6ES7 952-1KY00-0AA0**
MPI cable For connection of SIMATIC S7 and PG via MPI; 5 m in length	**6ES7 901-0BF00-0AA0**
IF 964-DP interface module To connect an additional DP line; for CPU 414-3, CPU 414-3 PN/DP, CPU 416-3, CPU 416-3 PN/DP, CPU 417-4	**6ES7 964-2AA04-0AB0**

	Order No.
Slot number plates 1 set (spare part)	**6ES7 912-0AA00-0AA0**
SIMATIC Manual Collection Electronic manuals on DVD, multilingual: 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	**6ES7 998-8XC01-8YE0**
SIMATIC Manual Collection update service for 1 year Current "Manual Collection" DVD and the three subsequent updates	**6ES7 998-8XC01-8YE2**
PROFIBUS bus components	
RS 485 bus connector with 90° cable outlet	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6ES7 972-0BA12-0XA0**
With PG interface	**6ES7 972-0BB12-0XA0**
RS 485 bus connector with angled cable outlet	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6ES7 972-0BA42-0XA0**
With PG interface	**6ES7 972-0BB42-0XA0**
RS 485 bus connector with 90° cable outlet for FastConnect connection system	
Max. transfer rate 12 Mbit/s	
Without PG interface	
• 1 unit	**6ES7 972-0BA52-0XA0**
• 100 units	**6ES7 972-0BA52-0XB0**
With PG interface	
• 1 unit	**6ES7 972-0BB52-0XA0**
• 100 units	**6ES7 972-0BB52-0XB0**
RS 485 bus connector with axial cable outlet	
For SIMATIC OP, for connection to PPI, MPI, PROFIBUS	**6GK1 500-0EA02**
PROFIBUS FastConnect bus cable Standard type with special design for quick mounting, 2-core, shielded, sold by the meter, max. delivery unit 1000 m, minimum ordering quantity 20 m	**6XV1 830-0EH10**
RS 485 repeater for PROFIBUS Transmission rate up to 12 Mbit/s; 24 V DC; IP20 enclosure	**6ES7 972-0AA02-0XA0**

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Ordering data

	Order No.
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	**6XV1 840-2AH10**
FO Standard Cable GP (50/125) Standard cable, splittable, UL approval, sold by the meter	**6XV1 873-2A**
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 Mbit/s RJ45 ports and two FO ports	**6GK5 204-2BB10-2AA3**
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	
IE FC RJ45 plug 180 180° cable outlet	
1 unit	**6GK1 901-1BB10-2AA0**
10 units	**6GK1 901-1BB10-2AB0**
50 units	**6GK1 901-1BB10-2AE0**
PROFIBUS/PROFINET bus components For establishing MPI/PROFIBUS/ PROFINET communication	See IK PI, CA 01 catalogs

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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

Technical specifications

	6ES7 416-2XN05-0AB0 CPU 416-2	6ES7 416-3XR05-0AB0 CPU 416-3	6ES7 416-3ES06-0AB0 CPU416-3 PN/DP
General information			
Engineering with			
• Programming package	STEP7 V 5.3 SP2 or higher with HW update	STEP7 V 5.3 SP2 or higher with HW update	STEP7 V5.5 or higher/iMap V3.0 + iMap STEP7 Add-on V3.0 SP5 or higher
Supply voltage			
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 losses			
Power loss, typ.	4.5 W	5.5 W	6.5 W
Memory			
Work memory			
• integrated	5.6 Mbyte	11.2 Mbyte	16 Mbyte
• integrated (for program)	2.8 Mbyte	5.6 Mbyte	8 Mbyte
• integrated (for data)	2.8 Mbyte	5.6 Mbyte	8 Mbyte
Load memory			
• expandable FEPROM, 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.	30 ns	30 ns	30 ns
for word operations, typ.	30 ns	30 ns	30 ns
for fixed point arithmetic, typ.	30 ns	30 ns	30 ns
for floating point arithmetic, typ.	90 ns	90 ns	90 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

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Technical specifications (continued)

	6ES7 416-2XN05-0AB0 CPU 416-2	6ES7 416-3XR05-0AB0 CPU 416-3	6ES7 416-3ES06-0AB0 CPU416-3 PN/DP
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
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
1st interface			
Type of interface	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
2nd interface			
Type of interface	integrated	integrated	PROFINET
Physics	RS 485 / PROFIBUS	RS 485 / PROFIBUS	Ethernet RJ45
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	
PROFINET IO Controller			
• Max. number of connectable IO devices for RT			256
• Number of IO devices with IRT and the option "high flexibility"			256
• Number of IO Devices with IRT and the option "high performance", max.			64
3rd interface			
Type of interface		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

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Technical specifications (continued)

	6ES7 416-2XN05-0AB0 CPU 416-2	6ES7 416-3XR05-0AB0 CPU 416-3	6ES7 416-3ES06-0AB0 CPU416-3 PN/DP
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
- 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
- Number of connections, max.			94
• UDP			Yes; via integrated PROFINET interface and loadable FBs
- Number of connections, max.			94
Web server			
• supported	No	No	Yes
Number of connections			
• overall	64	64	96
Configuration			
programming			
• Programming language			
- LAD	Yes	Yes	Yes
- FBD	Yes	Yes	Yes
- STL	Yes	Yes	Yes
- SCL	Yes	Yes	Yes
- CFC	Yes	Yes	Yes
- GRAPH	Yes	Yes	Yes
- HiGraph®	Yes	Yes	Yes
Know-how protection			
• User program protection/password protection	Yes	Yes	Yes
• Block encryption			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
Required slots	1	2	2
Weight			
Weight, approx.	0.7 kg	0.9 kg	900 g

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Ordering data	Order No.
CPU 416-2 Main memory 5.6 MB, power supply 24 V DC, MPI/PROFIBUS DP master interface, PROFIBUS DP master interface, slot for memory card, incl. slot number labels	**6ES7 416-2XN05-0AB0**
CPU 416-3 Main memory 11.2 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	**6ES7 416-3XR05-0AB0**
CPU 416-3 PN/DP Main memory 16 MB, power supply 24 V DC, MPI/PROFIBUS DP master interface, PROFINET interface, module slot for 1 IF submodule, slot for memory card, incl. slot number labels	**6ES7 416-3ES06-0AB0**
Memory card RAM	
64 KB	**6ES7 952-0AF00-0AA0**
256 KB	**6ES7 952-1AH00-0AA0**
1 MB	**6ES7 952-1AK00-0AA0**
2 MB	**6ES7 952-1AL00-0AA0**
4 MB	**6ES7 952-1AM00-0AA0**
8 MB	**6ES7 952-1AP00-0AA0**
16 MB	**6ES7 952-1AS00-0AA0**
64 MB	**6ES7 952-1AY00-0AA0**
FEPROM memory card	
64 KB	**6ES7 952-0KF00-0AA0**
256 KB	**6ES7 952-0KH00-0AA0**
1 MB	**6ES7 952-1KK00-0AA0**
2 MB	**6ES7 952-1KL00-0AA0**
4 MB	**6ES7 952-1KM00-0AA0**
8 MB	**6ES7 952-1KP00-0AA0**
16 MB	**6ES7 952-1KS00-0AA0**
32 MB	**6ES7 952-1KT00-0AA0**
64 MB	**6ES7 952-1KY00-0AA0**
MPI cable for connection of SIMATIC S7 and PG via MPI; 5 m in length	**6ES7 901-0BF00-0AA0**
IF 964-DP interface module To connect an additional DP line; for CPU 414-3, CPU 414-3 PN/DP, CPU 416-3, CPU 416-3 PN/DP, CPU 417-4	**6ES7 964-2AA04-0AB0**

	Order No.
Slot number plates 1 set (spare part)	**6ES7 912-0AA00-0AA0**
SIMATIC Manual Collection Electronic manuals on DVD, multilingual: 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	**6ES7 998-8XC01-8YE0**
SIMATIC Manual Collection update service for 1 year Current "Manual Collection" DVD and the three subsequent updates	**6ES7 998-8XC01-8YE2**
PROFIBUS bus components	
RS 485 bus connector with 90° cable outlet	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6ES7 972-0BA12-0XA0**
With PG interface	**6ES7 972-0BB12-0XA0**
RS 485 bus connector with angled cable outlet	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6ES7 972-0BA42-0XA0**
With PG interface	**6ES7 972-0BB42-0XA0**
RS 485 bus connector with 90° cable outlet for FastConnect connection system	
Max. transfer rate 12 Mbit/s	
Without PG interface	
• 1 unit	**6ES7 972-0BA52-0XA0**
• 100 units	**6ES7 972-0BA52-0XB0**
With PG interface	
• 1 unit	**6ES7 972-0BB52-0XA0**
• 100 units	**6ES7 972-0BB52-0XB0**
RS 485 bus connector with axial cable outlet	
For SIMATIC OP, for connection to PPI, MPI, PROFIBUS	**6GK1 500-0EA02**
PROFIBUS FastConnect bus cable Standard type with special design for quick mounting, 2-core, shielded, sold by the meter, max. delivery unit 1000 m, minimum ordering quantity 20 m	**6XV1 830-0EH10**
RS 485 repeater for PROFIBUS Transmission rate up to 12 Mbit/s; 24 V DC; IP20 enclosure	**6ES7 972-0AA02-0XA0**

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Ordering data	Order No.
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	**6XV1 840-2AH10**
FO Standard Cable GP (50/125) Standard cable, splittable, UL approval, sold by the meter	**6XV1 873-2A**
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 Mbit/s RJ45 ports and two FO ports	**6GK5 204-2BB10-2AA3**

	Order No.
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	
IE FC RJ45 plug 180 180° cable outlet	
1 unit	**6GK1 901-1BB10-2AA0**
10 units	**6GK1 901-1BB10-2AB0**
50 units	**6GK1 901-1BB10-2AE0**
PROFIBUS/PROFINET bus components For establishing MPI/PROFIBUS/ PROFINET communication	See IK PI, CA 01 catalogs

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Standard CPUs
CPU 417

Overview

- The most powerful SIMATIC S7-400 CPU
- Can be used in the most sophisticated installations in the upper performance range
- With two slots for IF modules

Technical specifications

	6ES7 417-4XT05-0AB0 CPU 417-4
General information	
Engineering with	
• Programming package	STEP7 V 5.3 SP2 or higher with HW update
Supply voltage	
24 V DC	No; Power supply via system power supply
Power losses	
Power loss, typ.	7.5 W
Memory	
Work memory	
• integrated	30 Mbyte
• integrated (for program)	15 Mbyte
• integrated (for data)	15 Mbyte
Load memory	
• expandable FEPROM, max.	64 Mbyte
• integrated RAM, max.	1 Mbyte
• expandable RAM, max.	64 Mbyte
CPU processing times	
for bit operations, typ.	18 ns
for word operations, typ.	18 ns
for fixed point arithmetic, typ.	18 ns
for floating point arithmetic, typ.	54 ns
Counters, timers and their retentivity	
S7 counter	
• Number	2 048
IEC counter	
• present	Yes
S7 times	
• Number	2 048
IEC timer	
• present	Yes

	6ES7 417-4XT05-0AB0 CPU 417-4
Data areas and their retentivity	
Flag	
• Number, max.	16 kbyte; Size of bit memory address area
Address area	
I/O address area	
• Inputs	16 kbyte
• Outputs	16 kbyte
Process image	
• Inputs, adjustable	16 kbyte
• Outputs, adjustable	16 kbyte
Time of day	
Clock	
• Hardware clock (real-time clock)	Yes
Operating hours counter	
• Number	16
1st interface	
Type of interface	integrated
Physics	RS 485 / PROFIBUS + MPI
Functionality	
• MPI	Yes
• DP master	Yes
• DP slave	Yes
DP master	
• Number of DP slaves, max.	32
2nd interface	
Type of interface	integrated
Physics	RS 485 / PROFIBUS
Functionality	
• DP master	Yes
• DP slave	Yes
DP master	
• Number of DP slaves, max.	125

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Technical specifications (continued)

	6ES7 417-4XT05-0AB0 CPU 417-4
3rd interface	
Type of interface	Pluggable interface module (IF), technical data as for 2nd interface
Plug-in interface modules	IF 964-DP (MLFB: 6ES7964-2AA04-0AB0)
Physics	RS 485 / PROFIBUS
Functionality	
• MPI	No
• DP master	Yes
• DP slave	Yes
DP master	
• Number of DP slaves, max.	125
4th interface	
Type of interface	Pluggable interface module (IF), technical data as for 2nd interface
Plug-in interface modules	IF 964-DP (MLFB: 6ES7964-2AA04-0AB0)
Isochronous mode	
Isochronous operation (application synchronized up to terminal)	Yes; For PROFIBUS only
Communication functions	
PG/OP communication	Yes
Data record routing	Yes
Global data communication	
• supported	Yes
S7 basic communication	
• supported	Yes
S7 communication	
• supported	Yes
S5-compatible communication	
• supported	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
Open IE communication	
• ISO-on-TCP (RFC1006)	Via CP 443-1 and loadable FB
Web server	
• supported	No
Number of connections	
• overall	64

	6ES7 417-4XT05-0AB0 CPU 417-4
Configuration	
programming	
• Programming language	
- LAD	Yes
- FBD	Yes
- STL	Yes
- SCL	Yes
- CFC	Yes
- GRAPH	Yes
- HiGraph®	Yes
Know-how protection	
• User program protection/password protection	Yes
Dimensions	
Width	50 mm
Height	290 mm
Depth	219 mm
Required slots	2
Weight	
Weight, approx.	0.9 kg

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Ordering data	Order No.
CPU 417-4	**6ES7 417-4XT05-0AB0**
Main memory 30 MB, power supply 24 V DC, MPI/PROFIBUS DP master interface, PROFIBUS DP master interface, module slots for up to 2 additional IF modules, slot for memory card, incl. slot number labels	
Memory card RAM	
64 KB	**6ES7 952-0AF00-0AA0**
256 KB	**6ES7 952-1AH00-0AA0**
1 MB	**6ES7 952-1AK00-0AA0**
2 MB	**6ES7 952-1AL00-0AA0**
4 MB	**6ES7 952-1AM00-0AA0**
8 MB	**6ES7 952-1AP00-0AA0**
16 MB	**6ES7 952-1AS00-0AA0**
64 MB	**6ES7 952-1AY00-0AA0**
FEPROM memory card	
64 KB	**6ES7 952-0KF00-0AA0**
256 KB	**6ES7 952-0KH00-0AA0**
1 MB	**6ES7 952-1KK00-0AA0**
2 MB	**6ES7 952-1KL00-0AA0**
4 MB	**6ES7 952-1KM00-0AA0**
8 MB	**6ES7 952-1KP00-0AA0**
16 MB	**6ES7 952-1KS00-0AA0**
32 MB	**6ES7 952-1KT00-0AA0**
64 MB	**6ES7 952-1KY00-0AA0**
MPI cable	**6ES7 901-0BF00-0AA0**
for connection of SIMATIC S7 and PG via MPI; 5 m in length	
IF 964-DP interface module	**6ES7 964-2AA04-0AB0**
To connect an additional DP line; for CPU 414-3, CPU 414-3 PN/DP, CPU 416-3, CPU 416-3 PN/DP, CPU 417-4	
Slot number plates	**6ES7 912-0AA00-0AA0**
1 set (spare part)	

	Order No.
SIMATIC Manual Collection	**6ES7 998-8XC01-8YE0**
Electronic manuals on DVD, multilingual: 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	
SIMATIC Manual Collection update service for 1 year	**6ES7 998-8XC01-8YE2**
Current "Manual Collection" DVD and the three subsequent updates	
RS 485 bus connector with 90° cable outlet	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6ES7 972-0BA12-0XA0**
With PG interface	**6ES7 972-0BB12-0XA0**
RS 485 bus connector with angled cable outlet	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6ES7 972-0BA42-0XA0**
With PG interface	**6ES7 972-0BB42-0XA0**
RS 485 bus connector with 90° cable outlet for FastConnect connection system	
Max. transfer rate 12 Mbit/s	
Without PG interface	
• 1 unit	**6ES7 972-0BA52-0XA0**
• 100 units	**6ES7 972-0BA52-0XB0**
With PG interface	
• 1 unit	**6ES7 972-0BB52-0XA0**
• 100 units	**6ES7 972-0BB52-0XB0**
RS 485 bus connector with axial cable outlet	
For SIMATIC OP, for connection to PPI, MPI, PROFIBUS	**6GK1 500-0EA02**
PROFIBUS FastConnect bus cable	
Standard type with special design for quick mounting, 2-core, shielded, sold by the meter, max. delivery unit 1000 m, minimum ordering quantity 20 m	**6XV1 830-0EH10**

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Overview

- The low-cost introduction to the mid performance range
- Can be used in small and medium-sized plants with requirements in the mid performance range

Note:

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

SIPLUS CPU 412	
Order No.	**6AG1 412-2EK06-2AB0**
Order No. based on	**6ES7 412-2EK06-0AB0**
Range of ambient temperature	-25 ... +70 °C
Conformal coating	Coating of the printed circuit boards and the electronic components
Technical data	The technical data of the standard product applies, except for the ambient conditions
Ambient conditions	
Relative humidity	100%, condensation/frost permissible. No commissioning if condensation present.
Biologically active substances, compliance with EN 60721-3-3	Class 3B2 mold and fungal spores (excluding fauna). The supplied plug covers must remain in place over the unused interfaces during operation!
Chemically active substances, compliance with EN 60721-3-3	Class 3C4 incl. salt spray in accordance with EN60068-2-52 (degree of severity 3). The supplied plug covers must remain in place over the unused interfaces during operation!
Mechanically active substances, compliance with EN 60721-3-3	Class 3S4 incl. sand, dust. The supplied plug covers must remain in place over the unused interfaces during operation!
Air pressure (depending on the highest positive temperature range specified)	1080 ... 795 hPa (-1000 ... +2000 m) see ambient temperature range 795 ... 658 hPa (+2000 ... +3500 m) derating 10 K 658 ... 540 hPa (+3500 ... +5000 m) derating 20 K

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

Ordering data

	Order No.
SIPLUS CPU 412-2 PN (extended temperature range and medial exposure) Main memory 1 MB, power supply 24 V DC, MPI/PROFIBUS DP master interface, PROFINET interface, slot for memory card, incl. slot number labels	**6AG1 412-2EK06-2AB0**
Memory Card RAM	
2 MB	**6AG1 952-1AL00-4AA0**
4 MB	**6AG1 952-1AM00-7AA0**
8 MB	**6AG1 952-1AP00-7AA0**
16 MB	**6AG1 952-1AS00-7AA0**
64 MB	**6AG1 952-1AY00-7AA0**
RS 485 bus connector with 90° cable outlet (extended temperature range and medial exposure) Max. transfer rate 12 Mbit/s	
Without PG interface	**6AG1 972-0BA12-2XA0**
With PG interface	**6AG1 972-0BB12-2XA0**
RS 485 bus connector with angled cable outlet (extended temperature range and medial exposure) Max. transfer rate 12 Mbit/s	
Without PG interface	**6AG1 972-0BA42-7XA0**
With PG interface	**6AG1 972-0BB42-7XA0**
RS 485 bus connector with axial cable outlet	
For SIPLUS OP, for connection to PPI, MPI, PROFIBUS	**6AG1 500-0EA02-2AA0**
Further accessories	See SIMATIC CPU 412, page 6/7

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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 Siemens Industry standard products. The contents listed here were taken from the respective standard products. SIPLUS extreme-specific information was added.

SIPLUS CPU 414	
Order No.	**6AG1 414-3EM06-7AB0**
Order No. based on	**6ES7 414-3EM06-0AB0**
Range of ambient temperature	-25 ... +70 °C
Conformal coating	Coating of the printed circuit boards and the electronic components
Technical data	The technical data of the standard product applies, except for the ambient conditions
Ambient conditions	
Relative humidity	100%, condensation/frost permissible. No commissioning if condensation present.
Biologically active substances , compliance with EN 60721-3-3	Class 3B2 mold and fungal spores (excluding fauna). The supplied plug covers must remain in place over the unused interfaces during operation!
Chemically active substances, compliance with EN 60721-3-3	Class 3C4 incl. salt spray in accordance with EN60068-2-52 (degree of severity 3). The supplied plug covers must remain in place over the unused interfaces during operation!
Mechanically active substances, compliance with EN 60721-3-3	Class 3S4 incl. sand, dust. The supplied plug covers must remain in place over the unused interfaces during operation!
Air pressure (depending on the highest positive temperature range specified)	1080 ... 795 hPa (-1000 ... +2000 m) see ambient temperature range 795 ... 658 hPa (+2000 ... +3500 m) derating 10 K 658 ... 540 hPa (+3500 ... +5000 m) derating 20 K

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

Ordering data

	Order No.
SIPLUS 414-3 PN/DP (extended temperature range and medial exposure) Main memory 4 MB, power supply 24 V DC, MPI/PROFIBUS DP master interface, PROFINET interface, slot for memory card, module slot for 1 IF module, incl. slot number labels	**6AG1 414-3EM06-7AB0**
Memory Card RAM	
2 MB	**6AG1 952-1AL00-4AA0**
4 MB	**6AG1 952-1AM00-7AA0**
8 MB	**6AG1 952-1AP00-7AA0**
16 MB	**6AG1 952-1AS00-7AA0**
64 MB	**6AG1 952-1AY00-7AA0**
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 (extended temperature range and medial exposure) max. transfer rate 12 Mbit/s	
without PG interface	**6AG1 972-0BA12-2XA0**
with PG interface	**6AG1 972-0BB12-2XA0**
RS 485 bus connector with angled cable outlet (extended temperature range and medial exposure) max. transfer rate 12 Mbit/s	
without PG interface	**6AG1 972-0BA42-7XA0**
with PG interface	**6AG1 972-0BB42-7XA0**
RS 485 bus connector with axial cable outlet (extended temperature range and medial exposure) For SIPLUS OP, for connection to PPI, MPI, PROFIBUS	**6AG1 500-0EA02-2AA0**
RS 485 repeater for PROFIBUS (extended temperature range and medial exposure) Transfer rate up to 12 Mbit/s; 24 V DC; IP20 enclosure	**6AG1 972-0AA02-7XA0**
SCALANCE X204-2 Industrial Ethernet Switch (medial exposure) 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 Mbit/s RJ45 ports and two FO ports	**6AG1 204-2BB10-4AA3**
IE FC RJ45 Plug 180 (extended temperature range and medial exposure) 180° cable outlet; 1 unit	**6AG1 901-1BB10-7AA0**
Further accessories	See SIMATIC CPU 414, page 6/11

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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 Siemens Industry standard products. The contents listed here were taken from the respective standard products. SIPLUS extreme-specific information was added.

SIPLUS CPU 416-3		
Order number	**6AG1 416-3XR05-4AB0**	**6AG1 416-3ES06-7AB0**
Order No. based on	**6ES7 416-3XR05-0AB0**	**6ES7 416-3ES06-0AB0**
Range of ambient temperature	0 ... +60 °C	-25 ... +70 °C
Conformal coating	Coating of the printed circuit boards and the electronic components	
Technical data	The technical data of the standard product applies except for the ambient conditions	
Ambient conditions		
Relative humidity	100%, condensation/frost permissible. No commissioning if condensation present.	
Biologically active substances, compliance with EN 60721-3-3	Class 3B2 mold and fungal spores (excluding fauna). The supplied plug covers must remain in place over the unused interfaces during operation!	
Chemically active substances, compliance with EN 60721-3-3	Class 3C4 incl. salt spray in accordance with EN60068-2-52 (degree of severity 3). The supplied plug covers must remain in place over the unused interfaces during operation!	
Mechanically active substances, compliance with EN 60721-3-3	Class 3S4 incl. sand, dust. The supplied plug covers must remain in place over the unused interfaces during operation!	
Air pressure (depending on the highest positive temperature range specified)	1080 ... 795 hPa (-1000 ... +2000 m) see ambient temperature range 795 ... 658 hPa (+2000 ... +3500 m) derating 10 K 658 ... 540 hPa (+3500 ... +5000 m) derating 20 K	

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

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Ordering data

	Order No.
SIPLUS CPU 416-3	**6AG1 416-3XR05-4AB0**
(medial exposure)	
Power supply 24 V DC, MPI/PROFIBUS DP master interface, PROFIBUS DP master interface, module slot for 1 IF module, slot for memory card, including mounting position labels	
11.2 MB work memory	
SIPLUS CPU 416-3 PN/DP	**6AG1 416-3ES06-7AB0**
(extended temperature range and medial exposure)	
Power supply 24 V DC, MPI/PROFIBUS DP master interface, PROFINET interface, module slot for 1 IF module, slot for memory card, including mounting position labels	
11.2 MB work memory	
Memory Card RAM	
(medial exposure)	
2 MB	**6AG1 952-1AL00-4AA0**
(extended temperature range and medial exposure)	
4 MB	**6AG1 952-1AM00-7AA0**
8 MB	**6AG1 952-1AP00-7AA0**
16 MB	**6AG1 952-1AS00-7AA0**
64 MB	**6AG1 952-1AY00-7AA0**
IF 964-DP interface module	**6AG1964-2AA04-7AB0**
(extended temperature range and medial exposure)	
For connecting an additional DP line; for SIPLUS CPU 414-3 PN/DP, CPU 416-3, CPU 416-3 PN/DP, CPU 417-4	
RS 485 bus connector with 90° cable outlet	
(extended temperature range and medial exposure)	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6AG1 972-0BA12-2XA0**
With PG interface	**6AG1 972-0BB12-2XA0**

	Order No.
RS 485 bus connector with angled cable outlet	
(extended temperature range and medial exposure)	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6AG1 972-0BA42-7XA0**
With PG interface	**6AG1 972-0BB42-7XA0**
RS 485 bus connector with axial cable outlet	
(extended temperature range and medial exposure)	
For SIPLUS OP, for connection to PPI, MPI, PROFIBUS	**6AG1 500-0EA02-2AA0**
RS 485 repeater for PROFIBUS	**6AG1 972-0AA02-7XA0**
Transfer rate up to 12 Mbit/s; 24 V DC; IP20 enclosure	
SCALANCE X204-2 Industrial Ethernet Switch	**6AG1 204-2BB10-4AA3**
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 Mbit/s RJ45 ports and two FO ports	
IE FC RJ45 plug 180	**6AG1 901-1BB10-7AA0**
(extended temperature range and medial exposure)	
180° cable outlet; 1 unit	
Further accessories	See SIMATIC CPU 416, page 6/16

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Overview

The most powerful SIMATIC S7-400 CPU

- Applicable for plants with maximum requirements in the high-end performance range
- With 2 plug-in slots for IF modules

Note:

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

SIPLUS CPU 417-4	
Order number	**6AG1 417-4XT05-4AB0**
Order No. based on	**6ES7 417-4XT05-0AB0**
Ambient temperature range	0 ... +60 °C
Conformal coating	Coating of the printed circuit boards and the electronic components
Technical data	The technical data of the standard product applies except for the ambient conditions
Ambient conditions	
Relative humidity	100%, condensation/frost permissible. No commissioning if condensation present.
Biologically active substances, compliance with EN 60721-3-3	Class 3B2 mold and fungal spores (excluding fauna). The supplied plug covers must remain in place over the unused interfaces during operation!
Chemically active substances, compliance with EN 60721-3-3	Class 3C4 incl. salt spray in accordance with EN60068-2-52 (degree of severity 3). The supplied plug covers must remain in place over the unused interfaces during operation!
Mechanically active substances, compliance with EN 60721-3-3	Class 3S4 incl. sand, dust. The supplied plug covers must remain in place over the unused interfaces during operation!
Air pressure (depending on the highest positive temperature range specified)	1080 ... 795 hPa (-1000 ... +2000 m) see ambient temperature range 795 ... 658 hPa (+2000 ... +3500 m) derating 10 K 658 ... 540 hPa (+3500 ... +5000 m) derating 20 K

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

Ordering data

	Order No.
SIPLUS CPU 417-4	**6AG1 417-4XT05-4AB0**
(medial exposure)	
Power supply 24 V DC, MPI/PROFIBUS DP master interface, PROFIBUS DP master interface, module slots for 2 additional IF modules, slot for memory card, including mounting position labels	
30 MB work memory	
Accessories	
Memory card RAM	
(medial exposure)	
2 MB	**6AG1 952-1AL00-4AA0**
(extended temperature range and medial exposure)	
8 MB	**6AG1 952-1AP00-7AA0**
16 MB	**6AG1 952-1AS00-7AA0**
64 MB	**6AG1 952-1AY00-7AA0**
FEPROM memory card	
(medial exposure)	
32 MB	**6AG1 952-1KT00-4AA0**
RS 485 bus connector with 90° cable outlet	
(extended temperature range and medial exposure)	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6AG1 972-0BA12-2XA0**
With PG interface	**6AG1 972-0BB12-2XA0**
RS 485 bus connector with angled cable outlet	
(extended temperature range and medial exposure)	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6AG1 972-0BA42-7XA0**
With PG interface	**6AG1 972-0BB42-7XA0**
Further accessories	See SIMATIC CPU 417, page 6/20

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Fail-safe CPUs
CPU 414F

Overview

- For constructing a fail-safe automation system for plants with increased safety requirements
- CPUs for high demands in the mid-level performance range
- Applicable for plants with additional demands on programming scope and processing speed
- Satisfies safety requirements up to SIL 3 acc. to IEC 61508 and Cat. 4 acc. to EN 954-1
- Standard and safety-related tasks can be performed with a single CPU
- Integrated PROFINET functions in CPU 414F-3 PN/DP
- Multi-processor mode is possible
- Safety-related communication with distributed I/O devices over PROFIBUS DP or PROFINET IO with PROFIsafe profile
- Fail-safe I/O modules can be connected in a distributed manner via the integrated interfaces (DP and PN with CPU 416F-3 PN/DP) and/or through communication modules (CP 443-5 Extended and CP 443-1 Adv.)
- Central and distributed use of standard modules for non-safety-oriented applications

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Technical specifications

	6ES7 414-3FM06-0AB0 CPU 414F-3 PN/DP
General information	
Engineering with	
• Programming package	STEP7 V5.5 or higher/iMap V3.0 + iMap STEP7 Add-on V3.0 SP5 or higher
Supply voltage	
24 V DC	No; Power supply via system power supply
Power losses	
Power loss, typ.	6.5 W
Memory	
Work memory	
• integrated	4 Mbyte
• integrated (for program)	2 Mbyte
• integrated (for data)	2 Mbyte
Load memory	
• expandable FEPROM, max.	64 Mbyte
• integrated RAM, max.	512 kbyte
• expandable RAM, max.	64 Mbyte
CPU processing times	
for bit operations, typ.	45 ns
for word operations, typ.	45 ns
for fixed point arithmetic, typ.	45 ns
for floating point arithmetic, typ.	135 ns

	6ES7 414-3FM06-0AB0 CPU 414F-3 PN/DP
Counters, timers and their retentivity	
S7 counter	
• Number	2 048
IEC counter	
• present	Yes
S7 times	
• Number	2 048
IEC timer	
• present	Yes
Data areas and their retentivity	
Flag	
• Number, max.	8 kbyte; Size of bit memory address area
Address area	
I/O address area	
• Inputs	8 kbyte
• Outputs	8 kbyte
Process image	
• Inputs, adjustable	8 kbyte
• Outputs, adjustable	8 kbyte
Time of day	
Clock	
• Hardware clock (real-time clock)	Yes
Operating hours counter	
• Number	16

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Technical specifications (continued)

	6ES7 414-3FM06-0AB0 CPU 414F-3 PN/DP
1st interface	
Type of interface	integrated
Physics	RS 485 / PROFIBUS + MPI
Functionality	
• MPI	Yes
• DP master	Yes
• DP slave	Yes
DP master	
• Number of DP slaves, max.	32
2nd interface	
Type of interface	PROFINET
Physics	Ethernet RJ45
Number of ports	2
Functionality	
• DP master	No
• DP slave	No
• PROFINET IO Controller	Yes
• PROFINET IO Device	Yes
• PROFINET CBA	Yes
PROFINET IO Controller	
• Max. number of connectable IO devices for RT	256
• Number of IO devices with IRT and the option "high flexibility"	256
• Number of IO Devices with IRT and the option "high performance", max.	64
3rd interface	
Type of interface	Pluggable interface module (IF)
Plug-in interface modules	IF 964-DP (MLFB: 6ES7964-2AA04-0AB0)
Physics	RS 485 / PROFIBUS
Functionality	
• MPI	No
• DP master	Yes
• DP slave	Yes
DP master	
• Number of DP slaves, max.	96
Isochronous mode	
Isochronous operation (application synchronized up to terminal)	Yes; Via PROFIBUS DP or PROFINET interface

	6ES7 414-3FM06-0AB0 CPU 414F-3 PN/DP
Communication functions	
PG/OP communication	Yes
Data record routing	Yes
Global data communication	
• supported	Yes
S7 basic communication	
• supported	Yes
S7 communication	
• supported	Yes
S5-compatible communication	
• supported	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
Open IE communication	
• TCP/IP	Yes; via integrated PROFINET interface and loadable FBs
- Number of connections, max.	62
• ISO-on-TCP (RFC1006)	Yes; Via integrated PROFINET interface or CP 443-1 Adv. and loadable FBs
- Number of connections, max.	62
• UDP	Yes; via integrated PROFINET interface and loadable FBs
- Number of connections, max.	62
Web server	
• supported	Yes
Number of connections	
• overall	64
Configuration	
programming	
• Programming language	
- LAD	Yes
- FBD	Yes
- STL	Yes
- SCL	Yes
- CFC	Yes
- GRAPH	Yes
- HiGraph®	Yes
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

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Ordering data	Order No.
CPU 414F-3 PN/DP	**6ES7 414-3FM06-0AB0**
For setting up safety-related automation system; main memory 4 MB, power supply 24 V DC, MPI/PROFIBUS DP master interface, PROFINET interface, slot for memory card, module slot for 1 IF module, incl. slot number labels	
Distributed Safety V5.4 programming tool	
Task: Configuration software for configuring fail-safe user programs for SIMATIC S7-300F, S7-400F, ET 200S Requirement: STEP 7 V5.3 SP3 and higher	
Floating license	**6ES7 833-1FC02-0YA5**
Floating license for 1 user, license key download without software or documentation[1]; email address required for delivery	**6ES7 833-1FC02-0YH5**
Distributed Safety Upgrade	
From V5.x to V5.4; Floating license for 1 user	**6ES7 833-1FC02-0YE5**
STEP 7 Safety Advanced V11	
Task: Engineering tool for configuring fail-safe user programs for SIMATIC S7-300F, S7-400F, WinAC RTX F, ET 200S, ET 200M, ET 200iSP, ET 200pro, ET 200eco Requirement: STEP 7 Professional V11 SP1	
Floating license for 1 user	**6ES7 833-1FA11-0YA5**
Floating license for 1 user, license key download without software or documentation[1]; email address required for delivery	**6ES7 833-1FA11-0YH5**
STEP 7 Safety Advanced Upgrade	
Distributed Safety V5.4 SP5 and STEP 7 Safety Advanced V11 for parallel use; incl. software on CD; Combo License for 1 user	**6ES7 833-1FA11-0YE5**
Distributed Safety V5.4 SP5 and STEP 7 Safety Advanced V11 for parallel use; includes software on CD; combo license for 1 user, license key download without software or documentation[1]; email address required for delivery	**6ES7 833-1FA11-0YK5**
Memory Card RAM	
64 KB	**6ES7 952-0AF00-0AA0**
256 KB	**6ES7 952-1AH00-0AA0**
1 MB	**6ES7 952-1AK00-0AA0**
2 MB	**6ES7 952-1AL00-0AA0**
4 MB	**6ES7 952-1AM00-0AA0**
8 MB	**6ES7 952-1AP00-0AA0**
16 MB	**6ES7 952-1AS00-0AA0**
64 MB	**6ES7 952-1AY00-0AA0**

	Order No.
FEPROM memory card	
64 KB	**6ES7952-0KF00-0AA0**
256 KB	**6ES7952-0KH00-0AA0**
1 MB	**6ES7 952-1KK00-0AA0**
2 MB	**6ES7 952-1KL00-0AA0**
4 MB	**6ES7 952-1KM00-0AA0**
8 MB	**6ES7 952-1KP00-0AA0**
16 MB	**6ES7 952-1KS00-0AA0**
32 MB	**6ES7 952-1KT00-0AA0**
64 MB	**6ES7 952-1KY00-0AA0**
MPI cable	**6ES7 901-0BF00-0AA0**
for connection of SIMATIC S7 and PG via MPI; 5 m in length	
IF 964-DP interface module	**6ES7 964-2AA04-0AB0**
For connecting an additional DP line	
Slot number plates	**6ES7 912-0AA00-0AA0**
1 set (spare part)	
SIMATIC Manual Collection	**6ES7 998-8XC01-8YE0**
Electronic manuals on DVD, multilingual: 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	
SIMATIC Manual Collection update service for 1 year	**6ES7 998-8XC01-8YE2**
Current "Manual Collection" DVD and the three subsequent updates	
PROFIBUS bus components	
RS 485 bus connector with 90° cable outlet	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6ES7 972-0BA12-0XA0**
With PG interface	**6ES7 972-0BB12-0XA0**
RS 485 bus connector with angled cable outlet	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6ES7 972-0BA42-0XA0**
With PG interface	**6ES7 972-0BB42-0XA0**
RS 485 bus connector with 90° cable outlet for FastConnect connection system	
Max. transfer rate 12 Mbit/s	
Without PG interface	
• 1 unit	**6ES7 972-0BA52-0XA0**
• 100 units	**6ES7 972-0BA52-0XB0**
With PG interface	
• 1 unit	**6ES7 972-0BB52-0XA0**
• 100 units	**6ES7 972-0BB52-0XB0**
RS 485 bus connector with axial cable outlet	
For SIMATIC OP, for connection to PPI, MPI, PROFIBUS	**6GK1 500-0EA02**

[1] For up-to-date information and download availability, see: www.siemens.com/tia-online-software-delivery

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Ordering data	Order No.
PROFIBUS FastConnect bus cable	
Standard type with special design for quick mounting, 2-core, shielded, sold by the meter, max. delivery unit 1000 m, minimum ordering quantity 20 m	**6XV1 830-0EH10**
RS 485 repeater for PROFIBUS	**6ES7 972-0AA02-0XA0**
Transmission rate up to 12 Mbit/s; 24 V DC; IP20 enclosure	
PROFINET bus components	
IE FC TP standard cable GP 2x2	**6XV1 840-2AH10**
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	
FO Standard Cable GP (50/125)	**6XV1 873-2A**
Standard cable, splittable, UL approval, sold by the meter	

	Order No.
SCALANCE X204-2 Industrial Ethernet Switch	**6GK5 204-2BB10-2AA3**
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 Mbit/s RJ45 ports and two FO ports	
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	
IE FC RJ45 plug 180	
180° cable outlet	
1 unit	**6GK1 901-1BB10-2AA0**
10 units	**6GK1 901-1BB10-2AB0**
50 units	**6GK1 901-1BB10-2AE0**
PROFIBUS/PROFINET bus components	See IK PI, CA 01 catalogs
For establishing MPI/PROFIBUS/ PROFINET communication	

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Fail-safe CPUs
CPU 416F

Overview

- For constructing a fail-safe automation system for plants with increased safety requirements
- High-performance CPU in the top-end performance range
- Satisfies safety requirements up to SIL 3 acc. to IEC 61508 and Cat. 4 acc. to EN 954-1
- Standard and safety-related tasks can be performed with a single CPU
- Multi-processor mode is possible
- Safety-related communication with distributed I/O devices over PROFIBUS DP with the *PROFI*safe profile
- Fail-safe I/O modules can be connected decentralized over the integrated interfaces (DP and PN with CPU416F-3 PN/DP) and/or through communication modules (CP443-5 Ext. and CP443-1 Adv.)
- Standard modules for non-safety-related applications can be operated centrally and decentralized

Technical specifications

	6ES7 416-2FN05-0AB0 CPU 416F-2	6ES7 416-3FS06-0AB0 CPU416F-3 PN/DP
General information		
Engineering with		
• Programming package	STEP 7 V5.3 SP2 or higher with hardware update, Distributed Safety V5.2 SP2 or higher	STEP7 V5.5 or higher/iMap V3.0 + iMap STEP7 Add-on V3.0 SP5 or higher
Supply voltage		
24 V DC	No; Power supply via system power supply	No; Power supply via system power supply
Power losses		
Power loss, typ.	4.5 W	6.5 W
Memory		
Work memory		
• integrated	5.6 Mbyte	16 Mbyte
• integrated (for program)	2.8 Mbyte	8 Mbyte
• integrated (for data)	2.8 Mbyte	8 Mbyte
Load memory		
• expandable FEPROM, max.	64 Mbyte	64 Mbyte
• integrated RAM, max.	1 Mbyte	1 Mbyte
• expandable RAM, max.	64 Mbyte	64 Mbyte
CPU processing times		
for bit operations, typ.	30 ns	30 ns
for word operations, typ.	30 ns	30 ns
for fixed point arithmetic, typ.	30 ns	30 ns
for floating point arithmetic, typ.	90 ns	90 ns
Counters, timers and their retentivity		
S7 counter		
• Number	2 048	2 048
IEC counter		
• present	Yes	Yes
S7 times		
• Number	2 048	2 048
IEC timer		
• present	Yes	Yes

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Technical specifications (continued)

	6ES7 416-2FN05-0AB0 CPU 416F-2	6ES7 416-3FS06-0AB0 CPU416F-3 PN/DP
Data areas and their retentivity		
Flag		
• Number, max.	16 kbyte; Size of bit memory address area	16 kbyte; Size of bit memory address area
Address area		
I/O address area		
• Inputs	16 kbyte	16 kbyte
• Outputs	16 kbyte	16 kbyte
Process image		
• Inputs, adjustable	16 kbyte	16 kbyte
• Outputs, adjustable	16 kbyte	16 kbyte
Time of day		
Clock		
• Hardware clock (real-time clock)	Yes	Yes
Operating hours counter		
• Number	16	16
1st interface		
Type of interface	integrated	integrated
Physics	RS 485 / PROFIBUS + MPI	RS 485 / PROFIBUS + MPI
Functionality		
• MPI	Yes	Yes
• DP master	Yes	Yes
• DP slave	Yes	Yes
DP master		
• Number of DP slaves, max.	32	32
2nd interface		
Type of interface	integrated	PROFINET
Physics	RS 485 / PROFIBUS	Ethernet RJ45
Number of ports		2
Functionality		
• DP master	Yes	No
• DP slave	Yes	No
• PROFINET IO Controller		Yes
• PROFINET IO Device		Yes
• PROFINET CBA		Yes
DP master		
• Number of DP slaves, max.	125	
PROFINET IO Controller		
• Max. number of connectable IO devices for RT		256
• Number of IO devices with IRT and the option "high flexibility"		256
• Number of IO Devices with IRT and the option "high performance", max.		64
3rd interface		
Type of interface		Pluggable interface module (IF)
Plug-in interface modules		IF 964-DP (MLFB: 6ES7964-2AA04-0AB0)
Physics		RS 485 / PROFIBUS
Functionality		
• MPI		No
• DP master		Yes
• DP slave		Yes
DP master		
• Number of DP slaves, max.		125

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Technical specifications (continued)

	6ES7 416-2FN05-0AB0 CPU 416F-2	6ES7 416-3FS06-0AB0 CPU416F-3 PN/DP
Isochronous mode		
Isochronous operation (application synchronized up to terminal)	Yes; For PROFIBUS only	Yes; Via PROFIBUS DP or PROFINET interface
Communication functions		
PG/OP communication	Yes	Yes
Data record routing	Yes	Yes
Global data communication		
• supported	Yes	Yes
S7 basic communication		
• supported	Yes	Yes
S7 communication		
• supported	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
Standard communication (FMS)		
• supported	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
- Number of connections, max.		94
• ISO-on-TCP (RFC1006)	Via CP 443-1 and loadable FB	Yes; Via integrated PROFINET interface or CP 443-1 and loadable FBs
- Number of connections, max.		94
• UDP		Yes; via integrated PROFINET interface and loadable FBs
- Number of connections, max.		94
Web server		
• supported	No	Yes
Number of connections		
• overall	64	96
Configuration		
programming		
• Programming language		
- LAD	Yes	Yes
- FBD	Yes	Yes
- STL	Yes	Yes
- SCL	Yes	Yes
- CFC	Yes	Yes
- GRAPH	Yes	Yes
- HiGraph®	Yes	Yes
Know-how protection		
• User program protection/password protection	Yes	Yes
• Block encryption		Yes; With S7 block Privacy
Dimensions		
Width	25 mm	50 mm
Height	290 mm	290 mm
Depth	219 mm	219 mm
Required slots	1	2
Weight		
Weight, approx.	0.7 kg	900 g

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Ordering data	Order No.
CPU 416F-2	**6ES7 416-2FN05-0AB0**
For configuring safety-related automation systems; 5.6 MB RAM, 24 V DC power supply, MPI/PROFIBUS DP master interface, PROFIBUS DP master interface, slot for memory card, incl. slot number labels	
CPU 416F-3 PN/DP	**6ES7 416-3FS06-0AB0**
For configuring safety-related automation systems; main memory 16 MB, 24 V DC power supply, MPI/PROFIBUS DP master interface, PROFINET interface, PROFIBUS DP master interface, receptacle for 1 IF submodule, slot for memory card, incl. slot number labels	
S7 Distributed Safety V5.4 programming tool	
Task: Configuration software for configuring fail-safe user programs for SIMATIC S7-300F, S7-400F, ET 200S Requirement: STEP 7 V5.3 SP3 and higher	
Floating license	**6ES7 833-1FC02-0YA5**
Floating license for 1 user, license key download without software or documentation[1]; email address required for delivery	**6ES7 833-1FC02-0YH5**
S7 Distributed Safety upgrade	
From V5.x to V5.4; Floating license for 1 user	**6ES7 833-1FC02-0YE5**
STEP 7 Safety Advanced V11	
Task: Engineering tool for configuring fail-safe user programs for SIMATIC S7-300F, S7-400F, WinAC RTX F, ET 200S, ET 200M, ET 200iSP, ET 200pro, ET 200eco Requirement: STEP 7 Professional V11 SP1	
Floating license for 1 user	**6ES7 833-1FA11-0YA5**
Floating license for 1 user, license key download without software or documentation[1]; email address required for delivery	**6ES7 833-1FA11-0YH5**
STEP 7 Safety Advanced Upgrade	
Distributed Safety V5.4 SP5 and STEP 7 Safety Advanced V11 for parallel use; incl. software on CD; Combo License for 1 user	**6ES7 833-1FA11-0YE5**
Distributed Safety V5.4 SP5 and STEP 7 Safety Advanced V11 for parallel use; includes software on CD; combo license for 1 user, license key download without software or documentation[1]; email address required for delivery	**6ES7 833-1FA11-0YK5**

	Order No.
Memory card RAM	
64 KB	**6ES7 952-0AF00-0AA0**
256 KB	**6ES7 952-1AH00-0AA0**
1 MB	**6ES7 952-1AK00-0AA0**
2 MB	**6ES7 952-1AL00-0AA0**
4 MB	**6ES7 952-1AM00-0AA0**
8 MB	**6ES7 952-1AP00-0AA0**
16 MB	**6ES7 952-1AS00-0AA0**
64 MB	**6ES7 952-1AY00-0AA0**
FEPROM memory card	
64 KB	**6ES7952-0KF00-0AA0**
256 KB	**6ES7952-0KH00-0AA0**
1 MB	**6ES7 952-1KK00-0AA0**
2 MB	**6ES7 952-1KL00-0AA0**
4 MB	**6ES7 952-1KM00-0AA0**
8 MB	**6ES7 952-1KP00-0AA0**
16 MB	**6ES7 952-1KS00-0AA0**
32 MB	**6ES7 952-1KT00-0AA0**
64 MB	**6ES7 952-1KY00-0AA0**
MPI cable	**6ES7 901-0BF00-0AA0**
for connection of SIMATIC S7 and PG via MPI; 5 m in length	
IF 964-DP interface module	**6ES7 964-2AA04-0AB0**
For connecting an additional DP line	
Slot number plates	**6ES7 912-0AA00-0AA0**
1 set (spare part)	
SIMATIC Manual Collection	**6ES7 998-8XC01-8YE0**
Electronic manuals on DVD, multilingual: 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	
SIMATIC Manual Collection update service for 1 year	**6ES7 998-8XC01-8YE2**
Current "Manual Collection" DVD and the three subsequent updates	

[1] For up-to-date information and download availability, see: www.siemens.com/tia-online-software-delivery

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Ordering data

	Order No.
PROFIBUS bus components	
RS 485 bus connector with 90° cable outlet	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6ES7 972-0BA12-0XA0**
With PG interface	**6ES7 972-0BB12-0XA0**
RS 485 bus connector with angled cable outlet	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6ES7 972-0BA42-0XA0**
With PG interface	**6ES7 972-0BB42-0XA0**
RS 485 bus connector with 90° cable outlet for FastConnect system	
Max. transfer rate 12 Mbit/s	
Without PG interface	
• 1 unit	**6ES7 972-0BA52-0XA0**
• 100 units	**6ES7 972-0BA52-0XB0**
With PG interface	
• 1 unit	**6ES7 972-0BB52-0XA0**
• 100 units	**6ES7 972-0BB52-0XB0**
RS 485 bus connector with axial cable outlet	
For SIMATIC OP, for connection to PPI, MPI, PROFIBUS	**6GK1 500-0EA02**
PROFIBUS FastConnect bus cable	
Standard type with special design for quick mounting, 2-core, shielded, sold by the meter, max. delivery unit 1000 m, minimum ordering quantity 20 m	**6XV1 830-0EH10**
RS 485 repeater for PROFIBUS	**6ES7 972-0AA02-0XA0**
Transmission rate up to 12 Mbit/s; 24 V DC; IP20 enclosure	

	Order No.
PROFINET bus components	
IE FC TP standard cable GP 2x2	**6XV1 840-2AH10**
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	
FO Standard Cable GP (50/125)	**6XV1 873-2A**
Standard cable, splittable, UL approval, sold by the meter	
SCALANCE X204-2 Industrial Ethernet Switch	**6GK5 204-2BB10-2AA3**
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 Mbit/s RJ45 ports and two FO ports	
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	
IE FC RJ45 plug 180	
180° cable outlet	
1 unit	**6GK1 901-1BB10-2AA0**
10 units	**6GK1 901-1BB10-2AB0**
50 units	**6GK1 901-1BB10-2AE0**
PROFIBUS/PROFINET bus components	See IK PI, CA 01 catalogs
For establishing MPI/PROFIBUS/ PROFINET communication	

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Overview CPU 412H

- CPU for SIMATIC S7-400H and S7-400F/FH
- Can be used in S7-400H high-availability systems
- Can be used with F runtime license as F-capable CPU in S7-400F/FH safety-related systems
- With integrated PROFIBUS DP master and combined MPI/PROFIBUS DP master interface
- With integrated PROFINET interface (2-port switch)
- Features 2 slots for sync modules

Overview CPU 414H

- CPU for SIMATIC S7-400H and S7-400F/FH
- Can be used in S7-400H high-availability systems
- Can be used with F runtime license as F-capable CPU in S7-400F/FH safety-related systems
- With integrated PROFIBUS DP master and combined MPI/PROFIBUS DP master interface
- With integrated PROFINET interface (2-port switch)
- Features 2 slots for sync modules

Overview CPU 416H

- CPU for SIMATIC S7-400H and S7-400F/FH
- Can be used in S7-400H high-availability systems
- Can be used with F runtime license as F-capable CPU in S7-400F/FH safety-related systems
- With integrated PROFIBUS DP master and combined MPI/PROFIBUS DP master interface
- With integrated PROFINET interface (2-port switch)
- Features 2 slots for sync modules

Overview CPU 417H

- CPU for SIMATIC S7-400H and S7-400F/FH
- Can be used in S7-400H high-availability systems
- Can be used with F runtime license as F-capable CPU in S7-400F/FH safety-related systems
- With integrated PROFIBUS DP master interface and combined MPI/PROFIBUS DP master interface
- With integrated PROFINET interface (2-port switch)
- Features 2 slots for sync modules

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Technical specifications

	6ES7 412-5HK06-0AB0 CPU 412-5H PN/DP	6ES7 414-5HM06-0AB0 CPU 414-5H PN/DP	6ES7 416-5HS06-0AB0 CPU 416-5H PN/DP	6ES7 417-5HT06-0AB0 CPU 417-5H PN/DP
General information				
Engineering with				
• Programming package	As of STEP 7 V5.5 SP2 with HF1	As of STEP 7 V5.5 SP2 with HF1	As of STEP 7 V5.5 SP2 with HF1	As of STEP 7 V5.5 SP2 with HF1
Supply voltage				
24 V DC	No; Power supply via system power supply	No; Power supply via system power supply	No; Power supply via system power supply	No; Power supply via system power supply
Power losses				
Power loss, typ.	7.5 W	7.5 W	7.5 W	7.5 W
Memory				
Work memory				
• integrated	1 Mbyte	4 Mbyte	16 Mbyte	32 Mbyte
• integrated (for program)	512 kbyte	2 Mbyte	6 Mbyte	16 Mbyte
• integrated (for data)	512 kbyte	2 Mbyte	10 Mbyte	16 Mbyte
Load memory				
• expandable FEPROM, max.	64 Mbyte	64 Mbyte	64 Mbyte	64 Mbyte
• integrated RAM, max.	512 kbyte	512 kbyte	1 Mbyte	1 Mbyte
• expandable RAM, max.	64 Mbyte	64 Mbyte	64 Mbyte	64 Mbyte
CPU processing times				
for bit operations, typ.	31.25 ns	18.75 ns	12.5 ns	7.5 ns
for word operations, typ.	31.25 ns	18.75 ns	12.5 ns	7.5 ns
for fixed point arithmetic, typ.	31.25 ns	18.75 ns	12.5 ns	7.5 ns
for floating point arithmetic, typ.	62.5 ns	37.5 ns	25 ns	15 ns
Counters, timers and their retentivity				
S7 counter				
• Number	2 048	2 048	2 048	2 048
IEC counter				
• present	Yes	Yes	Yes	Yes
S7 times				
• Number	2 048	2 048	2 048	2 048
IEC timer				
• present	Yes	Yes	Yes	Yes
Data areas and their retentivity				
Flag				
• Number, max.	8 192 byte	8 192 byte	16 384 byte	16 384 byte
Address area				
I/O address area				
• Inputs	8 kbyte	8 kbyte	16 kbyte	16 kbyte
• Outputs	8 kbyte	8 kbyte	16 kbyte	16 kbyte
Process image				
• Inputs, adjustable	8 kbyte	8 kbyte	16 kbyte	16 kbyte
• Outputs, adjustable	8 kbyte	8 kbyte	16 kbyte	16 kbyte
Time of day				
Clock				
• Hardware clock (real-time clock)	Yes	Yes	Yes	Yes
Operating hours counter				
• Number	16	16	16	16

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Technical specifications (continued)

	6ES7 412-5HK06-0AB0 CPU 412-5H PN/DP	6ES7 414-5HM06-0AB0 CPU 414-5H PN/DP	6ES7 416-5HS06-0AB0 CPU 416-5H PN/DP	6ES7 417-5HT06-0AB0 CPU 417-5H PN/DP
1st interface				
Type of interface	integrated	integrated	integrated	integrated
Physics	RS 485 / PROFIBUS + MPI	RS 485 / PROFIBUS + MPI	RS 485 / PROFIBUS + MPI	RS 485 / PROFIBUS + MPI
Functionality				
• MPI	Yes	Yes	Yes	Yes
• DP master	Yes	Yes	Yes	Yes
• DP slave	No	No	No	No
DP master				
• Number of DP slaves, max.	32	32	32	32
2nd interface				
Type of interface	PROFINET	PROFINET	PROFINET	PROFINET
Physics	Ethernet RJ45	Ethernet RJ45	Ethernet RJ45	Ethernet RJ45
Number of ports	2	2	2	2
Functionality				
• DP master	No	No	No	No
• DP slave	No	No	No	No
• PROFINET IO Controller	Yes	Yes	Yes	Yes
• PROFINET IO Device	No	No	No	No
• PROFINET CBA	No	No	No	No
PROFINET IO Controller				
• Max. number of connectable IO devices for RT	256	256	256	256
3rd interface				
Type of interface	integrated	integrated	integrated	integrated
Physics	RS 485 / PROFIBUS	RS 485 / PROFIBUS	RS 485 / PROFIBUS	RS 485 / PROFIBUS
Functionality				
• DP master	Yes	Yes	Yes	Yes
• DP slave	No	No	No	No
DP master				
• Number of DP slaves, max.	64	96	125	125
4th interface				
Type of interface	Pluggable synchronization submodule (FO)	Pluggable synchronization submodule (FO)	Pluggable synchronization submodule (FO)	Pluggable synchronization submodule (FO)
Plug-in interface modules	Synchronization modules 6ES7960-1AA06-0XA0 or 6ES7960-1AB06-0XA0	Synchronization modules 6ES7960-1AA06-0XA0 or 6ES7960-1AB06-0XA0	Synchronization modules 6ES7960-1AA06-0XA0 or 6ES7960-1AB06-0XA0	Synchronization modules 6ES7960-1AA06-0XA0 or 6ES7960-1AB06-0XA0
5th Interface				
Type of interface	Pluggable synchronization submodule (FO)	Pluggable synchronization submodule (FO)	Pluggable synchronization submodule (FO)	Pluggable synchronization submodule (FO)
Plug-in interface modules	Synchronization modules 6ES7960-1AA06-0XA0 or 6ES7960-1AB06-0XA0	Synchronization modules 6ES7960-1AA06-0XA0 or 6ES7960-1AB06-0XA0	Synchronization modules 6ES7960-1AA06-0XA0 or 6ES7960-1AB06-0XA0	Synchronization modules 6ES7960-1AA06-0XA0 or 6ES7960-1AB06-0XA0
Isochronous mode				
Isochronous operation (application synchronized up to terminal)	No	No	No	No

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Technical specifications (continued)

	6ES7 412-5HK06-0AB0 CPU 412-5H PN/DP	6ES7 414-5HM06-0AB0 CPU 414-5H PN/DP	6ES7 416-5HS06-0AB0 CPU 416-5H PN/DP	6ES7 417-5HT06-0AB0 CPU 417-5H PN/DP
Communication functions				
PG/OP communication	Yes	Yes	Yes	Yes
Data record routing	Yes	Yes	Yes	Yes
S7 routing	Yes	Yes	Yes	Yes
Global data communication				
• supported	No	No	No	No
S7 basic communication				
• supported	No	No	No	No
S7 communication				
• supported	Yes	Yes	Yes	Yes
S5-compatible communication				
• supported	Yes; (via CP max. 10 and FC AG_SEND and FC AG_RECV)	Yes; (via CP max. 10 and FC AG_SEND and FC AG_RECV)	Yes; (via CP max. 10 and FC AG_SEND and FC AG_RECV)	Yes; (via CP max. 10 and FC AG_SEND and FC AG_RECV)
Standard communication (FMS)				
• supported	Yes; Via CP and loadable FB	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	Yes; via integrated PROFINET interface and loadable FBs	Yes; via integrated PROFINET interface and loadable FBs	Yes; via integrated PROFINET interface and loadable FBs
- Number of connections, max.	46	62	94	118
• ISO-on-TCP (RFC1006)	Yes; Via integrated PROFINET interface or CP 443-1 and loadable FBs	Yes; Via integrated PROFINET interface or CP 443-1 and loadable FBs	Yes; Via integrated PROFINET interface or CP 443-1 and loadable FBs	Yes; Via integrated PROFINET interface or CP 443-1 and loadable FBs
- Number of connections, max.	46	62	94	118
• UDP	Yes; via integrated PROFINET interface and loadable FBs	Yes; via integrated PROFINET interface and loadable FBs	Yes; via integrated PROFINET interface and loadable FBs	Yes; via integrated PROFINET interface and loadable FBs
- Number of connections, max.	46	62	94	118
Web server				
• supported	No	No	No	No
Number of connections				
• overall	48	64	96	120
Configuration				
programming				
• Programming language				
- LAD	Yes	Yes	Yes	Yes
- FBD	Yes	Yes	Yes	Yes
- STL	Yes	Yes	Yes	Yes
- SCL	Yes	Yes	Yes	Yes
- CFC	Yes	Yes	Yes	Yes
- GRAPH	Yes	Yes	Yes	Yes
- HiGraph®	Yes	Yes	Yes	Yes
Know-how protection				
• User program protection/password protection	Yes	Yes	Yes	Yes
• Block encryption	Yes; With S7 block Privacy	Yes; With S7 block Privacy	Yes; With S7 block Privacy	Yes; With S7 block Privacy
Dimensions				
Width	50 mm	50 mm	50 mm	50 mm
Height	290 mm	290 mm	290 mm	290 mm
Depth	219 mm	219 mm	219 mm	219 mm
Required slots	2	2	2	2
Weight				
Weight, approx.	995 g	995 g	995 g	995 g

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Ordering data

	Order No.
CPU 412-5H For S7-400H and S7-400F/FH; 1 MB RAM, 1 combined MPI/ PROFIBUS DP master interface, 1 PROFIBUS DP interface, 2 PROFINET interfaces (switches), 2 slots for sync modules, slot for memory card, incl. slot number labels	**6ES7 412-5HK06-0AB0**
CPU 412-5H system bundle Not assembled, consisting of: UR2-H rack, 2 x PS 405/407 power supply units, 2 x CPU 412-5H, 4 x Sync modules (for max. 10 m), 2 x fiber optic cables for sync modules (1 m), 4 x backup batteries; additional two memory cards required (to be ordered separately)	
412-5H system bundle, 120/230 V AC, 10 A	**6ES7 400-0HR01-4AB0**
412-5H system bundle, 24/48/60 V DC, 10 A	**6ES7 400-0HR51-4AB0**
CPU 414-5H For S7-400H and S7-400F/FH; 4 MB RAM, 1 combined MPI/ PROFIBUS DP master interface, 1 PROFIBUS DP interface, 2 PROFINET interfaces (switches), 2 slots for sync modules, slot for memory card, incl. slot number labels	**6ES7 414-5HM06-0AB0**
CPU 414-5H system bundle Not assembled, consisting of: UR2-H rack, 2 x PS 405/407 power supply units, 2 x CPU 414-5H, 4 x Sync modules (for max. 10 m), 2 x fiber optic cables for sync modules (1 m), 4 x backup batteries; two additional memory cards required (to be ordered separately)	
414-5H system bundle, 120/230 V AC, 10 A	**6ES7 400-0HR02-4AB0**
414-5H system bundle, 24/48/60 V DC, 10 A	**6ES7 400-0HR52-4AB0**
CPU 416-5H For S7-400H and S7-400F/FH; 16 MB RAM, 1 combined MPI/ PROFIBUS DP master interface, 1 PROFIBUS DP interface, 2 PROFINET interfaces (switches), 2 slots for sync modules, slot for memory card, incl. slot number labels	**6ES7 416-5HS06-0AB0**
CPU 416-5H system bundle Not assembled, consisting of: UR2-H rack, 2 x PS 405/407 power supply units, 2 x CPU 416-5H, 4 x Sync modules (for max. 10 m), 2 x fiber optic cables for sync modules (1 m), 4 x backup batteries; two additional memory cards required (to be ordered separately)	
416-5H system bundle, 120/230 V AC, 10 A	**6ES7 400-0HR03-4AB0**
416-5H system bundle, 24/48/60 V DC, 10 A	**6ES7 400-0HR53-4AB0**
CPU 417-5H For S7-400H and S7-400F/FH; 32 MB RAM, 1 combined MPI/PROFIBUS DP master interface, 1 PROFIBUS DP interface, 2 PROFINET interfaces (switches), 2 slots for sync modules, slot for memory card, incl. slot number labels	**6ES7 417-5HT06-0AB0**
CPU 417-5H system bundle Not assembled, consisting of: UR2-H rack, 2 x PS 405/407 power supply units, 2 x CPU 417-5H, 4 x Sync modules (for max. 10 m), 2 x fiber optic cables for sync modules (1 m), 4 x backup batteries; two additional memory cards required (to be ordered separately)	
417-5H system bundle, 120/230 V AC, 10 A	**6ES7 400-0HR04-4AB0**
417-5H system bundle, 24/48/60 V DC, 10 A	**6ES7 400-0HR54-4AB0**
Memory card RAM	
1 MB	**6ES7 952-1AK00-0AA0**
2 MB	**6ES7 952-1AL00-0AA0**
4 MB	**6ES7 952-1AM00-0AA0**
8 MB	**6ES7 952-1AP00-0AA0**
16 MB	**6ES7 952-1AS00-0AA0**
64 MB	**6ES7 952-1AY00-0AA0**
FEPROM memory card	
1 MB	**6ES7 952-1KK00-0AA0**
2 MB	**6ES7 952-1KL00-0AA0**
4 MB	**6ES7 952-1KM00-0AA0**
8 MB	**6ES7 952-1KP00-0AA0**
16 MB	**6ES7 952-1KS00-0AA0**
32 MB	**6ES7 952-1KT00-0AA0**
64 MB	**6ES7 952-1KY00-0AA0**

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High-availability CPUs
CPU 412H, CPU 414H, CPU 416H, CPU 417H

Ordering data	Order No.
MPI cable for connection of SIMATIC S7 and PG via MPI; 5 m in length	**6ES7 901-0BF00-0AA0**
Slot number plates 1 set (spare part)	**6ES7 912-0AA00-0AA0**
S7 F Systems RT License For processing safety-related user programs, for one S7 400H-based system each with CPU 412-5H, CPU 414-5H, CPU 416-5H or CPU 417-5H	**6ES7 833-1CC00-6YX0**
S7 F Systems V6.1 Programming and configuring environment for creating and operating safety-related STEP 7 programs for an S7 400H-based target system, floating license for 1 user, runs under Windows XP Prof SP2, Windows XP Prof SP2/SP3, Windows Server 2003 SP2 2 languages (English, German) Type of delivery: License certificate as well as software and electronic documentation on CD	**6ES7 833-1CC02-0YA5**
S7 F systems upgrade from V5.x/V6.0 to V6.1 2 languages (English, German), floating license for 1 user Type of delivery: License certificate as well as software and electronic documentation on CD	**6ES7 833-1CC02-0YE5**
SIMATIC Manual Collection Electronic manuals on DVD, multilingual: 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	**6ES7 998-8XC01-8YE0**

	Order No.
SIMATIC Manual Collection update service for 1 year Current "Manual Collection" DVD and the three subsequent updates	**6ES7 998-8XC01-8YE2**
RS 485 bus connector with 90° cable outlet	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6ES7 972-0BA12-0XA0**
With PG interface	**6ES7 972-0BB12-0XA0**
RS 485 bus connector with angled cable outlet	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6ES7 972-0BA42-0XA0**
With PG interface	**6ES7 972-0BB42-0XA0**
Max. transfer rate 1.5 Mbit/s	
Without PG interface	**6ES7 972-0BA30-0XA0**
Bus connector RS 485 with 90° cable outlet for FastConnect connection technology	
Max. transfer rate 12 Mbit/s	
Without PG interface	
• 1 unit	**6ES7 972-0BA52-0XA0**
• 100 units	**6ES7 972-0BA52-0XB0**
With PG interface	
• 1 unit	**6ES7 972-0BB52-0XA0**
• 100 units	**6ES7 972-0BB52-0XB0**
RS 485 bus connector with axial cable outlet	
For SIMATIC OP, for connection to PPI, MPI, PROFIBUS	**6GK1 500-0EA02**
PROFIBUS FastConnect bus cable	
Standard type with special design for quick mounting, 2-core, shielded, sold by the meter, max. delivery unit 1000 m, minimum ordering quantity 20 m	**6XV1 830-0EH10**

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Sync-module for coupling the CPU 41xH

Overview

- For coupling the two CPU 41xH in the S7-400H subunits.
- Can be plugged direct into the CPU

Technical specifications

	6ES7 960-1AA06-0XA0	6ES7 960-1AB06-0XA0
Input current		
from CPU, max.	220 mA	240 mA
Power losses		
Power loss, typ.	0.77 W	0.83 W
Dimensions		
Width	13 mm	13 mm
Height	14 mm	14 mm
Depth	58 mm	58 mm
Weight		
Weight, approx.	14 g	14 g

Ordering data

	Order No.
Sync module	
for coupling the CPU 41xH for S7-400H/F/FH; 2 modules required per CPU;	
for patch cable, can be used with fiber-optic cables up to 10 m	**6ES7 960-1AA06-0XA0**
for patch and installation cables, can be used with fiber-optic cables up to 10 km	**6ES7 960-1AB06-0XA0**

	Order No.
Fiber-optic connecting cable	
For Sync module 6ES7 960-1Ax04-0XA0	
• 1 m	**6ES7 960-1AA04-5AA0**
• 2 m	**6ES7 960-1AA04-5BA0**
• 10 m	**6ES7 960-1AA04-5KA0**
For Sync module 6ES7 960-1AB06-0XA0; fiber-optic monomode LC/LC duplex crossed 9/125 µ (max. 10 km)	On request

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Y-link for S7-400H

Overview

- Transceiver for the transition from a redundant PROFIBUS DP master system to a single-channel PROFIBUS DP master system
- To connect devices with a single PROFIBUS DP interface to the redundant PROFIBUS DP master system of the SIMATIC S7-400H

Technical specifications

	6ES7 153-2BA02-0XB0
General information	
Vendor identification (VendorID)	801Eh
Supply voltage	
24 V DC	Yes
permissible range, lower limit (DC)	20.4 V
permissible range, upper limit (DC)	28.8 V
permissible range (ripple included), lower limit (DC)	20.4 V
permissible range (ripple included), upper limit (DC)	28.8 V
External protection for supply cables (recommendation)	2.5 A
Mains buffering	
• Mains/voltage failure stored energy time	5 ms
Input current	
Current consumption, max.	650 mA
Inrush current, typ.	3 A
I^2t	0.1 $A^2 \cdot s$
Output voltage	
Rated value, 5 V DC	Yes
Output current	
for backplane bus (5 V DC), max.	1.5 A
Power losses	
Power loss, typ.	5.5 W
Address area	
Addressing volume	
• Outputs	244 byte
• Inputs	244 byte
Hardware configuration	
Number of modules per DP slave interface, max.	12

	6ES7 153-2BA02-0XB0
Time stamping	
Accuracy	1 ms; 1ms at up to 8 modules; 10ms at up to 12 modules
Number of message buffers	15
Messages per message buffer	20
Number of stampable digital inputs, max.	128; Max. 128 signals/station; max. 32 signals/slot
Time format	RFC 1119
Time resolution	0.466 ns
Time interval for transmitting the message buffer if a message is present	1 000 ms
Time stamp on signal change	rising / falling edge as signal entering or exiting
Interfaces	
Interface physics, RS 485	Yes
Interface physics, FOC	No
PROFIBUS DP	
• Node addresses	1 to 125 permitted
• Automatic detection of transmission speed	Yes
• PROFIBUS DP, output current, max.	70 mA
• Transmission procedure	RS 485
• Transmission rate, max.	12 Mbit/s
• SYNC capability	Yes
• FREECE capability	Yes
• Direct data exchange (slave-to-slave communication)	Yes; Sender
• PROFIBUS DP	9-pin sub D
1st interface	
DP slave	
• GSD file	SI04801.GSG
• Automatic baud rate search	Yes
Communication functions	
Bus protocol/transmission protocol	PROFIBUS DP to EN 50170

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Technical specifications (continued)

	6ES7 153-2BA02-0XB0
Isolation	
Isolation checked with	Isolation voltage 500 V
Degree and class of protection	
IP20	Yes
Ambient conditions	
Operating temperature	
• Min.	0 °C
• max.	60 °C
Air pressure	
• Operating altitude above sea level, max.	3 000 m
Dimensions	
Width	40 mm
Height	125 mm
Depth	117 mm
Weight	
Weight, approx.	360 g

	6ES7 197-1LB00-0XA0
General information	
Requirements for DP master system	
• Length of parameter assignment message	244 byte
Supply voltage	
Description	via bus module
permissible range, lower limit (DC)	20.4 V
permissible range, upper limit (DC)	28.8 V
Interfaces	
PROFIBUS DP	
• Properties of the lower-level DP master systems	
- Transmission rate, max.	12 Mbit/s; 45.45 kbit/s to 12 Mbit/s
- Termination of lower-level DP master system	Active terminating resistor (Bus Terminator)
- Use of OLM/OBT	Yes
- Use of RS 485 repeaters, max.	9
- Number of DP slaves, max.	31; 64 when using RS 485 repeaters or OLM/OBT
Protocols	
PROFIBUS DP	Yes
Interrupts/diagnostics/ status information	
Status indicator	No
Alarms	
• Alarms	No
Diagnostic messages	
• Diagnostic functions	Yes
Galvanic isolation	
to lower-level DP master system	Yes
Dimensions	
Width	40 mm
Height	125 mm
Depth	130 mm
Weight	
Weight, approx.	200 g

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Y-link for S7-400H

Ordering data	Order No.
For use with STEP 7 from V5.4 or PCS 7 from V7.0:	
Y link For connecting single-channel DP slaves to SIMATIC S7-400H; consisting of 2 IM 153 interface modules (6ES7 153-2BA02-0XB0), 1 Y coupler (6ES7 197-1LB00-0XA0), 1 BM IM/IM bus module (6ES7 195-7HD80-0XA0), 1 BM Y coupler bus module (6ES7 654-7HY00-0XA0)	**6ES7 197-1LA04-0XA0**
For use with PCS 7 V6.0 or higher:	
Y link For connecting single-channel DP slaves to SIMATIC S7-400H; consisting of 2 IM 153 interface modules (6ES7 153-2BA82-0XB0), 1 Y coupler (6ES7 197-1LB00-0XA0), 1 BM IM/IM bus module (6ES7 195-7HD80-0XA0), 1 BM Y coupler bus module (6ES7 654-7HY00-0XA0)	**6ES7 197-1LA11-0XA0**

Accessories	Order No.
Mounting rail For assembling the Y link with active bus modules	
• Length 483 mm	**6ES7 195-1GA00-0XA0**
• Length 530 mm	**6ES7 195-1GF30-0XA0**

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Overview

- CPU for SIMATIC S7-400H and S7-400F/FH
- Usable in high-availability systems such as the S7-400H
- Usable with F runtime license as F-capable CPU in S7-400F/FH safety-related systems
- Features a combined MPI/PROFIBUS DP master interface
- Features 2 slots for sync modules

Note:

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

Technical specifications

The technical data correspond to those of the based-on modules apart from the values listed in the table:

	6AG1 412-3HJ14-4AB0	**6AG1 412-2EK06-2AB0**	**6AG1 412-5HK06-7AB0**
Based on	**6ES7 412-3HJ14-0AB0**	**6ES7 412-2EK06-0AB0**	**6ES7412-5HK06-0AB0**
Ambient conditions			
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)	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). For "F-Systems" applications max. +2000 m above sea level permissible
• Relative humidity			
- with condensation	100 %; Relative humidity, incl. condensation / frost permitted (no commissioning under condensation conditions)	100 %; Relative humidity, incl. condensation / frost permitted (no commissioning under condensation conditions)	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)
• Resistance			
- to biologically active substances	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 in corrosive atmospheres!	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!
- to chemically active substances	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!	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!	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!
- to mechanically active substances	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!	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!
Mechanical and climatic conditions during operation			
Climatic conditions in operation			
• Temperature			
- Min.	0 °C; = Tmin	-25 °C; = Tmin	-25 °C
- max.	60 °C; = Tmax	60 °C; = Tmax	70 °C; For "F-Systems" applications max. +60 °C permissible

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SIPLUS high-availability CPUs
SIPLUS CPU 412H

Ordering data

	Order No.
SIPLUS CPU 412-3H (medial exposure) for S7-400H and S7-400F/FH; 768 KB work memory, combined MPI/PROFIBUS DP master interface, 2 slots for sync modules, slot for memory card, including the mounting position labels	**6AG1 412-3HJ14-4AB0**
SIPLUS S7-400 CPU 412-2 PN (extended temperature range and medial exposure) For S7-400H and S7-400F/FH; 1 MB main memory (512 KB for code, 512 KB for data). 2 interfaces: MPI/DP 12 Mbit/s (X1) Ethernet/PROFINET (X5)	**6AG1 412-2EK06-2AB0**
SIPLUS S7-400 CPU 412-5H (extended temperature range and medial exposure) For S7-400H and S7-400F/FH; 1 MB main memory (512 KB for code, 512 KB for data). 5 interfaces: 1 x MPI/DP 1 x DP 1 x PN 2 x for sync modules	**6AG1 412-5HK06-7AB0**

	Order No.
Accessories	
Memory card RAM	
(medial exposure)	
2 MB	**6AG1 952-1AL00-4AA0**
4 MB	**6AG1 952-1AM00-7AA0**
8 MB	**6AG1 952-1AP00-7AA0**
16 MB	**6AG1 952-1AS00-7AA0**
64 MB	**6AG1 952-1AY00-7AA0**
FEPROM memory card	
(medial exposure)	
32 MB	**6AG1 952-1KT00-4AA0**
RS 485 bus connector with 90° cable outlet (extended temperature range and medial exposure) Max. transfer rate 12 Mbit/s	
Without PG interface	**6AG1 972-0BA12-2XA0**
With PG interface	**6AG1 972-0BB12-2XA0**
RS 485 bus connector with angled cable outlet (extended temperature range -40°C ... +70°C and medial exposure) Max. transfer rate 12 Mbit/s	
Without PG interface	**6AG1 972-0BA42-7XA0**
With PG interface	**6AG1 972-0BB42-7XA0**
Further accessories	See SIMATIC CPU 412, page 6/39

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Overview

CPU for SIMATIC S7-400H and S7-400F/FH

- Usable in high-availability systems such as the S7-400H
- Usable with F runtime license as F-capable CPU in S7-400F/FH safety-related systems
- With integral PROFIBUS DP master interface
- Features 2 slots for sync modules

Note:

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

Technical specifications

The technical data correspond to those of the based-on modules apart from the values listed in the table:

	6AG1 414-4HM14-4AB0	**6AG1 414-3EM06-7AB0**	**6AG1 414-5HM06-7AB0**
Based on	**6ES7 414-4HM14-0AB0**	**6ES7 414-3EM06-0AB0**	**6ES7 414-5HM06-0AB0**
Ambient conditions			
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)	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). For "F-Systems" applications max. +2000 m above sea level permissible
• Relative humidity			
- with condensation	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)	100 %; Relative humidity, incl. condensation / frost permitted (no commissioning under condensation conditions)	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)
• Resistance			
- to biologically active substances	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 in corrosive atmospheres!	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!
- to chemically active substances	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 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!
- to mechanically active substances	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!	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!
Mechanical and climatic conditions during operation			
Climatic conditions in operation			
• Temperature			
- Min.	0 °C; = Tmin	-25 °C; = Tmin	-25 °C
- max.	60 °C; = Tmax	70 °C; = Tmax	70 °C; For "F-Systems" applications max. +60 °C permissible

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Ordering data

	Order No.
SIPLUS CPU 414-4H (medial exposure) For S7-400H and S7-400F/FH; 2.8 MB main memory, MPI/ PROFIBUS DP master interface, 2 slots for sync modules, slot for memory card, incl. slot number labels	**6AG1 414-4HM14-4AB0**
SIPLUS S7-400 CPU 414-3 PN/DP (extended temperature range and medial exposure) 4 MB main memory (2 MB for code, 2 MB for data) 3 interfaces: MPI/DP 12 Mbit/s (X1), Ethernet/PROFINET (X5), IF 964-DP pluggable (IF1)	**6AG1 414-3EM06-7AB0**
SIPLUS S7-400 CPU 414-5H (extended temperature range and medial exposure) For S7-400H and S7-400F/FH; 1 MB main memory (512 KB for code, 512 KB for data) 5 interfaces: 1 x MPI/DP 1 x DP 1 x PN 2 x for sync modules	**6AG1 414-5MH06-7AB0**

	Order No.
Accessories	
Memory Card RAM	
(medial exposure)	
2 MB	**6AG1 952-1AL00-4AA0**
(extended temperature range and medial exposure)	
4 MB	**6AG1 952-1AM00-7AA0**
8 MB	**6AG1 952-1AP00-7AA0**
16 MB	**6AG1 952-1AS00-7AA0**
64 MB	**6AG1 952-1AY00-7AA0**
FEPROM memory card	
(medial exposure)	
32 MB	**6AG1 952-1KT00-4AA0**
RS 485 bus connector with 90° cable outlet	
(extended temperature range and medial exposure)	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6AG1 972-0BA12-2XA0**
With PG interface	**6AG1 972-0BB12-2XA0**
RS 485 bus connector with angled cable outlet	
(extended temperature range and medial exposure)	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6AG1 972-0BA42-7XA0**
With PG interface	**6AG1 972-0BB42-7XA0**
Further accessories	See SIMATIC CPU 414-4H, page 6/39

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Overview

CPU for SIMATIC S7-400H and S7-400F/FH

- Usable in high-availability systems such as the S7-400H
- Usable with F runtime license as F-capable CPU in S7-400F/FH safety-related systems
- With integral PROFIBUS DP master interface
- Features 2 slots for sync modules

Note:

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

Technical specifications

	6AG1 417-4HT14-4AB0	6AG1 417-4XT05-4AB0	6AG1 417-5HT06-7AB0
Based on	**6ES7 417-4HT14-0AB0**	**6ES7 417-4XT05-0AB0**	**6ES7 417-5HT06-0AB0**
Ambient conditions			
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)	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). For "F-Systems" applications max. +2000 m above sea level permissible
• Relative humidity			
- with condensation	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)
• Resistance			
- to biologically active substances	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!	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!
- to chemically active substances	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!	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!
- to mechanically active substances	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!	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!
Mechanical and climatic conditions during operation			
Climatic conditions in operation			
• Temperature			
- Min.	0 °C; = Tmin	0 °C; = Tmin	-25 °C
- max.	60 °C; = Tmax	60 °C; = Tmax	70 °C; For "F-Systems" applications max. +60 °C permissible

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Ordering data

	Order No.
SIPLUS CPU 417H	
(medial exposure)	
For S7-400H and S7-400F/FH; 30 MB work memory, MPI/ PROFIBUS DP master interface, 2 slots for sync modules, slot for memory card, incl. slot number plates	**6AG1 417-4HT14-4AB0**
SIPLUS S7-400 CPU417-4	**6AG1 417-4XT05-4AB0**
(medial exposure)	
For S7-400H and S7-400F/FH. Based on 6ES7 417-4XT05-0AB0	
SIPLUS S7-400 CPU 417-5H	**6AG1 417-5HT06-7AB0**
(extended temperature range and medial exposure)	
For S7-400H and S7-400F/FH; 1 MB main memory (512 KB for code, 512 KB for data)	
5 interfaces: 1 x MPI/DP 1 x DP 1 x PN 2 x for sync modules	

	Order No.
Accessories	
Memory card RAM	
(medial exposure)	
2 MB	**6AG1 952-1AL00-4AA0**
(extended temperature range and medial exposure)	
4 MB	**6AG1 952-1AM00-7AA0**
8 MB	**6AG1 952-1AP00-7AA0**
16 MB	**6AG1 952-1AS00-7AA0**
64 MB	**6AG1 952-1AY00-7AA0**
FEPROM memory card	
(medial exposure)	
32 MB	**6AG1 952-1KT00-4AA0**
RS 485 bus connector with 90° cable outlet	
(extended temperature range and medial exposure)	
Max. transmission rate 12 Mbit/s	
Without PG interface	**6AG1 972-0BA12-2XA0**
With PG interface	**6AG1 972-0BB12-2XA0**
RS 485 bus connector with angled cable outlet	
(extended temperature range and medial exposure)	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6AG1 972-0BA42-7XA0**
With PG interface	**6AG1 972-0BB42-7XA0**
Further accessories	See SIMATIC CPU 417-4H, page 6/39

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Overview

- For linking the two CPUs 414-4H/417-4H in the subunits of the S7-400H
- Can be plugged directly into the CPU

Note:

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

Technical specifications

	6ES7 960-1AA04-4XA0	6ES7 960-1AB04-4XA0	6ES7 960-1AA06-7XA0	6ES7 960-1AB06-7XA0
Based on	**6ES7 960-1AA04-0XA0**	**6ES7 960-1AB04-0XA0**	**6ES7 960-1AA06-0XA0**	**6ES7 960-1AB06-0XA0**
Current consumption from CPU, max.	210 mA	250 mA	220 mA	240 mA
Power dissipation, typ.	1.1 mW	1.3 mW	0.77 mW	0.83 mW
Extended range of environmental conditions				
• Temperatures	0 °C ... 60 °C	0 °C ... 60 °C	-25 °C ... +70 °C	-25 °C ... +70 °C
• Temperatures with reference to ambient temperature, air pressure and altitude	0 °C ... +60 °C at 1080 hPa ... 795 hPa (-1000 m ... +2000 m)	0 °C ... +60 °C at 1080 hPa ... 795 hPa (-1000 m ... +2000 m)	-25 °C ... +70 °C at 1080 hPa ... 795 hPa (-1000 m ... +2000 m)	-25 °C ... +70 °C at 1080 hPa ... 795 hPa (-1000 m ... +2000 m)
	0 °C ... +50 °C a t 795 hPa ... 658 hPa (+2000 m ... +3500 m)	0 °C ... +50 °C at 795 hPa ... 658 hPa (+2000 m ... +3500 m)	-25 °C ... +60 °C at 795 hPa ... 658 hPa (+2000 m ... +3500 m)	-25 °C ... +60 °C at 795 hPa ... 658 hPa (+2000 m ... +3500 m)
	0 °C ... +40 °C at 658 hPa ... 540 hPa (+3500 m ... +5000 m)	0 °C ... +40 °C at 658 hPa ... 540 hPa (+3500 m ... +5000 m)	-25 °C ... +50 °C at 658 hPa ... 540 hPa (+3500 m ... +5000 m)	-25 °C ... +50 °C at 658 hPa ... 540 hPa (+3500 m ... +5000 m)
Relative humidity (with condensation / maximum)	100 %, incl. condensation/frost (no commissioning in bedewed state)	100 %, incl. condensation/frost (no commissioning in bedewed state)	100 %, incl. condensation/frost (no commissioning in bedewed state)	100 %, incl. condensation/frost (no commissioning in bedewed state)
Resistance				
• to biologically active substances / compliance with EN 60721-3-3	Yes; Class 3B2 mold and fungal spores (excluding fauna). The supplied plug covers must remain in place over the unused interfaces during operation.	Yes; Class 3B2 mold and fungal spores (excluding fauna). The supplied plug covers must remain in place over the unused interfaces during operation.	Yes; Class 3B2 mold and fungal spores (excluding fauna). The supplied plug covers must remain in place over the unused interfaces during operation.	Yes; Class 3B2 mold and fungal spores (excluding fauna). The supplied plug covers must remain in place over the unused interfaces during operation.
• to chemically active substances / compliance with EN 60721-3-3	Yes; Class 3C4 (relative humidity < 75 %) incl. salt spray in accordance with EN 60068-2-52 (degree of severity 3). The supplied plug covers must remain in place over the unused interfaces during operation.	Yes; Class 3C4 (relative humidity < 75 %) incl. salt spray in accordance with EN 60068-2-52 (degree of severity 3). The supplied plug covers must remain in place over the unused interfaces during operation.	Yes; Class 3C4 (relative humidity < 75 %) incl. salt spray in accordance with EN 60068-2-52 (degree of severity 3). The supplied plug covers must remain in place over the unused interfaces during operation.	Yes; Class 3C4 (relative humidity < 75 %) incl. salt spray in accordance with EN 60068-2-52 (degree of severity 3). The supplied plug covers must remain in place over the unused interfaces during operation.
• to mechanically active substances, compliance with EN 60721-3-3	Yes; Class 3S4 incl. sand, dust. The supplied plug covers must remain in place over the unused interfaces during operation.	Yes; Class 3S4 incl. sand, dust. The supplied plug covers must remain in place over the unused interfaces during operation.	Yes; Class 3S4 incl. sand, dust. The supplied plug covers must remain in place over the unused interfaces during operation.	Yes; Class 3S4 incl. sand, dust. The supplied plug covers must remain in place over the unused interfaces during operation.
Dimensions				
• Width	25 mm	25 mm	13 mm	13 mm
• Height	53 mm	53 mm	14 mm	14 mm
• Depth	140 mm	140 mm	58 mm	58 mm
Cable length, max.	10 m	10 km	10 m	10 km
Weight, approx.	65 g	65 g	14 g	14 g

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SIPLUS sync module for connecting the CPU 41xH

Ordering data	Order No.
SIPLUS sync module	
(medial exposure)	
for coupling the CPU 41xH for S7-400H/F/FH; 2 modules required per CPU;	
• for patch cable, can be used with fiber-optic cables up to 10 m	**6AG1 960-1AA04-4XA0**
• for patch and installation cables, can be used with fiber-optic cables up to 10 km	**6AG1 960-1AB04-4XA0**
SIPLUS sync module	
(extended temperature range -25 °C ... +70 °C and medial exposure)	
• for patch cable, can be used with fiber-optic cables up to 10 m	**6AG1 960-1AA06-7XA0**
• for patch and installation cables, can be used with fiber-optic cables up to 10 km	**6AG1 960-1AB06-7XA0**

	Order No.
Accessories	see SIMATIC sync module, page 6/41
SIPLUS S7-400 OPTICAL FIBER CABLE 1M HF-S	
1 m	**6AG1 960-1AA04-7AA0**
2 m	**6AG1 960-1AA04-7BA0**
10 m	**6AG1960-1AA04-7KA0**

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Overview

- Bus coupler for transition from a redundant PROFIBUS DP master system to a single-channel PROFIBUS DP master system
- For connection of devices with only one PROFIBUS DP interface to the redundant PROFIBUS DP master system of the SIMATIC S7-400H

Note:

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

	SIPLUS Y-Link for S7-400H	**SIPLUS S7 BUS MODULE BM Y coupler**
Order No.	**6AG1 197-1LA11-4XA0**	**6AG1 654-7HY00-7XA0**
Order No. based on	**6ES7 197-1LA11-0XA0**	**6ES7 654-7HY00-0XA0**
Ambient temperature range	0 °C … +60 °C	-25 °C … +70 °C
Conformal coating	Coating of the printed circuit boards and the electronic components	
Technical data	The technical data of the standard product applies except for the ambient conditions.	
Ambient conditions		
Relative humidity	100%, condensation/frost permissible. No commissioning if condensation present.	
Biologically active substances, compliance with EN 60721-3-3	Class 3B2 mold and fungal spores (excluding fauna). The supplied plug covers must remain in place over the unused interfaces during operation!	
Chemically active substances, compliance with EN 60721-3-3	Class 3C4 incl. salt spray in accordance with EN60068-2-52 (degree of severity 3). The supplied plug covers must remain in place over the unused interfaces during operation!	
Mechanically active substances, compliance with EN 60721-3-3	Class 3S4 incl. sand, dust. The supplied plug covers must remain in place over the unused interfaces during operation!	
Air pressure (depending on the highest positive temperature range specified)	1 080 ... 795 hPa (-1 000 ... +2 000 m) see ambient temperature range 795 ... 658 hPa (+2 000 ... +3 500 m) derating 10 K 658 ... 540 hPa (+3 500 ... +5 000 m) derating 20 K	

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

Ordering data

	Order No.
For use with STEP 7 from V5.4 or PCS 7 from V7.0:	
SIPLUS Y-Link for S7-400H (medial exposure) for connecting single-channel DP slaves to SIMATIC S7-400H; consisting of 2 IM 153 interface modules, 1 Y-coupler, 1 BM IM/IM bus module, 1 BM Y-coupler bus module	**6AG1 197-1LA11-4XA0**

	Order No.
Accessories	
SIPLUS S7 BUS MODULE BM Y-coupler (extended temperature range and medial exposure)	**6AG1 654-7HY00-7XA0**
Additional accessories	See SIMATIC Y-Link, page 6/44

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Interface modules
PROFIBUS IF-964 DP module

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 6ES7 414-3XM05-0AB0, 6ES7 414-3EM05-0AB0, 6ES7 414-3EM06-0AB0, 6ES7 414-3FM06-0AB0, 6ES7 416-3XR05-0AB0, 6ES7 416-3ER05-0AB0, 6ES7 416-3ES06-0AB0, 6ES7 416-3FS06-0AB0 and 6ES7 417-4XT05-0AB0.

Technical specifications

	6ES7 964-2AA04-0AB0
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, max.	1 200 m; At 9.6 kbit/s: max. 1200 m; at 12 Mbit/s: max. 100 m
1st interface	
Physics	RS 485
Isolated	Yes
Functionality	
• DP master	Yes; Default setting
• DP slave	Yes
DP master	
• Transmission rate, max.	12 Mbit/s
• Transmission rate, min.	9.6 kbit/s
• Number of DP slaves, max.	125; depending on the CPU used
• Services	
- PG/OP communication	Yes
- Equidistance mode support	Yes
- SYNC/FREEZE	Yes
- Direct data exchange (slave-to-slave communication)	Yes
• Address area	
- Inputs, max.	device-dependent
- Outputs, max.	device-dependent
• User data per DP slave	
- Inputs, max.	244 byte
- Outputs, max.	244 byte
Communication functions	
Number of connections	
• overall	device-dependent
Dimensions	
Width	26 mm
Height	54 mm
Depth	130 mm
Weight	
Weight, approx.	65 g

Ordering data

	Order No.
IF-964 DP interface module	**6ES7 964-2AA04-0AB0**
Interface module with integral PROFIBUS DP master interface	

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SIPLUS PROFIBUS IF-964 DP module

Overview

- To connect distributed I/O via PROFIBUS DP
- Max. transmission rate 12 Mbit/s
- Electrically isolated RS-485 interface
- Connection via 9-pin Sub-D socket
- Depending on the S7-400 CPU, one or two pluggable PROFIBUS modules:
  - CPU 414-3/416-3: 1 module
  - CPU 417-4: 2 modules

Notes:

Can only be used with the CPUs 6AG1 416-3XR05-4AB0, 6AG1 416-3ER05-4AB0 and 6AG1 417-4XT05-4AB0.

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

	SIPLUS PROFIBUS IF-964 DP module
Order No.	**6AG1 964-2AA04-7AB0**
Order No. based on	**6ES7 964-2AA04-0AB0**
Ambient temperature range	-25 ... +70 °C
Conformal coating	Coating of the printed circuit boards and the electronic components
Technical data	The technical data of the standard product applies except for the ambient conditions.
Ambient conditions	
Relative humidity	100%, condensation/frost permissible. No commissioning if condensation present.
Biologically active substances, compliance with EN 60721-3-3	Class 3B2 mold and fungal spores (excluding fauna). The supplied plug covers must remain in place over the unused interfaces during operation!
Chemically active substances, compliance with EN 60721-3-3	Class 3C4 incl. salt spray in accordance with EN60068-2-52 (degree of severity 3). The supplied plug covers must remain in place over the unused interfaces during operation!
Mechanically active substances, compliance with EN 60721-3-3	Class 3S4 incl. sand, dust. The supplied plug covers must remain in place over the unused interfaces during operation!
Air pressure (depending on the highest positive temperature range specified)	1080 ... 795 hPa (-1000 ... +2000 m) see ambient temperature range 795 ... 658 hPa (+2000 ... +3500 m) derating 10 K 658 ... 540 hPa (+3500 ... +5000 m) derating 20 K

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

Ordering data

	Order No.
SIPLUS IF-964 DP interface module (extended temperature range and medial exposure) Interface module with integrated PROFIBUS DP master interface	**6AG1 964-2AA04-7AB0**

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SM 421 digital input module

Overview

- Digital inputs for the SIMATIC S7-400
- For connecting standard switches and two-wire proximity switches (BERO)

Technical specifications

	6ES7 421-7BH01-0AB0	6ES7 421-1BL01-0AA0	6ES7 421-1EL00-0AA0	6ES7 421-1FH20-0AA0	6ES7 421-7DH00-0AB0
Supply voltage					
Load voltage L+					
• Rated value (DC)	24 V				
• permissible range, lower limit (DC)	20.4 V				
• permissible range, upper limit (DC)	28.8 V				
Input current					
from backplane bus 5 V DC, max.	130 mA	20 mA	200 mA	80 mA	150 mA
from supply voltage L+, max.	120 mA				
Power losses					
Power loss, max.	5 W	6 W	16 W	12 W	8 W; 3.5 W (24 V DC); 6.5 W (48 V DC); 8.0 W (60 V DC)
Digital inputs					
Number/binary inputs	16	32	32	16	16
Number of simultaneously controllable inputs					
• all mounting positions					
- up to 40 °C, max.	16	32	32	16	16
- up to 60 °C, max.	16	32	32	16	16
Input voltage					
• Type of input voltage	DC	DC	AC/DC	AC/DC	AC/DC
• Rated value, DC	24 V	24 V			
• Rated value, UC			120 V	230 V; 120/230 V UC	24 V; 24 to 60 V UC
• for signal "0"	-30 to +5 V DC	-30 to +5 V DC	0 to 20 V UC	0 to 40 V AC/ -40 to +40 V DC	-6 to +6 V DC/ 0 to 5 V AC
• for signal "1"	11 to 30 V DC	13 to 30 V DC	79 to 132 V AC; 80 to 132 V DC	74 to 264 V AC; 80 to 264 V DC, -80 to -264 V	15 to 72 V DC; -15 to -72 V DC; 15 to 60 V AC
• Frequency range			47 to 63 Hz	47 to 63 Hz	47 to 63 Hz AC / DC

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Technical specifications (continued)

	6ES7 421-7BH01-0AB0	6ES7 421-1BL01-0AA0	6ES7 421-1EL00-0AA0	6ES7 421-1FH20-0AA0	6ES7 421-7DH00-0AB0
Input current					
• for signal "0", max. (permissible quiescent current)		1.3 mA	1 mA	6 mA; AC: 6 mA; DC: 2 mA	
• for signal "1", typ.	6 mA; 6 to 8 mA	7 mA	2 mA; 2 to 5 mA	10 mA; at 120 V: 10 mA AC, 1.8 mA DC; at 230 V: 14 mA AC, 2 mA DC	4 mA; 4 to 10 mA
Input delay (for rated value of input voltage)					
• for standard inputs					
- Parameterizable	Yes				Yes
- Rated value					0.5 ms; 0.5 / 3 / 10 / 20 ms
Cable length					
• Cable length, shielded, max.	1 000 m; 1000 m/ 3 ms; 70 m/0.5 ms; 30 m/0.1 ms; 30 m/ 0.05 ms	1 000 m	1 000 m	1 000 m	1 000 m
• Cable length unshielded, max.	600 m; 600 m: 3 ms; 50 m: 0.5 ms; 20 m: 0.1 ms; 20 m: 0.05 ms	600 m	600 m	600 m	600 m; 600 m: 3, 10, 20 ms; 100 m: 0.5 ms
Encoder					
Connectable encoders					
• 2-wire sensor	Yes	Yes	Yes	Yes	Yes
- Permissible quiescent current (2-wire sensor), max.	3 mA	1.5 mA	1 mA	5 mA; AC: 5 mA	0.5 mA; 0.5 to 2 mA
Interrupts/diagnostics/ status information					
Alarms					
• Diagnostic alarm	Yes; Parameterizable				Yes; Parameterizable
• Hardware interrupt	Yes; Parameterizable				Yes; Parameterizable
Diagnostic messages					
• Diagnostics	Yes; internal/ external fault				Yes; internal/ external fault
Galvanic isolation					
Galvanic isolation digital inputs					
• between the channels, in groups of	8	32	8	4	1
• between the channels and the backplane bus	Yes	Yes	Yes	Yes	Yes
Isolation					
Isolation checked with	500 V DC	500 V DC	1500 V AC	1500 V AC	1500 V AC
Dimensions					
Width	25 mm	25 mm	25 mm	25 mm	25 mm
Height	290 mm	290 mm	290 mm	290 mm	290 mm
Depth	210 mm	210 mm	210 mm	210 mm	210 mm
Weight					
Weight, approx.	600 g	500 g	600 g	650 g	600 g

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SM 421 digital input module

Ordering data	Order No.
SM 421 digital input modules	
16 inputs, 24 V DC, with process/diagnostics interrupt	**6ES7 421-7BH01-0AB0**
32 inputs, 24 V DC	**6ES7 421-1BL01-0AA0**
32 inputs, 120 V AC/DC	**6ES7 421-1EL00-0AA0**
16 inputs, 120/230 V AC/DC, inputs according to IEC 1131-2 Type 2	**6ES7 421-1FH20-0AA0**
16 inputs, 24 to 60 V AC/DC, with process/diagnostics interrupt	**6ES7 421-7DH00-0AB0**
Front connector	
48-pin	
• with screw contacts, 1 unit	**6ES7 492-1AL00-0AA0**
• with screw contacts, 84 units	**6ES7 492-1AL00-1AB0**
• with spring-loaded terminals, 1 unit	**6ES7 492-1BL00-0AA0**
• with crimp contacts, 1 unit	**6ES7 492-1CL00-0AA0**
• with crimp contacts, 84 units	**6ES7 492-1CL00-1AB0**
SIMATIC TOP connect	See page 6/129; for information about which components can be used for the respective module, see Industry Mall

	Order No.
Cover film for labeling strips	**6ES7 492-2XX00-0AA0**
Spare part	
Labeling sheets for machine inscription	
DIN A4, for printing using laser printer; pack of 10	
petrol	**6ES7 492-2AX00-0AA0**
light-beige	**6ES7 492-2BX00-0AA0**
yellow	**6ES7 492-2CX00-0AA0**
red	**6ES7 492-2DX00-0AA0**
SIMATIC Manual Collection	**6ES7 998-8XC01-8YE0**
Electronic manuals on DVD, multilingual: 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	
SIMATIC Manual Collection update service for 1 year	**6ES7 998-8XC01-8YE2**
Current "Manual Collection" DVD and the three subsequent updates	

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Overview

- Digital outputs for the SIMATIC S7-400
- For connecting solenoid valves, contactors, low-power motors, lamps and motor starters

Technical specifications

	6ES7 422-1FH00-0AA0	6ES7 422-1HH00-0AA0	6ES7 422-1BH11-0AA0	6ES7 422-1BL00-0AA0	6ES7 422-7BL00-0AB0
Supply voltage					
Load voltage L+					
• Rated value (DC)		60 V	24 V	24 V	24 V
• permissible range, lower limit (DC)		1 V	20.4 V	20.4 V	20.4 V
• permissible range, upper limit (DC)		60 V	28.8 V	28.8 V	28.8 V
Load voltage L1					
• Rated value (AC)	230 V; 120/230 V AC	230 V			
• permissible range, lower limit (AC)	79 V	2 V			20.4 V
• permissible range, upper limit (AC)	264 V	264 V			28.8 V
Input current					
from load voltage L+ (without load), max.	1.5 mA		30 mA	30 mA	120 mA
from load voltage L1 (without load), max.	6 mA				
from backplane bus 5 V DC, max.	400 mA	1 A	160 mA	200 mA	200 mA
Power losses					
Power loss, max.	16 W	25 W	7 W	4 W	8 W
Digital outputs					
Number/binary outputs	16	16; Relay	16	32	32
Limitation of inductive shutdown voltage to			-30 V	-27 V	L+ (-45 V)
Lamp load, max.	50 W	60 W	10 W	5 W	5 W
Output voltage					
• for signal "1", min.	L1 (-18.1 V)		L+ (-0.5 V)	L+ (-0.3 V)	L+ (-0.8 V)
Output current					
• for signal "1" rated value	2 A	5 A	2 A	0.5 A	0.5 A
• for signal "1" permissible range for 0 to 60 °C, min.	10 mA		5 mA	5 mA	5 mA
• for signal "1" permissible range for 0 to 60 °C, max.			2.4 A	0.6 A	0.6 A
• for signal "0" residual current, max.	2.6 mA		0.5 mA	0.3 mA	0.5 mA

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SM 422 digital output module

Technical specifications (continued)

	6ES7 422-1FH00-0AA0	6ES7 422-1HH00-0AA0	6ES7 422-1BH11-0AA0	6ES7 422-1BL00-0AA0	6ES7 422-7BL00-0AB0
Switching frequency					
• with resistive load, max.	10 Hz	10 Hz	100 Hz	100 Hz	100 Hz
• with inductive load, max.	0.5 Hz		0.1 Hz	0.5 Hz	2 Hz
Aggregate current of outputs (per group)					
• all mounting positions					
- up to 60 °C, max.	2 A; 5 A with fan subassembly; per 4 adjacent outputs	5 mA; 10 A with fan subassembly	2 A; 2 adjacent outputs each	2 A; 8 adjacent outputs each	2 A
Relay outputs					
• Number of operating cycles, max.		100 000; 100,000 (AC 15 / DC 13); 3,000,000 mechanical			
• Switching capacity of contacts					
- with inductive load, max.		5 A; 5 A (30 V DC); 5 A (230 V AC)			
- Switching frequency/contacts/at ohmic load/maximum		5 A; 5 A (30 V DC); 5 A (230 V AC); 1.2 A (60 V DC); 0.2 A (125 V DC)			
Cable length					
• Cable length, shielded, max.	1 000 m	1 000 m	1 000 m	1 000 m	1 000 m
• Cable length unshielded, max.	600 m	600 m	600 m	600 m	600 m
Interrupts/diagnostics/ status information					
Alarms					
• Diagnostic alarm					Yes; Parameterizable
Diagnostic messages					
• Diagnostics					Yes; internal/ external fault
Galvanic isolation					
Galvanic isolation digital outputs					
• between the channels, in groups of	4	2	8	32	8
• between the channels and the backplane bus	Yes	Yes	Yes	Yes	Yes
Isolation					
Isolation checked with	1500 V AC	1500 V AC	500 V DC	500 V DC	500 V DC
Dimensions					
Width	25 mm	25 mm	25 mm	25 mm	25 mm
Height	290 mm	290 mm	290 mm	290 mm	290 mm
Depth	210 mm	210 mm	210 mm	210 mm	210 mm
Weight					
Weight, approx.	800 g	700 g	600 g	600 g	600 g

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Ordering data	Order No.
SM 422 digital output modules	
16 outputs, 24 V DC; 2 A	**6ES7 422-1BH11-0AA0**
32 outputs, 24 V DC; 0.5 A	**6ES7 422-1BL00-0AA0**
32 outputs, 24 V DC, 0.5 A; with diagnostics	**6ES7 422-7BL00-0AB0**
16 outputs, 120/230 V AC; 2 A	**6ES7 422-1FH00-0AA0**
16 outputs, relay contacts	**6ES7 422-1HH00-0AA0**
Front connector	
48-pin	
• with screw contacts, 1 unit	**6ES7 492-1AL00-0AA0**
• with screw contacts, 84 units	**6ES7 492-1AL00-1AB0**
• with spring-loaded terminals, 1 unit	**6ES7 492-1BL00-0AA0**
• with crimp contacts, 1 unit	**6ES7 492-1CL00-0AA0**
• with crimp contacts, 84 units	**6ES7 492-1CL00-1AB0**
SIMATIC TOP connect	See page 6/129
Cover film for labeling strips	**6ES7 492-2XX00-0AA0**
Spare part	

	Order No.
Labeling sheets for machine inscription	
DIN A4, for printing using laser printer; pack of 10	
petrol	**6ES7 492-2AX00-0AA0**
light-beige	**6ES7 492-2BX00-0AA0**
yellow	**6ES7 492-2CX00-0AA0**
red	**6ES7 492-2DX00-0AA0**
SIMATIC Manual Collection	**6ES7 998-8XC01-8YE0**
Electronic manuals on DVD, multilingual: 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	
SIMATIC Manual Collection update service for 1 year	**6ES7 998-8XC01-8YE2**
Current "Manual Collection" DVD and the three subsequent updates	

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SIPLUS SM 421 digital input module

Overview

- Digital inputs for SIMATIC S7-400
- For connection of switches and 2-wire proximity switches (BEROs)

Note:

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

SIPLUS SM 421 digital input module	
Order number	**6AG1 421-1BL01-2AA0**
Order No. based on	**6ES7 421-1BL01-0AA0**
Ambient temperature range	-25 ... +60 °C
Conformal coating	Coating of the printed circuit boards and the electronic components
Technical data	The technical data of the standard product applies except for the ambient conditions
Ambient conditions	
Relative humidity	100%, condensation/frost permissible. No commissioning if condensation present.
Biologically active substances, compliance with EN 60721-3-3	Class 3B2 mold and fungal spores (excluding fauna). The supplied plug covers must remain in place over the unused interfaces during operation!
Chemically active substances, compliance with EN 60721-3-3	Class 3C4 incl. salt spray in accordance with EN60068-2-52 (degree of severity 3). The supplied plug covers must remain in place over the unused interfaces during operation!
Mechanically active substances, compliance with EN 60721-3-3	Class 3S4 incl. sand, dust. The supplied plug covers must remain in place over the unused interfaces during operation!
Air pressure (depending on the highest positive temperature range specified)	1080 ... 795 hPa (-1000 ... +2000 m) see ambient temperature range 795 ... 658 hPa (+2000 ... +3500 m) derating 10 K 658 ... 540 hPa (+3500 ... +5000 m) derating 20 K

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

Ordering data	**Order No.**
SIPLUS SM 421 digital input modules	
(extended temperature range and medial exposure)	
32 inputs, 24 V DC	**6AG1 421-1BL01-2AA0**
Accessories	See SIMATIC S7-400 digital input modules, page 6/58

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SIPLUS SM 422 digital output module

Overview

- Digital outputs for SIMATIC S7-400
- For connecting solenoid valves, contactors, small-power motors, lamps and motor starters

Note:

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

SIPLUS SM 422 digital input module	
Order number	**6AG1 422-1BL00-2AA0**
Order No. based on	**6ES7 422-1BL00-0AA0**
Ambient temperature range	-25 ... +60 °C
Conformal coating	Coating of the printed circuit boards and the electronic components
Technical data	The technical data of the standard product applies except for the ambient conditions
Ambient conditions	
Relative humidity	100%, condensation/frost permissible. No commissioning if condensation present.
Biologically active substances, compliance with EN 60721-3-3	Class 3B2 mold and fungal spores (excluding fauna). The supplied plug covers must remain in place over the unused interfaces during operation!
Chemically active substances, compliance with EN 60721-3-3	Class 3C4 incl. salt spray in accordance with EN60068-2-52 (degree of severity 3). The supplied plug covers must remain in place over the unused interfaces during operation!
Mechanically active substances, compliance with EN 60721-3-3	Class 3S4 incl. sand, dust. The supplied plug covers must remain in place over the unused interfaces during operation!
Air pressure (depending on the highest positive temperature range specified)	1080 ... 795 hPa (-1000 ... +2000 m) see ambient temperature range 795 ... 658 hPa (+2000 ... +3500 m) derating 10 K 658 ... 540 hPa (+3500 ... +5000 m) derating 20 K

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

Ordering data

	Order No.
SIPLUS SM 422 digital output modules (extended temperature range and medial exposure)	
32 outputs, 24 V DC	**6AG1 422-1BL00-2AA0**
Accessories	See SIMATIC S7-400 digital output modules, page 6/61

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SM 431 analog input module

Overview

- Analog inputs for the SIMATIC S7-400
- For connection of voltage and current sensors, thermocouples, resistors and resistance thermometers
- Resolution from 13 to 16 bit

Technical specifications

	6ES7 431-0HH00-0AB0	6ES7 431-1KF20-0AB0	6ES7 431-1KF00-0AB0	6ES7 431-1KF10-0AB0
Supply voltage				
Load voltage L+				
• Rated value (DC)	24 V; Only required for supplying 2-wire transmitters	24 V; Only required for supplying 2-wire transmitters	not necessary	24 V; Only required for supplying 2-wire transmitters
• Reverse polarity protection	Yes	Yes		Yes
Input current				
from load voltage L+ (without load), max.	400 mA; for 16 connected, fully controlled 2-wire transmitters	200 mA; for 8 connected, fully controlled 2-wire transmitters		200 mA
from backplane bus 5 V DC, max.	100 mA	1 000 mA	350 mA	600 mA
Power losses				
Power loss, typ.	2 W	4.9 W	1.8 W	3.5 W
Analog inputs				
Number of analog inputs	16	8	8	8
Number of analog inputs for voltage/ current measurement	16	8	8	8
Number of analog inputs for resistance measurement		4	4	4
permissible input voltage for voltage input (destruction limit), max.	20 V; 20 V DC permanent, 75 V DC for max. 1 s (duty factor 1:20)	18 V; 18 V continuous, 75 V for 1 ms (mark to space ratio 1:20)	50 V	18 V; 18 V continuous, 75 V for 1 ms (mark to space ratio 1:20)
permissible input current for current input (destruction limit), max.	40 mA	40 mA; Permanent	50 mA; 40 mA continuous	40 mA; Permanent
Input ranges (rated values), voltages				
• 1 to 5 V	Yes	Yes	Yes	Yes
• -1 V to +1 V	Yes	Yes	Yes	Yes
• -10 V to +10 V	Yes	Yes	Yes	Yes
• -2.5 V to +2.5 V				Yes
• -250 mV to +250 mV				Yes
• -5 V to +5 V				Yes
• -500 mV to +500 mV				Yes
• -80 mV to +80 mV				Yes

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Technical specifications (continued)

	6ES7 431-0HH00-0AB0	6ES7 431-1KF20-0AB0	6ES7 431-1KF00-0AB0	6ES7 431-1KF10-0AB0
Input ranges (rated values), currents				
• 0 to 20 mA				Yes
• -20 to +20 mA	Yes	Yes	Yes	
• 4 to 20 mA	Yes	Yes	Yes	Yes
Input ranges (rated values), thermoelements				
• Type B				Yes
• Type E				Yes
• Type J				Yes
• Type K				Yes
• Type L				Yes
• Type N				Yes
• Type R				Yes
• Type S				Yes
• Type T				Yes
• Type U				Yes
Input ranges (rated values), resistance thermometers				
• Ni 100				Yes
• Ni 1000				Yes
• Pt 100				Yes
• Pt 1000				Yes
• Pt 10000				Yes
• Pt 200				Yes
• Pt 500				Yes
Input ranges (rated values), resistors				
• 0 to 150 ohms				Yes
• 0 to 300 ohms				Yes
• 0 to 48 ohms				Yes
• 0 to 600 ohms		Yes	Yes	Yes
• 0 to 6000 ohms				Yes; Usable up to 5000 Ohm
Thermocouple (TC)				
• for thermocouples				Type B, E, J, K, L, N, R, S, T, U
• Temperature compensation				
- internal temperature compensation				No
- external temperature compensation with compensations socket				Yes
- external temperature compensation with Pt100				Yes
- dynamic reference temperature value				Yes
Resistance thermometer (RTD)				
• Characteristic linearization				
- for resistance thermometer				Pt100, Pt200, Pt500, Pt1000, Ni100, Ni1000
Characteristic linearization				
• Parameterizable				Yes
Cable length				
• Cable length, shielded, max.	200 m	200 m	200 m	200 m; 50 m with thermocouples and input ranges <= 80 mV

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Technical specifications (continued)

	6ES7 431-0HH00-0AB0	6ES7 431-1KF20-0AB0	6ES7 431-1KF00-0AB0	6ES7 431-1KF10-0AB0
Analog value creation				
Integrations and conversion time/ resolution per channel				
• Resolution with overrange (bit including sign), max.	13 bit	14 bit; 14 / 14 / 14	13 bit	14 bit; with activated filtering: 16 bits
• Integration time, parameterizable	Yes	Yes	Yes	Yes
• Basic conversion time, ms	55 / 65 ms	52 µs	23 / 25 ms	20.1 / 23.5 ms
• Integration time, ms	50 / 60 ms		16.7 / 20 ms	16.7 / 20 ms
• Basic conversion time, including integration time, ms				
- additional conversion time for wire break monitoring				4.3 ms
- additional conversion time for resistance measurement				40.2 / 47 ms
- additional conversion time for wire break monitoring and resistance measurement				5.5 ms
• Interference voltage suppression for interference frequency f1 in Hz	60 / 50 Hz	none / 400 / 60 / 50 Hz	60 / 50 Hz	60 / 50 Hz
Encoder				
Connection of signal encoders				
• for current measurement as 2-wire transducer		Yes	Yes; with external transmitter supply	Yes
• for current measurement as 4-wire transducer	Yes	Yes	Yes	Yes
• for resistance measurement with 2-conductor connection		Yes; Line resistances are also measured	Yes; Line resistances are also measured	Yes; Line resistances are also measured
• for resistance measurement with 3-conductor connection		Yes; Line resistances are also measured	Yes; Line resistances are also measured	Yes
• for resistance measurement with 4-conductor connection		Yes	Yes	Yes
Errors/accuracies				
Operational limit in overall temperature range				
• Voltage, relative to input area	+/- 0,65 %; 1.0% at 1 to 5 V; 0.65% at +/-1 V, +/-10 V	+/- 0,7 %; +/-0.7% at +/-1 V; +/-0.9% at +/-10 V, 1 to 5 V	+/- 1 %; +/-1.0% at +/-1 V; +/-0.6% at +/-10 V; +/-0.7% at 1 to 5 V	+/- 0,38 %; +/-0.38% at +/-80 mV; +/-0.35% at +/-250 mV, +/-500mV, +/-1 V, +/-2,5 V, +/-5 V, 1 to 5 V, +/-10 V
• Current, relative to input area	+/- 0,65 %	+/- 0,8 %; at +/-20 mA, 4 to 20 mA	+/- 1 %; at +/-20 mA, 4 to 20 mA	+/- 0,35 %; +/-20 mA, 0 to 20 mA, 4 to 20 mA
• Impedance, relative to input area		+/- 1 %	+/- 1,25 %; 0 to 500 ohms (4-conductor measurement, in range of 600 ohms)	+/- 0,5 %
• Resistance-type thermometer, relative to input area				+/- 0,5 %

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Technical specifications (continued)

	6ES7 431-0HH00-0AB0	6ES7 431-1KF20-0AB0	6ES7 431-1KF00-0AB0	6ES7 431-1KF10-0AB0
Basic error limit (operational limit at 25 °C)				
• Voltage, relative to input area	+/- 0,25 %; 0.5% at 1 to 5 V; 0.25% at +/-1 V, +/-10 V	+/- 0,6 %; 0.6% at +/-1 V; 0.75% at +/-10 V, 1 to 5 V	+/- 0,7 %; 0.7% at +/-1 V; 0.4% at +/-10 V; 0.5% at 1 to 5 V	+/- 0,15 %; +/-0.15%(+/-250 mV, +/-500 mV, +/-1 V, +/-2.5 V, +/-5 V, 1 to 5 V, +/- 10 V); +/-0.17% (+/- 80 mV);
• Current, relative to input area	+/- 0,25 %; at +/-20 mA, 4 to 20 mA	+/- 0,7 %; at +/-20 mA, 4 to 20 mA	+/- 0,7 %; at +/-20 mA, 4 to 20 mA	+/- 0,15 %; +/-20 mA, 0 to 20 mA, 4 to 20 mA
• Impedance, relative to input area		+/- 0,7 %; 0 to 600 ohms	+/- 0,8 %; 0 to 500 ohms (4-conductor measurement, in range of 600 ohms)	+/- 0,15 %; +/-0.15% at 0 to 48 ohms (4-conductor measurement), 0 to 150 ohms (4-conductor measurement), 0 to 300 ohms (4-conductor measurement), 0 to 600 ohms (4-conductor measurement), 0 to 5000 ohms (4-conductor measurement, in range of 6000 ohms); +/-0.3% at 0 to 300 ohms (3-conductor measurement), 0 to 600 ohms (3-conductor measurement), 0 to 5000 ohms (3-conductor measurement, in range of 6000 ohms)
• Resistance-type thermometer, relative to input area				+/- 0,3 %
Galvanic isolation				
Galvanic isolation analog inputs				
• Galvanic isolation analog inputs	No	Yes; internal/external	Yes; internal/external	Yes; internal/external
• between the channels	No	No	No	No
Permissible potential difference				
between the inputs (UCM)	2 V DC / 2 Vpp AC	8 V AC	30 V AC	120 V AC
Isolation				
Isolation checked with	500 V DC between bus and local ground	2120 V DC between bus and analog part; 500 V DC between bus and local ground; 707 V DC between analog part and L+/M; 2120 V DC between analog part and local ground; 2120 V DC between L+/M and local ground	2120 V DC between bus and analog part; 500 V DC between bus and local ground; 2120 V DC between analog part and local ground	2120 V DC between bus and L+/M; 2120 V DC between bus and analog part; 500 V DC between bus and local ground; 707 V DC between analog part and L+/M; 2120 V DC between analog part and local ground; 2120 V DC between L+/M and local ground
Dimensions				
Width	25 mm	25 mm	25 mm	25 mm
Height	290 mm	290 mm	290 mm	290 mm
Depth	210 mm	210 mm	210 mm	210 mm
Required slots	1	1	1	1
Weight				
Weight, approx.	500 g	500 g	500 g	500 g

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Technical specifications (continued)

	6ES7 431-7QH00-0AB0	6ES7 431-7KF00-0AB0	6ES7 431-7KF10-0AB0
Supply voltage			
Load voltage L+			
• Rated value (DC)	24 V; Only required for supplying 2-wire transmitters		
• Reverse polarity protection	Yes		
Input current			
from load voltage L+ (without load), max.	400 mA	400 mA	400 mA
from backplane bus 5 V DC, max.	700 mA	1 200 mA	650 mA
Power losses			
Power loss, typ.	4.5 W	4.6 W	3.3 W
Analog inputs			
Number of analog inputs	16	8	8
Number of analog inputs for voltage/current measurement	16	8	
Number of analog inputs for resistance measurement	8		8
permissible input voltage for voltage input (destruction limit), max.	18 V; 18 V continuous, 75 V for 1 ms (mark to space ratio 1:20)	35 V; 35 V continuous, 75 V for max. 1 s (mark to space ratio 1:20)	35 V; 35 V continuous, 75 V for max. 1 s (mark to space ratio 1:20)
permissible input current for current input (destruction limit), max.	40 mA	32 mA	
Input ranges (rated values), voltages			
• 1 to 5 V	Yes	Yes	
• -1 V to +1 V	Yes	Yes	
• -10 V to +10 V	Yes	Yes	
• -100 mV to +100 mV		Yes	
• -2.5 V to +2.5 V	Yes	Yes	
• -20 mV to +20 mV		Yes	
• -25 mV to +25 mV	Yes		
• -250 mV to +250 mV	Yes	Yes	
• -5 V to +5 V	Yes	Yes	
• -50 mV to +50 mV	Yes	Yes	
• -500 mV to +500 mV	Yes	Yes	
• -80 mV to +80 mV	Yes	Yes	
Input ranges (rated values), currents			
• 0 to 20 mA	Yes	Yes	
• -10 to +10 mA	Yes	Yes	
• -20 to +20 mA	Yes	Yes	
• -3.2 to +3.2 mA		Yes	
• 4 to 20 mA	Yes	Yes	
• -5 to +5 mA	Yes	Yes	
Input ranges (rated values), thermoelements			
• Type B	Yes	Yes	
• Type E	Yes	Yes	
• Type J	Yes	Yes	
• Type K	Yes	Yes	
• Type L	Yes	Yes	
• Type N	Yes	Yes	
• Type R	Yes	Yes	
• Type S	Yes	Yes	
• Type T	Yes	Yes	
• Type U	Yes	Yes	

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Technical specifications (continued)

	6ES7 431-7QH00-0AB0	6ES7 431-7KF00-0AB0	6ES7 431-7KF10-0AB0
Input ranges (rated values), resistance thermometers			
• Ni 100	Yes		Yes
• Ni 1000	Yes		Yes; Different characteristics selectable: Europe/U.S.
• Pt 100	Yes		Yes
• Pt 1000	Yes		Yes
• Pt 200	Yes		Yes
• Pt 500	Yes		Yes
Input ranges (rated values), resistors			
• 0 to 150 ohms	Yes		
• 0 to 300 ohms	Yes		
• 0 to 48 ohms	Yes		
• 0 to 600 ohms	Yes		
• 0 to 6000 ohms	Yes; Usable up to 5000 Ohm		
Thermocouple (TC)			
• for thermocouples	Type B, E, J, K, L, N, R, S, T, U	Type B, E, J, K, L, N, R, S, T, U	
• Temperature compensation			
- internal temperature compensation		Yes	
- external temperature compensation with compensations socket	Yes	Yes	
- external temperature compensation with Pt100	Yes		
- dynamic reference temperature value	Yes	Yes	
Resistance thermometer (RTD)			
• Characteristic linearization			
- for resistance thermometer	Pt100, Pt200, Pt500, Pt1000, Ni100, Ni1000		Pt100, Pt200, Pt500, Pt1000, Ni100, Ni1000; different characteristics selectable (Europe/U.S.)
Characteristic linearization			
• Parameterizable	Yes	Yes	Yes
Cable length			
• Cable length, shielded, max.	200 m; 50 m with thermocouples and input ranges <= 80 mV	200 m	200 m; 50 m with thermocouples and input ranges +/-80 mV
Analog value creation			
Integrations and conversion time/ resolution per channel			
• Resolution with overrange (bit including sign), max.	16 bit; 16 / 16 / 16	16 bit	16 bit
• Integration time, parameterizable	Yes	Yes	Yes
• Basic conversion time, ms	6 / 20.1 / 23.5 ms	10 / 16.7 / 20 / 100	8 / 23 / 25 ms
• Integration time, ms	2.5 / 16.7 / 20 ms	2.5 / 16.7 / 20 / 100 ms	20 ms at 50 Hz (entire module incl. wire break)
• Basic conversion time, including integration time, ms			
- additional conversion time for wire break monitoring	4.3 / 4.3 / 4.3 ms		110 ms / 4 ms
- additional conversion time for resistance measurement	12 / 40.2 / 47 ms		
- additional conversion time for wire break monitoring and resistance measurement	5.5 ms	1 ms (module)	none
• Interference voltage suppression for interference frequency f1 in Hz	400 / 60 / 50 Hz	400 / 60 / 50 / 10 Hz	none/ 60 / 50 Hz

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Technical specifications (continued)

	6ES7 431-7QH00-0AB0	6ES7 431-7KF00-0AB0	6ES7 431-7KF10-0AB0
Encoder			
Connection of signal encoders			
• for current measurement as 2-wire transducer	Yes		
• for current measurement as 4-wire transducer	Yes	Yes	
• for resistance measurement with 2-conductor connection	Yes; Line resistances are also measured		
• for resistance measurement with 3-conductor connection	Yes		Yes
• for resistance measurement with 4-conductor connection	Yes	Yes	Yes
Errors/accuracies			
Operational limit in overall temperature range			
• Voltage, relative to input area	+/- 0,3 %; +/-0.3% at +/-250 mV, +/-500 mV, +/-1 V, +/-2.5 V, +/-5 V, 1 to 5 V, +/- 10 V; +/-0.31% at +/-80 mV; +/-0.32% at +/-50 mV; +/-0.35% at +/-25 mV;	+/- 0,3 %	
• Current, relative to input area	+/- 0,3 %; at 0 to 20 mA, +/-5 mA, +/-10 mA, +/- 20 mA, 4 to 20 mA	+/- 0,5 %	
• Impedance, relative to input area	+/- 0,3 %; +/-0.3% at 0 to 48 Ohm (4-conductor measurement), 0 to 150 Ohm (4-conductor measurement), 0 to 300 Ohm (4-conductor measurement), 0 to 600 Ohm (4-conductor measurement), 0 to 5000 Ohm (4-conductor measurement, in range of 6000 Ohm); +/-0.4% at 0 to 300 Ohm (3-conductor measurement), 0 to 600 Ohm (3-conductor measurement), 0 to 5000 Ohm (3-conductor measurement, in range of 6000 Ohm);		
• Resistance-type thermometer, relative to input area	+/- 0,4 %		+/-1 °C
Basic error limit (operational limit at 25 °C)			
• Voltage, relative to input area	+/- 0,15 %; +/-0.15% at +/-250 mV, +/-500 mV, +/-1 V, +/-2.5 V, +/-5 V, 1 to 5 V, +/-10 V; +/-0.17% at +/-80 mV; +/-0.19% at +/-50 mV; +/-0.23% at +/-25 mV;	+/- 0,1 %	
• Current, relative to input area	+/- 0,15 %; at 0 to 20 mA, +/-5 mA, +/-10 mA, +/- 20 mA, 4 to 20 mA	+/- 0,17 %	
• Impedance, relative to input area	+/- 0,15 %; +/-0.15% at 0 to 48 ohms (4-conductor measurement), 0 to 150 ohms (4-conductor measurement), 0 to 300 ohms (4-conductor measurement), 0 to 5000 ohms (4-conductor measurement, in range of 6000 ohms); +/-0.3% at 0 to 300 ohms (3-conductor measurement), 0 to 600 ohms (3-conductor measurement), 0 to 5000 ohms (3-conductor measurement, in range of 6000 ohms)		
• Resistance-type thermometer, relative to input area	+/- 0,3 %		+/-0.2 °C

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Technical specifications (continued)

	6ES7 431-7QH00-0AB0	6ES7 431-7KF00-0AB0	6ES7 431-7KF10-0AB0
Interrupts/diagnostics/ status information			
Alarms			
• Diagnostic alarm	Yes; Parameterizable	Yes; Parameterizable	Yes; Parameterizable
• Limit value alarm	Yes; Parameterizable	Yes	Yes
Diagnostic messages			
• Diagnostics	Yes; Parameterizable	Yes	Yes
Galvanic isolation			
Galvanic isolation analog inputs			
• Galvanic isolation analog inputs	Yes; internal/external	Yes; internal/external	Yes; internal/external
• between the channels	No	Yes	No
Permissible potential difference between the inputs (UCM)	120 V AC	120 V AC	none
Isolation			
Isolation checked with	2120 V DC between bus and L+/M; 2120 V DC between bus and analog part; 500 V DC between bus and local ground; 707 V DC between analog part and L+/M; 2120 V DC between analog part and local ground; 2120 V DC between L+/M and local ground	1500 V DC	1500 V DC
Dimensions			
Width	25 mm	25 mm	25 mm
Height	290 mm	290 mm	290 mm
Depth	210 mm	210 mm	210 mm
Required slots	1	1	1
Weight			
Weight, approx.	500 g	650 g	650 g

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SM 431 analog input module

Ordering data	Order No.
SM 431 analog input modules	
16 inputs, non-isolated, 13 bit	**6ES7 431-0HH00-0AB0**
8 inputs, isolated, 13 bit	**6ES7 431-1KF00-0AB0**
8 inputs, isolated, 14 bit, with linearization	**6ES7 431-1KF10-0AB0**
8 inputs, isolated, 14 bit	**6ES7 431-1KF20-0AB0**
16 inputs, isolated, 16 bit, process interrupt capability	**6ES7 431-7QH00-0AB0**
8 inputs, isolated, 16 bit, process interrupt capability, for thermocouples (I, U)	**6ES7 431-7KF00-0AB0**
8 inputs, isolated, 16 bit, process interrupt capability, for thermal resistors	**6ES7 431-7KF10-0AB0**
Front connector	
48-pin	
• with screw contacts, 1 unit	**6ES7 492-1AL00-0AA0**
• with screw contacts, 84 units	**6ES7 492-1AL00-1AB0**
• with spring-loaded terminals, 1 unit	**6ES7 492-1BL00-0AA0**
• with crimp contacts, 1 unit	**6ES7 492-1CL00-0AA0**
• with crimp contacts, 84 units	**6ES7 492-1CL00-1AB0**
1 unit; for 6ES7 431-7KF00-0AB0; spare part, included in scope of delivery	**6ES7431-7KF00-6AA0**
SIMATIC TOP connect	See page 6/129
Measuring range module for analog inputs	**6ES7 974-0AA00-0AA0**
1 module for 2 inputs (spare part)	

	Order No.
Cover film for labeling strips	**6ES7 492-2XX00-0AA0**
Spare part	
Labeling sheets for machine inscription	
DIN A4, for printing using laser printer; pack of 10	
petrol	**6ES7 492-2AX00-0AA0**
light-beige	**6ES7 492-2BX00-0AA0**
yellow	**6ES7 492-2CX00-0AA0**
red	**6ES7 492-2DX00-0AA0**
SIMATIC Manual Collection	**6ES7 998-8XC01-8YE0**
Electronic manuals on DVD, multilingual: 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	
SIMATIC Manual Collection update service for 1 year	**6ES7 998-8XC01-8YE2**
Current "Manual Collection" DVD and the three subsequent updates	

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Overview

- Analog outputs for the SIMATIC S7-400
- For the connection of analog actuators

Technical specifications

	6ES7 432-1HF00-0AB0
Supply voltage	
Load voltage L+	
• Rated value (DC)	24 V
Input current	
from backplane bus 5 V DC, max.	150 mA
from supply voltage L+, max.	400 mA
Power losses	
Power loss, max.	9 W
Analog outputs	
Number of analog outputs	8
Voltage output, short-circuit protection	Yes
Voltage output, short-circuit current, max.	30 mA
Current output, no-load voltage, max.	19 V
Output ranges, voltage	
• 0 to 10 V	Yes
• 1 to 5 V	Yes
• -10 to +10 V	Yes
Output ranges, current	
• 0 to 20 mA	Yes
• -20 to +20 mA	Yes
• 4 to 20 mA	Yes
Load impedance (in rated range of output)	
• with voltage outputs, min.	1 kΩ
• with voltage outputs, capacitive load, max.	1 µF
• with current outputs, max.	500 Ω; 600 ohms if common-mode-voltage reduced to <1 V
Cable length	
• Cable length, shielded, max.	200 m
Analog value creation	
Integrations and conversion time/ resolution per channel	
• Resolution with overrange (bit including sign), max.	13 bit
• Conversion time (per channel)	420 µs; 420 µs in the ranges 1 to 5 V and 4 to 20 mA; 300 µs in all ranges

	6ES7 432-1HF00-0AB0
Settling time	
• for resistive load	0.1 ms
• for capacitive load	3.5 ms
• for inductive load	0.5 ms
Errors/accuracies	
Operational limit in overall temperature range	
• Voltage, relative to output area	+/- 0,5 %; +/-10 V, 0 to 10 V, 1 to 5 V
• Current, relative to output area	+/- 1 %; +/-20 mA, 4 to 20 mV
Basic error limit (operational limit at 25 °C)	
• Voltage, relative to output area	+/- 0,5 %; +/-10 V, 0 to 10 V, 1 to 5 V
• Current, relative to output area	+/- 0,5 %; +/-20 mA, 0 to 20 mA
Interrupts/diagnostics/ status information	
Substitute values connectable	No
Galvanic isolation	
Galvanic isolation analog outputs	
• between the channels and the backplane bus	Yes
Isolation	
Isolation checked with	2120 V DC between bus and L+/M; 2120 V DC between bus and analog part; 500 V DC between bus and local ground; 707 V DC between analog part and L+/M; 2120 V DC between analog part and local ground; 2120 V DC between L+/M and local ground
Dimensions	
Width	25 mm
Height	290 mm
Depth	210 mm
Required slots	1
Weight	
Weight, approx.	650 g

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SM 432 analog output module

Ordering data	Order No.
SM 432 analog output module 8 outputs, isolated, 13 bit	**6ES7 432-1HF00-0AB0**
Front connector 48-pin	
• with screw contacts, 1 unit	**6ES7 492-1AL00-0AA0**
• with screw contacts, 84 units	**6ES7 492-1AL00-1AB0**
• with spring-loaded terminals, 1 unit	**6ES7 492-1BL00-0AA0**
• with crimp contacts, 1 unit	**6ES7 492-1CL00-0AA0**
• with crimp contacts, 84 units	**6ES7 492-1CL00-1AB0**
SIMATIC TOP connect	See page, page 6/129
Cover film for labeling strips Spare part	**6ES7 492-2XX00-0AA0**

	Order No.
Labeling sheets for machine inscription DIN A4, for printing using laser printer; pack of 10	
petrol	**6ES7 492-2AX00-0AA0**
light-beige	**6ES7 492-2BX00-0AA0**
yellow	**6ES7 492-2CX00-0AA0**
red	**6ES7 492-2DX00-0AA0**
SIMATIC Manual Collection Electronic manuals on DVD, multilingual: 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	**6ES7 998-8XC01-8YE0**
SIMATIC Manual Collection update service for 1 year Current "Manual Collection" DVD and the three subsequent updates	**6ES7 998-8XC01-8YE2**

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SIPLUS SM 431 analog input module

Overview

- Analog inputs for SIMATIC S7-400
- For connecting voltage sensors and current sensors, thermocouples, resistors and resistance thermometers
- Resolution 13 to 16 bit

Note:

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

SIPLUS SM 431 analog input module	
Order number	**6AG1 431-0HH00-4AB0**
Order No. based on	**6ES7 431-0HH00-0AB0**
Ambient temperature range	0 ... +60 °C
Conformal coating	Coating of the printed circuit boards and the electronic components
Technical data	The technical data of the standard product applies, except for the ambient conditions
Ambient conditions	
Relative humidity	100%, condensation/frost permissible. No commissioning if condensation present.
Biologically active substances, compliance with EN 60721-3-3	Class 3B2 mold and fungal spores (excluding fauna). The supplied plug covers must remain in place over the unused interfaces during operation!
Chemically active substances, compliance with EN 60721-3-3	Class 3C4 incl. salt spray in accordance with EN60068-2-52 (degree of severity 3). The supplied plug covers must remain in place over the unused interfaces during operation!
Mechanically active substances, compliance with EN 60721-3-3	Class 3S4 incl. sand, dust. The supplied plug covers must remain in place over the unused interfaces during operation!
Air pressure (depending on the highest positive temperature range specified)	1080 ... 795 hPa (-1000 ... +2000 m) see ambient temperature range 795 ... 658 hPa (+2000 ... +3500 m) derating 10 K 658 ... 540 hPa (+3500 ... +5000 m) derating 20 K

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

Ordering data

	Order No.
SIPLUS SM 431 analog input module (medial exposure) 16 inputs, non-floating, 13 bit	**6AG1 431-0HH00-4AB0**
Accessories	See SIMATIC S7-400 analog input modules, page 6/72

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SIPLUS SM 432 analog output module

Overview

- Analog outputs for SIMATIC S7-400
- For connection of analog actuators

Note:

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

SIPLUS SM 432 analog output module	
Order number	**6AG1 432-1HF00-4AB0**
Order No. based on	**6ES7 432-1HF00-0AB0**
Range of ambient temperature	0 ... +60 °C
Conformal coating	Coating of the printed circuit boards and the electronic components
Technical data	The technical data of the standard product applies except for the environmental conditions.
Ambient conditions	
Relative humidity	100%, condensation/frost permissible. No commissioning if condensation present.
Biologically active substances, compliance with EN 60721-3-3	Class 3B2 mold and fungal spores (excluding fauna). The supplied plug covers must remain in place over the unused interfaces during operation!
Chemically active substances, compliance with EN 60721-3-3	Class 3C4 incl. salt spray in accordance with EN60068-2-52 (degree of severity 3). The supplied plug covers must remain in place over the unused interfaces during operation!
Mechanically active substances, compliance with EN 60721-3-3	Class 3S4 incl. sand, dust. The supplied plug covers must remain in place over the unused interfaces during operation!
Air pressure (depending on the highest positive temperature range specified)	1080 ... 795 hPa (-1000 ... +2000 m) see ambient temperature range 795 ... 658 hPa (+2000 ... +3500 m) derating 10 K 658 ... 540 hPa (+3500 ... +5000 m) derating 20 K

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

Ordering data

	Order No.
SIPLUS SM 432 analog output module (medial exposure) 8 outputs, floating, 13 bit	**6AG1 432-1HF00-4AB0**
Accessories	See SIMATIC S7-400 analog output modules, page 6/74

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Overview

- Two-channel intelligent counter module for simple counting tasks
- For direct connection of incremental encoders
- Comparison function with 2 specifiable comparison values
- Integrated digital outputs for outputting the response when the comparison values are reached

Note

SIMODRIVE Sensor/Motion Connect 500 feature incremental encoders and preassembled connecting cables for counting and positioning functions.

www.siemens.com/simatic-technology

Technical specifications

	6ES7 450-1AP00-0AE0
Supply voltage	
Load voltage 1L+	
• Reverse polarity protection	Yes
Load voltage 2L+	
• Reverse polarity protection	Yes
Aux. voltage 1L+, load voltage 2 L+	
• Rated value (DC)	24 V
• permissible range, lower limit (DC)	20.4 V; Dynamic 18.5 V
• permissible range, upper limit (DC)	28.8 V; dynamic 30.2 V
• non-periodic skip	
- Duration	500 ms
- Recovery time	50 s
- Value	35 V
Input current	
from load voltage 1L+ (without load), max.	40 mA
from backplane bus 5 V DC, max.	450 mA
Encoder supply	
5 V encoder supply	
• 5 V	Yes; 5.2 V +/-2%
• Short-circuit protection	Yes
• Output current, max.	300 mA
24 V encoder supply	
• 24 V	Yes; 1L+ (-3 V)
• Short-circuit protection	Yes
• Output current, max.	300 mA
Power losses	
Power loss, typ.	9 W

	6ES7 450-1AP00-0AE0
Digital inputs	
Number/binary inputs	6
Functions	1 for gate start, 1 for gate stop, 1 for setting the counter
Input voltage	
• for signal "0"	-28.8 to +5 V
• for signal "1"	+11 to +28.8 V
Input current	
• for signal "1", typ.	9 mA
Input delay (for rated value of input voltage)	
• Input frequency (with a time delay of 0.1 ms), max.	200 kHz
• for standard inputs	
- Parameterizable	Yes
- at "0" to "1", max.	2.5 µs; >= 2.5 µs (200 kHz); <= 25 µs (20 kHz)
Digital outputs	
Number/binary outputs	6
Functionality/short-circuit strength	Yes; Clocked electronically
Limitation of inductive shutdown voltage to	2L+ (-39 V)
Output voltage	
• for signal "0", max.	3 V
• for signal "1", min.	2L+ (-1.5 V)
Output current	
• for signal "1" rated value	0.5 A
• for signal "1" permissible range for 0 to 60 °C, min.	5 mA
• for signal "1" permissible range for 0 to 60 °C, max.	0.6 A
Output delay with resistive load	
• "0" to "1", max.	300 µs

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FM 450-1 counter module

Technical specifications (continued)

	6ES7 450-1AP00-0AE0
Encoder	
Connectable encoders	
• Incremental encoder (symmetrical)	Yes; With 2 pulse trains offset by 90°
• Incremental encoder (asymmetrical)	Yes
• 24 V initiator	Yes
• 24 V directional element	Yes; 1 pulse train, 1 direction level
Counter	
Number of counter inputs	2; 32 bit or +/-31 bit
Counter input 5 V	
• Type	RS 422
• Terminating resistor	220 Ω
• Differential input voltage	min. 0.5 V
• Counting frequency, max.	500 kHz
Counter input 24 V	
• Input voltage, for signal "0"	-30 to +5 V
• Input voltage, for signal "1"	+11 to +30 V
• Input current, for signal "1", typ.	9 mA
• Counting frequency, max.	200 kHz
• Minimum pulse width	>= 2.5 µs (200 kHz); <= 25 µs (20 kHz) (parameterizable)
Parameter	
Remark	Assigned binary addresses: 64 bytes/64 bytes
Galvanic isolation	
Galvanic isolation digital inputs	
• between the channels and the backplane bus	Yes; Optocoupler
Galvanic isolation digital outputs	
• between the channels and the backplane bus	Yes; Optocoupler
Galvanic isolation counter	
• between the channels and the backplane bus	Yes; Optocoupler
Permissible potential difference	
between different circuits	75 VDC / 60 VAC
Isolation	
Isolation checked with	500 V
Connection method	
required front connector	1x 48-pin
Dimensions	
Width	25 mm
Height	290 mm
Depth	210 mm
Weight	
Weight, approx.	650 g

Ordering data

	Order No.
FM 450-1 counter module	**6ES7 450-1AP00-0AE0**
with 2 channels, max. 500 kHz; for incremental encoder	
Front connectors	
48-pin	
• with screw contacts, 1 item	**6ES7 492-1AL00-0AA0**
• with screw contacts, 84 items	**6ES7 492-1AL00-1AB0**
• with spring-loaded terminals, 1 item	**6ES7 492-1BL00-0AA0**
• with crimp contacts, 1 item	**6ES7 492-1CL00-0AA0**
• with crimp contacts, 84 items	**6ES7 492-1CL00-1AB0**
Front covers for CPU and function modules	**6ES7 492-1XL00-0AA0**
Spare part	

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Overview

- Three-channel positioning module for rapid/slow-action drives
- 4 digital outputs per channel for motor control
- Displacement measurement incremental or synchronous-serial

Note

Displacement measuring systems and precut/preassembled cables for counting and positioning functions are available under SIMODRIVE Sensor or Motion Connect 500.

www.siemens.com/simatic-technology

Technical specifications

	6ES7 451-3AL00-0AE0
Supply voltage	
24 V DC	Yes
Input current	
Current consumption, max.	550 mA
Encoder supply	
5 V encoder supply	
• 5 V	Yes
• Output current, max.	210 mA
• Cable length, max.	35 m; at max. 210 mA
24 V encoder supply	
• 24 V	Yes
• Output current, max.	300 mA
• Cable length, max.	100 m; at max. 300 mA
Absolute encoder (SSI) encoder supply	
• Absolute encoder (SSI)	Yes
• Output voltage	24 V DC
• Output current, max.	300 mA
• Cable length, max.	300 m; At max. 156 kbit/s
Digital inputs	
Number/binary inputs	12; 4 per axis
Functions	Reference cams, reversing cams, flying actual value setting, start/stop positioning
Input voltage	
• Rated value, DC	24 V
• for signal "0"	-3 to +5 V
• for signal "1"	11 to 30 V
Input current	
• for signal "1", typ.	6 mA
• for 2-wire sensor	
- for signal "1", typ.	30 mA

	6ES7 451-3AL00-0AE0
Digital outputs	
Number/binary outputs	12; 4 per axis
Functions	Rapid traverse, creep, run right, run left
Functionality/short-circuit strength	Yes
Output voltage	
• for signal "1", min.	UP -3 V
Output current	
• for signal "1" permissible range for 0 to 55 °C, max.	600 mA; with UPmax
• for signal "0" residual current, max.	0.5 mA
Encoder	
Connectable encoders	
• Incremental encoder (symmetrical)	Yes
• Incremental encoder (asymmetrical)	Yes
• Absolute encoder (SSI)	Yes
Encoder signals, incremental encoder (symmetrical)	
• Trace mark signals	A, notA, B, notB
• Zero mark signal	N, notN
• Input signal	5 V difference signal (phys. RS 422)
• Input frequency, max.	1 MHz
Encoder signals, incremental encoder (asymmetrical)	
• Trace mark signals	A, B
• Zero mark signal	N
• Input voltage	24 V
• Input frequency, max.	50 kHz; for 25 m cable length, 25 kHz for 100 m cable length
• Cable length, shielded, max.	100 m
Encoder signals, absolute encoder (SSI)	
• Input signal	5 V difference signal (phys. RS 422)
• Data signal	DATA, notDATA
• Clock signal	CL, notCL
• Message frame length, parameterizable	13 or 25 bit serial
• Clock frequency, max.	1.25 MHz
• Gray code	1
• Cable length, shielded, max.	300 m; At max. 156 kbit/s
Galvanic isolation	
Galvanic isolation digital inputs	
• Galvanic isolation digital inputs	Yes
Galvanic isolation digital outputs	
• Galvanic isolation digital outputs	Yes
Degree and class of protection	
IP20	Yes
Ambient conditions	
Operating temperature	
• Min.	0 °C
• max.	55 °C
Storage/transport temperature	
• Min.	-40 °C
• max.	70 °C
Relative humidity	
• Humidity class F	Yes
Connection method	
required front connector	1x 48-pin
Dimensions	
Width	50 mm
Height	290 mm
Depth	210 mm
Weight	
Weight, approx.	1 300 g

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FM 451 positioning module

Ordering data	Order No.
FM 451 positioning module	**6ES7 451-3AL00-0AE0**
for rapid traverse and creep speed drives	
Front connector	
48-pin	
• with screw contacts, 1 item	**6ES7 492-1AL00-0AA0**
• with screw contacts, 84 items	**6ES7 492-1AL00-1AB0**
• with spring-loaded terminals, 1 item	**6ES7 492-1BL00-0AA0**
• with crimp contacts, 1 item	**6ES7 492-1CL00-0AA0**
• with crimp contacts, 84 items	**6ES7 492-1CL00-1AB0**
Front covers for CPU and function modules	**6ES7 492-1XL00-0AA0**
Spare part	

	Order No.							
Signal cable								
Pre-assembled for HTL encoder, UL/DESINA	**6FX5 0**	■	**2-2AL00-**	■	■	■	■	
Pre-assembled for SSI absolute encoder, UL/DESINA	**6FX5 0**	■	**2-2CC11-**	■	■	■	■	
Pre-assembled for TTL encoder 6FX2001-1, UL/DESINA	**6FX5 0**	■	**2-2CD01-**	■	■	■	■	
Pre-assembled for TTL encoder 24 V, UL/DESINA	**6FX5 0**	■	**2-2CD24-**	■	■	■	■	
Not crimped		**0**						
Module end crimped, connector case supplied		**1**						
Motor end crimped, connector case supplied		**4**						
0 m				**1**				
100 m				**2**				
200 m				**3**				
0 m					**A**			
10 m					**B**			
20 m					**C**			
30 m					**D**			
40 m					**E**			
50 m					**F**			
60 m					**G**			
70 m					**H**			
80 m					**J**			
90 m					**K**			
0 m						**A**		
1 m						**B**		
2 m						**C**		
3 m						**D**		
4 m						**E**		
5 m						**F**		
6 m						**G**		
7 m						**H**		
8 m						**J**		
0 m						**K**		
0.0 m							**0**	
0.1 m							**1**	
0.2 m							**2**	
0.3 m							**3**	
0.4 m							**4**	
0.5 m							**5**	
0.6 m							**6**	
0.7 m							**7**	
0.8 m							**8**	

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Overview

- Very high speed electronic cam controller
- Low-cost alternative to mechanical cam controllers
- 32 cam tracks, 16 onboard digital outputs for direct output of actions
- Incremental or synchronous-serial position feedback

Note:

We offer position measuring systems and preassembled connecting cables for counting and positioning functions under SIMODRIVE Sensor or Motion Connect 500.

www.siemens.com/simatic-technology

Technical specifications

	6ES7 452-1AH00-0AE0
Supply voltage	
24 V DC	Yes
Input current	
Current consumption, max.	500 mA
Encoder supply	
5 V encoder supply	
• 5 V	Yes
• Output current, max.	300 mA
• Cable length, max.	32 m
24 V encoder supply	
• 24 V	Yes
• Output current, max.	300 mA
• Cable length, max.	100 m
Digital inputs	
Number/binary inputs	11
Functions	Reference point switch, flying actual value setting/length measurement, brake release, enable track output no. 3 to 10
Input voltage	
• Rated value, DC	24 V
• for signal "0"	-28.8 to +5 V
• for signal "1"	11 to 28.8 V
Input current	
• for signal "0", max. (permissible quiescent current)	2 mA
• for 2-wire sensor	
- for signal "1", typ.	9 mA
Digital outputs	
Number/binary outputs	16
Functions	Cam track
Functionality/short-circuit strength	Yes
Output voltage	
• Rated value (DC)	24 V
• for signal "1", min.	UP - 0.8 V
Output current	
• for signal "1" permissible range for 0 to 55 °C, max.	600 mA; with UPmax
• for signal "0" residual current, max.	0.5 mA

	6ES7 452-1AH00-0AE0
Encoder	
Connectable encoders	
• Incremental encoder (symmetrical)	Yes
• Incremental encoder (asymmetrical)	Yes
• Absolute encoder (SSI)	Yes
• 2-wire sensor	Yes
Encoder signals, incremental encoder (symmetrical)	
• Trace mark signals	A, notA, B, notB
• Zero mark signal	N, notN
• Input signal	5 V difference signal (phys. RS 422)
• Input frequency, max.	1 MHz
Encoder signals, incremental encoder (asymmetrical)	
• Trace mark signals	A, B
• Zero mark signal	N
• Input voltage	24 V
• Input frequency, max.	50 kHz; 50 kHz for 25 m cable length; 25 kHz for 100 m cable length
Encoder signals, absolute encoder (SSI)	
• Input signal	5 V difference signal (phys. RS 422)
• Data signal	DATA, notDATA
• Clock signal	CL, notCL
• Message frame length, parameterizable	13 or 25 bit serial
• Clock frequency, max.	1 MHz
• Gray code	1
• Cable length, shielded, max.	300 m; at max. 125 kHz
Galvanic isolation	
Galvanic isolation digital inputs	
• Galvanic isolation digital inputs	No
Galvanic isolation digital outputs	
• Galvanic isolation digital outputs	No
Degree and class of protection	
IP20	Yes

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FM 452 cam controller

Technical specifications (continued)

	6ES7 452-1AH00-0AE0
Ambient conditions	
Operating temperature	
• Min.	0 °C
• max.	55 °C
Storage/transport temperature	
• Min.	-40 °C
• max.	70 °C
Relative humidity	
• Humidity class F	Yes
Connection method	
required front connector	1x 48-pin
Dimensions	
Width	25 mm
Height	290 mm
Depth	210 mm
Weight	
Weight, approx.	650 g

Ordering data

	Order No.
FM 452 electronic cam controller	**6ES7 452-1AH00-0AE0**
Front covers for CPU and function modules	**6ES7 492-1XL00-0AA0**
Spare part	
Front connector	
48-pin	
• with screw contacts, 1 item	**6ES7 492-1AL00-0AA0**
• with screw contacts, 84 items	**6ES7 492-1AL00-1AB0**
• with spring-loaded terminals, 1 item	**6ES7 492-1BL00-0AA0**
• with crimp contacts, 1 item	**6ES7 492-1CL00-0AA0**
• with crimp contacts, 84 items	**6ES7 492-1CL00-1AB0**
Signal cable	
Pre-assembled for HTL and TTL encoder, without Sub-D connector, UL/DESINA	**6FX5 002-2CA12-■■■■**
Pre-assembled for SSI absolute encoder 6FX2001-5, without Sub-D connector, UL/DESINA	**6FX5 002-2CC12-■■■■**
Length code	see FM 451, page 6/80

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Overview

- Positioning module for servo and/or stepper motors in machines with high clock-pulse rates
- Can be used for simple point-to-point positioning and for complex traversing profiles
- Up to 3 independent motors can be controlled

Note:

We offer position measuring systems and preassembled connecting cables for counting and positioning functions under SIMODRIVE Sensor or Motion Connect 500.

Further information can be found on the Internet at:

www.siemens.com/simatic-technology

Technical specifications

	6ES7 453-3AH00-0AE0
Supply voltage	
Auxiliary voltage	
• Rated value (DC)	24 V
• dynamic range	18.5 to 30.2 V
• static area	20.4 to 28.8 V
Input current	
from load voltage1L+, max.	1 A; with 24 V position encoder; 1 A for 5 V position encoder
from load voltage 2L+ to 4L+, max.	2 A; Per channel
from backplane bus 5 V DC, max.	1.6 A; Rated current
Encoder supply	
5 V encoder supply	
• 5 V	Yes
• Output current, max.	300 mA
• Cable length, max.	35 m; at max. 210 mA; 25 m at max. 300 mA
24 V encoder supply	
• 24 V	Yes
• Cable length, max.	100 m; at max. 300 mA
Power losses	
Power loss, max.	8 W
Digital inputs	
Number/binary inputs	6; for each channel/axis
Functions	configurable
Input voltage	
• Rated value, DC	24 V
• for signal "0"	-3 to +5 V (max. 3 mA)
• for signal "1"	11 to 30 V (max. 7 mA)
Input delay (for rated value of input voltage)	
• for standard inputs	
- at "0" to "1", max.	15 µs; via input voltage range, 8 µs at 24 V DC
- at "1" to "0", max.	45 µs; via input voltage range

	6ES7 453-3AH00-0AE0
Digital outputs	
Number/binary outputs	4; for each channel/axis
Functions	configurable
Functionality/short-circuit strength	Yes
Output voltage	
• Rated value (DC)	24 V
• for signal "1", min.	UP - 0,3 V
Output current	
• for signal "1" rated value	0.5 A; at 40 °C; 0.1 A at 60 °C
• for signal "1" permissible range for 0 to 40 °C, min.	5 mA
• for signal "1" permissible range for 0 to 40 °C, max.	0.6 A
• for signal "1" permissible range for 40 to 60 °C, min.	5 mA
• for signal "1" permissible range for 40 to 60 °C, max.	0.12 A
• for signal "0" residual current, max.	2 mA
Switching frequency	
• with resistive load, max.	100 Hz
• with inductive load, max.	0.25 Hz
Encoder	
Connectable encoders	
• Incremental encoder (symmetrical)	Yes
• Absolute encoder (SSI)	Yes
Encoder signals, incremental encoder (symmetrical)	
• Input signal	5 V difference signal (phys. RS 422)
• Input frequency, max.	1 MHz; for 10 m cable length; 0.5 MHz for 35 m cable length
Encoder signals, absolute encoder (SSI)	
• Input signal	5 V difference signal (phys. RS 422)
• Clock frequency, max.	1.25 Mbit/s at 10 cable length (2.5 Mbit/s available soon)
• Cable length, shielded, max.	250 m; At max. 156 kbit/s

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FM 453 positioning module

Technical specifications (continued)

	6ES7 453-3AH00-0AE0
Drive interface	
Signal input I	
• Type	Drive interface step, signal input "READY 1"
• Function	"Power section ready" where Ui < 1 V, Ii = 2mA
Signal output I	
• Type	5 V (phys. RS 422)
• Function	Clock pulse, direction, enable, current control
• Differential output voltage, min.	2 V; RL = 100 Ohm
• Differential output voltage for signal "0", max.	1.1 V; Io = 30 mA
• Differential output voltage, for signal "1", min.	3.7 V; Io = -30 mA
• Load impedance	55 Ω
• Pulse frequency	200 kHz; 500 kHz available soon
• Cable length, max.	35 m; 35 m with symm. transmission; 10 m with asymm. transmission
Signal output II	
• Type	Contact relay
• Function	Drive disconnection for operation
• Load	1 A/50 V/30 VA DC
Signal output III	
• Type	Analog output
• Function	Drive interface Servo: Setpoint output for drive
• Output voltage	-10 to +10 V
• Output current	-3 to +3 mA
• Cable length, max.	30 m
Galvanic isolation	
Galvanic isolation digital inputs	
• Galvanic isolation digital inputs	Yes; Optocoupler
Galvanic isolation digital outputs	
• Galvanic isolation digital outputs	Yes; Optocoupler
Degree and class of protection	
IP20	Yes
Ambient conditions	
Operating temperature	
• Min.	0 °C
• max.	55 °C
Storage/transport temperature	
• Min.	-40 °C
• max.	70 °C
Relative humidity	
• Humidity class F	No
Connection method	
required front connector	1x 48-pin
Dimensions	
Width	50 mm
Height	290 mm
Depth	210 mm
Weight	
Weight, approx.	1 620 g

Ordering data

	Order No.
FM 453 positioning module	**6ES7 453-3AH00-0AE0**
with 3 channels/axes	
Setpoint connecting cable	
for 3 servo motors	**6FX2 002-3AD01-■■■■**
for 3 stepper motors	**6FX2002-3AB04-■■■■**
for 2 servo motors / 1 stepper motor	**6FX2002-3AB02-■■■■**
for 1 servo motor / 2 stepper motors	**6FX2002-3AB03-■■■■**
Length code	See page 6/80
Front connector	
48-pin	
• with screw contacts, 1 item	**6ES7 492-1AL00-0AA0**
• with screw contacts, 84 items	**6ES7 492-1AL00-1AB0**
• with spring-loaded terminals, 1 item	**6ES7 492-1BL00-0AA0**
• with crimp contacts, 1 item	**6ES7 492-1CL00-0AA0**
• with crimp contacts, 84 items	**6ES7 492-1CL00-1AB0**
Front covers for CPU and function modules	**6ES7 492-1XL00-0AA0**
Spare part	
Signal cable	
Pre-assembled for SSI absolute encoder, UL/DESINA	**6FX5 0■2-2CC11-■■■■**
Pre-assembled for TTL encoder 6FX2001-1, UL/DESINA	**6FX5 0■2-2CD01-■■■■**
Pre-assembled for TTL encoder 24 V, UL/DESINA	**6FX5 0■2-2CD24-■■■■**
Length code	See page 6/80

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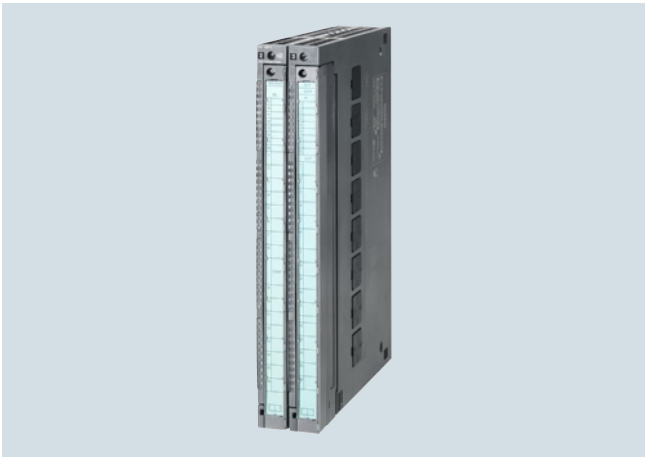
Overview



- 16-channel closed-loop control module for universal control tasks
- Can be used for temperature, pressure and flow controls
- Convenient online self-optimization for temperature controls
- Predefined controller structures
- 2 control algorithms
- 2 versions:
  - FM 455 C as continuous controller
  - FM 455 S as step or pulse controller
- With 16 analog outputs (FM 455 C) or 32 digital outputs (FM 455 S) for actuators

Technical specifications

	6ES7 455-0VS00-0AE0	6ES7 455-1VS00-0AE0
Supply voltage		
Load voltage L+		
• Rated value (DC)	24 V	24 V
• permissible range, lower limit (DC)	20.4 V	20.4 V
• permissible range, upper limit (DC)	28.8 V	28.8 V
Input current		
from load voltage L+ (without load), max.	440 mA; typ. 370 mA	400 mA; typ. 330 mA
Power losses		
Power loss, typ.	12 W	10.7 W
Power loss, max.	17.3 W	16.2 W
Digital inputs		
Number/binary inputs	16	16
Input characteristic curve acc. to IEC 61131, Type 2	Yes	Yes
Input voltage		
• Rated value, DC	24 V	24 V
• for signal "0"	-3 to +5 V	-3 to +5 V
• for signal "1"	13 to 30 V	13 to 30 V
Input current		
• for signal "1", typ.	7 mA	7 mA
Cable length		
• Cable length, shielded, max.	1 000 m	1 000 m
• Cable length unshielded, max.	600 m	600 m

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Technical specifications (continued)

	6ES7 455-0VS00-0AE0	6ES7 455-1VS00-0AE0
Digital outputs		
Number/binary outputs		32
Functionality/short-circuit strength		Yes; Electronic
Limitation of inductive shutdown voltage to		L+ (-1.5 V)
Lamp load, max.		5 W
Controlling a digital input		Yes
Load resistance range		
• lower limit		240 Ω
• upper limit		4 kΩ
Output voltage		
• for signal "1", min.		L+ (-2.5 V)
Output current		
• for signal "1" rated value		0.1 A
• for signal "1" permissible range for 0 to 60 °C, min.		5 mA
• for signal "1" permissible range for 0 to 60 °C, max.		150 mA
• for signal "0" residual current, max.		0.5 mA
Parallel switching of 2 outputs		
• for logic links		Yes
Switching frequency		
• with resistive load, max.		100 Hz
• with inductive load, max.		0.5 Hz
• on lamp load, max.		100 Hz
Cable length		
• Cable length, shielded, max.		1 000 m
• Cable length unshielded, max.		600 m
Analog inputs		
Number of analog inputs	16; With thermocouples or 2-wire connection; 8 with Pt 100 or 4-wire connection	16; With thermocouples or 2-wire connection; 8 with Pt 100 or 4-wire connection
permissible input voltage for voltage input (destruction limit), max.	20 V	20 V
permissible input current for current input (destruction limit), max.	40 mA	40 mA
Input ranges (rated values), voltages		
• 0 to +10 V	Yes	Yes
• -1.75 to +11.75 V	Yes	Yes
• -80 mV to +80 mV	Yes	Yes
Input ranges (rated values), currents		
• 0 to 20 mA	Yes	Yes
• 0 to 23.5 mA	Yes	Yes
• -3.5 to +23.5 mA	Yes	Yes
• 4 to 20 mA	Yes	Yes
Input ranges (rated values), thermoelements		
• Type B	Yes	Yes
• Type J	Yes	Yes
• Type K	Yes	Yes
• Type R	Yes	Yes
• Type S	Yes	Yes

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Technical specifications (continued)

	6ES7 455-0VS00-0AE0	6ES7 455-1VS00-0AE0
Input ranges (rated values), resistance thermometers		
• Pt 100	Yes	Yes
Thermocouple (TC)		
• for thermocouples	Type B, J, K, R, S	Type B, J, K, R, S
• Temperature compensation		
- internal temperature compensation	Yes; Parameterizable	Yes; Parameterizable
- external temperature c ompensation with Pt100	Yes; Parameterizable	Yes; Parameterizable
Resistance thermometer (RTD)		
• Characteristic linearization		
- for resistance thermometer	Pt100 (standard)	Pt100 (standard)
Characteristic linearization		
• Parameterizable	Yes	Yes
Cable length		
• Cable length, shielded, max.	200 m; 50 m at 80 mV and thermocouples	200 m; 50 m at 80 mV and thermocouples
Analog outputs		
Number of analog outputs	16	
Voltage output, short-circuit protection	Yes	
Voltage output, short-circuit current, max.	25 mA	
Current output, no-load voltage, max.	18 V	
Output ranges, voltage		
• 0 to 10 V	Yes	
• -10 to +10 V	Yes	
Output ranges, current		
• 0 to 20 mA	Yes	
• -20 to +20 mA	Yes	
• 4 to 20 mA	Yes	
Connection of actuators		
• for voltage output 2-conductor connection	Yes	
• for current output 2-conductor connection	Yes	
Load impedance (in rated range of output)		
• with voltage outputs, min.	1 kΩ	
• with voltage outputs, capacitive load, max.	1 µF	
• with current outputs, max.	500 Ω	
• with current outputs, inductive load, max.	1 mH	
Cable length		
• Cable length, shielded, max.	200 m; 50 m at 80 mV and thermocouples	
Analog value creation		
Measurement principle	integrating	integrating
Integrations and conversion time/ resolution per channel		
• Resolution with overrange (bit including sign), max.	14 bit; 12 or 14 bit, parameterizable	14 bit; 12 or 14 bit, parameterizable
• Conversion time (per channel)	16.67 ms; for 12 bit: 16 2/3 ms for 60 Hz, 20 ms for 50 Hz; for 14 bit: 100 ms for 50 and 60 Hz	16.67 ms; for 12 bit: 16 2/3 ms for 60 Hz, 20 ms for 50 Hz; for 14 bit: 100 ms for 50 and 60 Hz
Settling time		
• for resistive load	0.2 ms	0.1 ms
• for capacitive load	3.3 ms	3.3 ms
• for inductive load	0.5 ms	0.5 ms

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Technical specifications (continued)

	6ES7 455-0VS00-0AE0	6ES7 455-1VS00-0AE0
Encoder		
Connection of signal encoders		
• for voltage measurement	Yes	Yes
• for current measurement as 4-wire transducer	Yes	Yes
Connectable encoders		
• 2-wire sensor	Yes	Yes
- Permissible quiescent current (2-wire sensor), max.	1.5 mA	1.5 mA
Errors/accuracies		
Linearity error (relative to input area)	+/- 0,05 %	+/- 0,05 %
Temperature error (relative to input area)	+/- 0,005 %/K	+/- 0,005 %/K
Linearity error (relative to output area)	+/- 0,05 %	
Temperature error (relative to output area)	+/- 0,02 %/K	
Operational limit in overall temperature range		
• Voltage, relative to input area	+/-0.6 to +/-1%	+/-0.6 to +/-1%
• Current, relative to input area	+/-0.6 to +/-1%	+/-0.6 to +/-1%
• Resistance-type thermometer, relative to input area	+/-0.6 to +/-1%	+/-0.6 to +/-1%
• Voltage, relative to output area	+/- 0,5 %	
• Current, relative to output area	+/- 0,6 %	
Basic error limit (operational limit at 25 °C)		
• Voltage, relative to input area	+/-0.4 to +/-0.6 %	+/-0.4 to +/-0.6 %
• Current, relative to input area	+/-0.4 to +/-0.6 %	+/-0.4 to +/-0.6 %
• Resistance-type thermometer, relative to input area	+/-0.4 to +/-0.6 %	+/-0.4 to +/-0.6 %
• Voltage, relative to output area	+/- 0,4 %	
• Current, relative to output area	+/- 0,5 %	
Interference voltage suppression for f = n x (f1 +/- 1%), f1 = interference frequency		
• Series mode interference (peak value of interference < rated value of input range), min.	40 dB	40 dB
• common mode voltage (USS < 2.5 V) , min.	70 dB	70 dB
Interrupts/diagnostics/ status information		
Substitute values connectable	Yes; Parameterizable	Yes; Parameterizable
Control technology		
Number of closed-loop controllers	16; With thermocouples or 2-wire connection; 8 with Pt 100 or 4-wire connection	16; With thermocouples or 2-wire connection; 8 with Pt 100 or 4-wire connection
Galvanic isolation		
Galvanic isolation controller		
• between the channels	No	No
• between the channels and the backplane bus	Yes; Optocoupler	Yes; Optocoupler

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Technical specifications (continued)

	6ES7 455-0VS00-0AE0	6ES7 455-1VS00-0AE0
Permissible potential difference		
between inputs and MANA (UCM)	2.5 V DC	2.5 V DC
between M internally and the inputs	75 VDC / 60 VAC	75 VDC / 60 VAC
Isolation		
Isolation checked with	500 V DC	500 V DC
Connection method		
required front connector	2x 48-pin	2x 48-pin
Dimensions		
Width	50 mm	50 mm
Height	290 mm	290 mm
Depth	210 mm	210 mm
Weight		
Weight, approx.	1 400 g	1 400 g

Ordering data

	Order No.
FM 455 C controller module with 16 analog outputs for 16 continuous controllers	**6ES7 455-0VS00-0AE0**
FM 455 S controller module with 32 digital outputs for 16 step or pulse controllers	**6ES7 455-1VS00-0AE0**

	Order No.
Front connectors	
48-pin	
• with screw contacts, 1 item	**6ES7 492-1AL00-0AA0**
• with screw contacts, 84 items	**6ES7 492-1AL00-1AB0**
• with spring-loaded terminals, 1 item	**6ES7 492-1BL00-0AA0**
• with crimp contacts, 1 item	**6ES7 492-1CL00-0AA0**
• with crimp contacts, 84 items	**6ES7 492-1CL00-1AB0**

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FM 458-1 DP application module

Overview

SIMATIC FM 458-1 DP integrated in SIMATIC S7-400

- Designed for high-performance and user-configurable closed-loop control tasks in the SIMATIC S7-400.
- Can be adapted to individual requirements as required, such as:
  Controlling, computing, closed-loop control as well as motion control. Can therefore be used flexibly for a wide variety of applications.
- Extensive library with approx. 300 function blocks:
  E.g. simple functions such as AND, ADD and OR through to complex GMC (general motion control) blocks as virtual master or gear functions.
- User-friendly graphical configuration with the SIMATIC engineering tool CFC (Continuous Function Chart) and the D7-SYS add-on software package:
  Optimum code generation by the compiler, therefore SCL is not required.
- PROFIBUS DP interface onboard.

SIMATIC FM 458-1 DP is based on more than 15 years experience with high-performance control systems and combines this know-how with the advantages of SIMATIC – the leading automation system for decades. In contrast to other function modules with static structures/functions, the FM 458-1 DP application module can be configured flexibly and adapted to individual requirements.

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Overview

- Basic module for handling arithmetic, closed-loop control and open-loop control tasks
- PROFIBUS DP interface for connection of distributed I/O and drives
- Modular design with expansion modules for I/O and communication

Technical specifications

	6DD1 607-0AA2
Supply voltage	
5 V DC	Yes
24 V DC	Yes
permissible range (ripple included), lower limit (DC)	4.8 V
permissible range (ripple included), upper limit (DC)	5.25 V
Input current	
Current consumption, typ.	1.5 A
Current consumption, max.	3 A
Encoder supply	
Backup battery	
• Battery operation	Yes
- Backup current, max.	15 µA
Memory	
Backup	
• present	Yes; SRAM
Time of day	
Clock	
• Hardware clock (real-time clock)	Yes
• Resolution	500 ms
Digital inputs	
Number/binary inputs	8; Connector X2
Input voltage	
• Rated value, DC	24 V
• for signal "0"	-1 to +6 V
• for signal "1"	13.5 to 33 V
Input current	
• for signal "0", max. (permissible quiescent current)	0 mA
• for signal "1", typ.	3 mA; at 24 V
Input delay (for rated value of input voltage)	
• for standard inputs	
- at "0" to "1", max.	5 µs
Interfaces	
PROFIBUS DP	
• equidistance	Yes; With connection to interrupt tasks
• Direct data exchange (slave-to-slave communication)	Yes
Interrupts/diagnostics/ status information	
Alarms	
• Alarms	Yes
Galvanic isolation	
Galvanic isolation digital inputs	
• Galvanic isolation digital inputs	No; only via optional interface modules
Dimensions	
Required slots	1
Weight	
Weight, approx.	1 000 g

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FM 458-1 DP application module
FM 458-1 DP basic module

Ordering data	Order No.
FM 458-1 DP application module	**6DD1 607-0AA2**
Basic module for computing, closed-loop control and open-loop control tasks; with PROFIBUS DP interface	
Micro Memory Card	
For FM 458-1 DP basic module	
2 MB	**6ES7 953-8LL31-0AA0**
4 MB	**6ES7 953-8LM20-0AA0**
8 MB	**6ES7 953-8LP20-0AA0**
FM 458-1 DP Know-How-Protect	**6DD1 607-0GA0**
For protection of technological application modules against unauthorized copying	
SC 64 interface cable	**6DD1 684-0GE0**
To connect FM 458-1 to the serial port of a programming device/ PC	
SB10 interface module	**6DD1 681-0AE2**
To connect 8 binary I/Os to FM 458-1 DP	
SB61 interface module	**6DD1 681-0EB3**
To connect 8 binary I/Os to FM 458-1 DP, input voltage: 24/48 V DC	
SU12 interface module	**6DD1 681-0AJ1**
To connect 10 signals to FM 458-1 DP	
RS 485 bus connector with 90° cable outlet	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6ES7 972-0BA12-0XA0**
With PG interface	**6ES7 972-0BB12-0XA0**

	Order No.
RS 485 bus connector with angled cable outlet	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6ES7 972-0BA42-0XA0**
With PG interface	**6ES7 972-0BB42-0XA0**
RS 485 bus connector with 90° cable outlet for FastConnect connection system	
Max. transfer rate 12 Mbit/s	
Without PG interface	
• 1 unit	**6ES7 972-0BA52-0XA0**
• 100 units	**6ES7 972-0BA52-0XB0**
With PG interface	
• 1 unit	**6ES7 972-0BB52-0XA0**
• 100 units	**6ES7 972-0BB52-0XB0**
PROFIBUS FastConnect bus cable	
Standard type with special design for quick mounting, 2-core, shielded, sold by the meter, max. delivery unit 1000 m, minimum ordering quantity 20 m	**6XV1 830-0EH10**
Preferred lengths:	
20 m	**6XV1 830-0EN20**
50 m	**6XV1 830-0EN50**
100 m	**6XV1 830-0ET10**

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Overview

- Optional plug-in expansion module for the FM 458-1 DP basic module
- For input and output of time-critical signals
- With digital and analog inputs/outputs
- Incremental and absolute value encoders can be connected
- 4 high-resolution analog outputs
- Fan-free operation up to 40°C

Technical specifications

	6DD1 607-0CA1
Supply voltage	
5 V DC	Yes
24 V DC	Yes; to be set up externally
Input current	
Current consumption, typ.	1.5 A
Encoder supply	
Output voltage	about 14 V (non-isolated)
Output current, rated value	100 mA
Output current	
• Short-circuit protection	Yes; Electronic
Digital inputs	
Number/binary inputs	16
Input voltage	
• Rated value, DC	24 V
• for signal "0"	-1 to +6 V or input open
• for signal "1"	+13 to +33 V
Input current	
• for signal "0", max. (permissible quiescent current)	0 mA
• for signal "1", typ.	3 mA
Input delay (for rated value of input voltage)	
• for standard inputs	
- at "0" to "1", max.	200 µs
Digital outputs	
Number/binary outputs	8
Functionality/short-circuit strength	Yes; electronic/thermal
• Response threshold, typ.	250 mA
Limitation of inductive shutdown voltage to	Supply voltage +1 V
Output voltage	
• for signal "0", max.	3 V
• for signal "1", max.	Supply voltage -2.5 V
Output current	
• for signal "1" rated value	50 mA
• for signal "1" permissible range for 0 to 40 °C, min.	100 mA
• for signal "0" residual current, max.	20 µA
• Total switching current	80% at 50 °C all outputs 50 mA
Output delay with resistive load	
• "0" to "1", max.	15 µs

	6DD1 607-0CA1
Analog inputs	
Number of analog inputs	5; Differential inputs
Input ranges (rated values), voltages	
• -10 V to +10 V	Yes; -10 V: +/-4 LSB; to +10 V: +/-4 LSB (1 LSB = 4.88 mV)
• Input resistance (-10 V to +10 V)	470 kΩ
Analog outputs	
Number of analog outputs	8; 4 outputs 16 bit; 4 outputs 12 bit
Voltage output, short-circuit protection	Yes; relative to frame
Voltage output, short-circuit current, max.	16 bits: 27 mA; 12 bits: 100 mA
Output ranges, voltage	
• -10 to +10 V	Yes
Analog value creation	
Integrations and conversion time/ resolution per channel	
• Resolution with overrange (bit including sign), max.	4 AO: 16 bits, 4 AO: 12 bits, 5 AI: 12 bits
• Conversion time (per channel)	4 AO (16 bits): 2 µs; 4 AO (12 bits): 4 µs; 5 AI: 45 µs
Encoder	
Number of connectable encoders, max.	12; 8 incremental encoders (synchronizable), 4 absolute encoders
Connectable encoders	
• Incremental encoder (symmetrical)	Yes
• Incremental encoder (asymmetrical)	Yes
• Absolute encoder (SSI)	Yes; Single or multiturn encoder with SSI (synchronous serial) or EnDat interface
Encoder signals, incremental encoder (symmetrical)	
• Trace mark signals	1) for tracks A and B (90° out of phase), poss. with zero pulse N; 2) for separate forward and backward track
• Input signal	With 0 signal: -5 to 0 V; with 1 signal: +3 to +5 V; permissible input voltage range: differential voltage -5 to +5 V; max. input current: 15 mA (important: not limited on module side!)

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Technical specifications (continued)

	6DD1 607-0CA1
Encoder signals, incremental encoder (asymmetrical)	
• Trace mark signals	Track A and B (phase-shifted by 90 degrees), possibly with zero pulse N
• Input voltage	with 0 signal: -30 to +4 V (at 15 mA load); with 1 signal: +8 to 30 V (at 15 mA load); permissible input voltage range: differential voltage -30 to +30 V
Encoder signals, absolute encoder (SSI)	
• Input signal	5 V acc. to RS 422
• Data signal	Dual-, Gray-, Gray-Excess-Code
• Clock frequency, max.	2 MHz; 100 kHz to 2 MHz (depending on cable length)
Errors/accuracies	
Linearity error (relative to output area)	(+/- 1 LSB)
Galvanic isolation	
Galvanic isolation digital inputs	
• Galvanic isolation digital inputs	No
Galvanic isolation digital outputs	
• Galvanic isolation digital outputs	No
Galvanic isolation analog inputs	
• Galvanic isolation analog inputs	No
Galvanic isolation analog outputs	
• Galvanic isolation analog outputs	No
Dimensions	
Required slots	1
Weight	
Weight, approx.	1 kg

Ordering data

	Order No.
EXM 438-1 input/output expansion For direct exchange of digital and analog signals between FM 458-1 DP and the plant	**6DD1 607-0CA1**
SB10 interface module To connect 8 binary inputs or outputs to FM 458-1 DP	**6DD1 681-0AE2**
SB61 interface module To connect 8 binary inputs to FM 458-1 DP, input voltage: 24/48 V DC	**6DD1 681-0EB3**
SB71 interface module To connect 8 binary outputs to FM 458-1 DP, output voltage: 24/48 V DC	**6DD1 681-0DH1**
SU12 interface module To connect 10 signals to FM 458-1 DP	**6DD1 681-0AJ1**
SU13 interface module To connect 50 signals to FM 458-1 DP	**6DD1 681-0GK0**
SC 62 interface cable To connect EXM 438-1 with up to 5 SBxx or SU12	**6DD1 684-0GC0**
SC 63 interface cable To connect EXM 438-1 with an SU13	**6DD1 684-0GD0**

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FM 458-1 DP application module – EXM 448 universal communications expansion module

Overview

- Optional expansion module for the FM 458-1 DP basic module
- For fast communication over PROFIBUS DP or SIMOLINK
- EXM 448: With vacant slot for a MASTERDRIVES option module

Technical specifications

	6DD1 607-0EA0
Supply voltage	
5 V DC	Yes
Input current	
Current consumption, typ.	0.8 A
Dimensions	
Required slots	1
Weight	
Weight, approx.	0.8 kg

Ordering data

	Order No.
EXM 448 universal communications expansion module For fast communication, for example, with drives; with free slot for MASTERDRIVES option module	**6DD1 607-0EA0**

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FM 458-1 DP application module – EXM 448-2 universal communications expansion module

Overview

- Optional plug-in expansion module for the FM 458-1 DP basic module
- For high-speed communication over up to 2 SIMOLINK interfaces
- For coupling several FM 458-1 DP application modules in synchronism with the sampling time

Technical specifications

	6DD1 607-0EA2
Supply voltage	
5 V DC	Yes
Input current	
Current consumption, typ.	0.6 A
Dimensions	
Required slots	1
Weight	
Weight, approx.	0.9 kg

Ordering data

	Order No.
EXM 448-2 universal communications expansion For high-speed communication with drives; for establishing two SIMOLINK fiber optic connections	**6DD1 607-0EA2**

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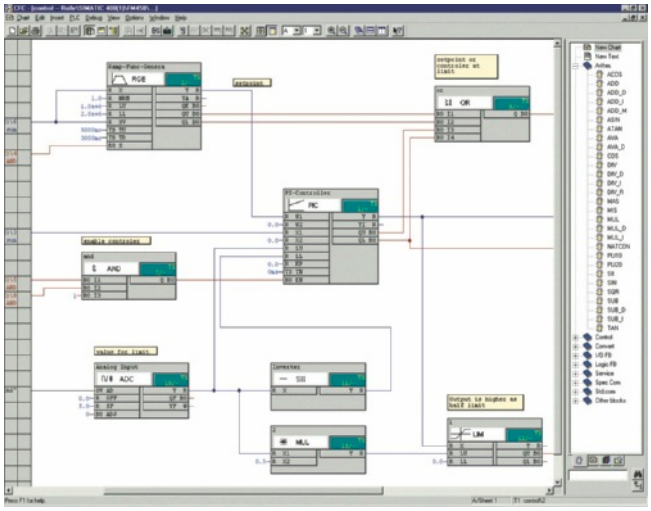
Overview



- Add-on for STEP 7/CFC/SFC for configuration of control and automation tasks with T400, FM 458, SIMADYN D or SIMATIC TDC
- Contains function blocks for every application
- Scope of delivery: Software packages D7-SYS, CFC, SFC, TH-PO
- Optional:
  D7-FB-Gen, function block generator for the creation of customized function blocks

Ordering data

Ordering data	Order No.
SIMATIC D7-SYS V8.0 Task: Function block library for configuring closed-loop control and automation tasks Target system: SIMATIC S7-400/FM 458/ SIMATIC TDC/T400/SIMADYN Requirement: Windows XP, Windows 7 32/64-bit, Windows Server 2003/2008 Type of delivery: on CD, German, English, with electronic documentation	
Floating license	**6ES7 852-0CC03-0YA5**
Upgrade License V7.x and higher	**6ES7 852-0CC03-0YE5**
Software Update Service[1)]	**6ES7 852-0CC01-0YL5**
SIMATIC D7 FB Gen V2.1 Function block generator	**6DD1 805-5DA0**
SIMATIC Manual Collection Electronic manuals on DVD, multilingual: 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	**6ES7 998-8XC01-8YE0**
SIMATIC Manual Collection update service for 1 year Current "Manual Collection" DVD and the three subsequent updates	**6ES7 998-8XC01-8YE2**

1) For more information on the software update service, see Section 11, page 11/3.

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Overview SC64 interface cable

(Similar to figure)

Interface cable for FM 458-1 DP basic module and SB10, SB60, SB61 and SU12 interface modules.

Overview SC63 interface cable

This cable is used to connect the SIMATIC TDC SM500 peripheral (I/O) module or the SIMATIC S7-400 EXM 438-1 expansion module to a SU13 interface module.

Overview SC62 interface cable

This cable is used to connect the SIMATIC TDC SM500 peripheral module (I/O) or the SIMATIC S7-400 EXM 438-1 expansion module to up to 5 interface modules SB10, SB60, SB70, SB61 SB71 and/or SU12.

Overview SB10 interface module

Similar to figure.

The interface module is used to connect 8 digital inputs or outputs.

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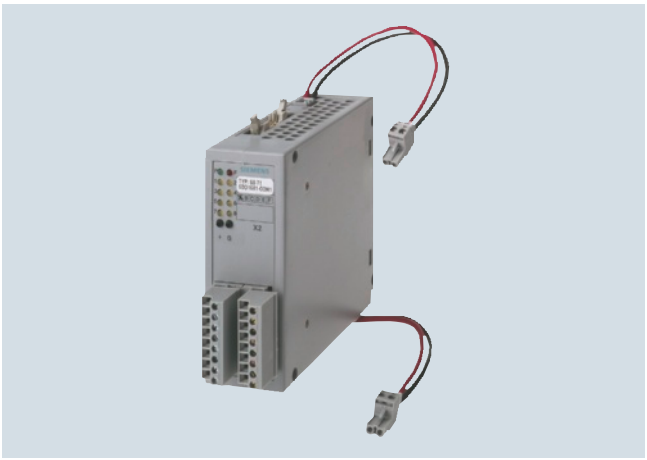
Overview SB61 interface module

It is used to connect 8 digital inputs with conversion from 24/48 V DC to 24 V DC.

Overview SB71 interface module



The interface module is used to connect 8 digital outputs with conversion of the 24 V DC voltage on the module side to a max. of 24/48 V DC/AC on the plant side using transistors.

Overview SU12 interface module

The interface module is used to connect 10 signals; there is no electronic conversion.

Overview SU13 interface module

This interface module can be used to connect 50 signals; there is no electronic conversion.

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Technical specifications

Technical specifications SB10 interface module	
Number of digital inputs or outputs	8
Electrical isolation	No
Max. cable cross-section	1.5 mm^2
Dimensions (W x H x D) in mm	45 x 130 x 156
Weight	0.3 kg
Technical specifications SB61 interface module	
Number of digital inputs for • Input voltage	8 24/48 V DC
Electrical isolation	Yes, via optocoupler
Max. cable cross-section	1.5 mm^2
Dimensions (W x H x D) in mm	45 x 130 x 156
Weight	0.32 kg
Technical specifications SB71 interface module	
Number of digital outputs • Output voltage, max	8 24/48 V DC
Output current, max.	40 mA, short-circuit proof
Electrical isolation	Yes, via optocoupler
Max. cable cross-section	1.5 mm^2
Dimensions (W x H x D) in mm	45 x 130 x 156
Technical specifications SU12 interface module	
Number of signal cables which can be connected	10
Signal amplitude per signal, max.	60 V, 0.5 A
Electrical isolation	No
Max. cable cross-section	1.5 mm^2
Dimensions (W x H x D) in mm	45 x 130 x 156
Weight	0.28 kg
Technical specifications SU13 interface module	
Number of signal cables which can be connected	50
Signal amplitude per signal, max.	60 V, 0.5 A
Electrical isolation	No
Max. cable cross-section	1.5 mm^2
Dimensions (W x H x D) in mm	45 x 130 x 156
Weight	0.3 kg

Ordering data

	Order No.
SC64 interface cable between FM 458-1 DP (X2) module with SBxx or SU12 interface module, 2 m long	**6DD1 684-0GE0**
SC62 interface cable between SM500 or EXM 438-1 module and max. 5 SB10, SB60, SB70, SB61 SB71 interface modules and/or SU12, 2 m long	**6DD1 684-0GC0**
SC63 interface cable between SM500 or EXM 438-1 module and SU13 interface module, 2 m long	**6DD1 684-0GD0**
SB10 interface module 8 digital inputs/outputs 24 V DC	**6DD1 681-0AE2**
SB61 interface module 8 digital inputs 24/48 V DC	**6DD1 681-0EB3**
SB71 interface module 8 digital outputs with transistors, 24/48 V DC	**6DD1 681-0DH1**
SU12 interface module with plug-in connector, 10-pole	**6DD1 681-0AJ1**
SU13 interface module with screw-type plug-in connector	**6DD1 681-0GK0**

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SIPLUS FM 450-1 counter modules

Overview

- Two-channel, intelligent counter module for simple counting tasks
- For direct connection of incremental encoders
- Comparison functions with two definable comparison values
- Integrated digital outputs for the output of the reaction on reaching the comparison values

Note:

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

SIPLUS FM 450-1 counter module	
Order No.	**6AG1 450-1AP00-4AE0**
Order No. based on	**6ES7 450-1AP00-0AE0**
Ambient temperature range	0 ... +60 °C
Conformal coating	Coating of the printed circuit boards and the electronic components
Technical data	The technical data of the standard product applies except for the ambient conditions.
Ambient conditions	
Relative humidity	100%, condensation/frost permissible. No commissioning if condensation present.
Biologically active substances, compliance with EN 60721-3-3	Class 3B2 mold and fungal spores (excluding fauna). The supplied plug covers must remain in place over the unused interfaces during operation!
Chemically active substances, compliance with EN 60721-3-3	Class 3C4 incl. salt spray in accordance with EN60068-2-52 (degree of severity 3). The supplied plug covers must remain in place over the unused interfaces during operation!
Mechanically active substances, compliance with EN 60721-3-3	Class 3S4 incl. sand, dust. The supplied plug covers must remain in place over the unused interfaces during operation!
Air pressure (depending on the highest positive temperature range specified)	1 080 ... 795 hPa (-1 000 ... +2 000 m) see ambient temperature range 795 ... 658 hPa (+2 000 ... +3 500 m) derating 10 K 658 ... 540 hPa (+3 500 ... +5 000 m) derating 20 K

Note:

We offer incremental sensors and preassembled connecting cables for counting and positioning functions under SIMODRIVE Sensor or Motion Connect 500.

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

Ordering data

	Order No.
SIPLUS FM 450-1 counter module (medial exposure) with 2 channels, max. 500 kHz; for incremental encoder	**6AG1 450-1AP00-4AE0**
Accessories	See SIMATIC FM 450-1, page 6/78

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SIPLUS DCF 77 radio clock module

Overview

This module can be used to synchronize the real-time clock of the SIMATIC S7-200, S7-300 and S7-400 automation systems with the official time of the DCF 77 time signal transmitter of the Physikalisch-Technische Bundesanstalt Braunschweig.

The time is received by means of a DCF receiver (antenna with electronics) which is connected via two digital inputs on the SIMATIC and SIPLUS together with a software driver included in the scope of delivery (function block FB). The function blocks are available on the Internet for downloading.

www.siemens.com/siplus - Support - Tools and Downloads!

Technical specifications

SIPLUS DCF 77 radio clock module	
Radio frequency	77.5 Hz
Power supply	24 V DC (20.4 to 28.8 DC)
Power consumption, typ.	50 mA
Dimensions (W x H x D)	75 mm x 125 mm[1] x 75 mm

[1] Additionally 25 mm (0.98 in) for heavy duty threaded joint and bending radius for cables

Ordering data

	Order No.
SIPLUS DCF 77 radio clock module For synchronizing SIMATIC S7-200, S7-300 and S7-400 with the official time of the DCF 77 time signal transmitter of the Physikalisch-Technische Bundesanstalt Braunschweig	**6AG1 057-1AA03-0AA0**

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Overview

- For high-performance transmission of messages via point-to-point connections (high message rate)
- Physical interface: RS 422/RS 485 (X.27)
- Up to 32 nodes
- Protocol implemented: ASCII, 3964 (R)
- Simple parameterization via a parameterization tool integrated into STEP 7

Technical specifications

	6ES7 440-1CS00-0YE0
Supply voltage	
5 V DC	Yes
24 V DC	Yes
Input current	
from backplane bus 5 V DC, max.	360 mA
Power losses	
Power loss, typ.	1.7 W
Memory	
Memory requirements per interface in memory card of S7-CPU	1 to 5 Kbytes for parameters
Interfaces	
Number of interfaces	1
Interface physics, RS 422/RS 485 (X.27)	Yes
RS 422/485, cable length, shielded, max.	1 200 m
Point-to-point	
• Integrated protocol driver	
- 3964 (R)	Yes
- ASCII	Yes
• Transmission speed, RS 422/485	
- with 3964 (R) protocol, max.	115.2 kbit/s
- with ASCII protocol, max.	115.2 kbit/s
Dimensions	
Width	25 mm
Height	290 mm
Depth	210 mm
Weight	
Weight, approx.	600 g

Ordering data

	Order No.
CP 440 communications module	**6ES7 440-1CS00-0YE0**
with one RS 422/485 (X.27) interface	
RS 422/485 connecting cable	
for linking to SIMATIC S7	
5 m	**6ES7 902-3AB00-0AA0**
10 m	**6ES7 902-3AC00-0AA0**
50 m	**6ES7 902-3AG00-0AA0**

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CP 441-1, CP 441-2

Overview

- For fast, high-performance serial data exchange via point-to-point connection
- 2 versions:
  - CP 441-1 with 1 variable interface for easy point-to-point coupling.
  - CP 441-2 with 2 variable interfaces for high-performance point-to-point connection.
- Plug-in interface modules for different physical transmission properties:
  RS 232C (V.24), 20 mA (TTY) or RS 422/RS 485 (X.27)
- Implemented protocols: ASCII, 3964 (R), printer driver; for CP 441-2 additional RK 512 and Modbus RTU (reloadable)
- Simple parameter assignment using tool integrated in STEP 7

Technical specifications

	6ES7 441-1AA05-0AE0 CP 441-1	6ES7 441-2AA05-0AE0 CP 441-2
Supply voltage		
5 V DC	Yes	Yes
24 V DC	Yes	Yes
Input current		
from backplane bus 5 V DC, max.	300 mA	300 mA
Power losses		
Power loss, typ.	2.1 W; incl. 1x20 mA TTY module	2.7 W; incl. 2x20mA TTY module
Memory		
Memory requirements per interface in memory card of S7-CPU	1 to 5 KB for parameters; 0 to 55 KB for message texts	1 to 5 KB for parameters; 0 to 55 KB for message texts; 0 to 64 KB for loadable drivers
Interfaces		
Number of interfaces	1; variable	2; variable
Interface physics, 20 mA (TTY)	Yes	Yes
Interface physics, RS 232C (V.24)	Yes	Yes
Interface physics, RS 422/RS 485 (X.27)	Yes	Yes
20mA (TTY), cable length, shielded, max.	1 000 m; At 9600 bps	1 000 m; At 9600 bps
RS 232, cable length, shielded, max.	15 m; At 115200 bps	15 m; At 115200 bps
RS 422/485, cable length, shielded, max.	1 200 m; At 19200 bps	1 200 m; At 19200 bps
Point-to-point		
• Transmission rate, max.	115.2 kbit/s; Min. 300 bps	115.2 kbit/s; Min. 300 bps
• supported printers	HP-Deskjet, HP-Laserjet, IBM-Proprinter, user-defined	HP-Deskjet, HP-Laserjet, IBM-Proprinter, user-defined
• Integrated protocol driver		
- 3964 (R)	Yes	Yes
- ASCII	Yes	Yes
- RK512	No	Yes
- Printer	Yes	Yes
- customer-specific drivers reloadable	No	No
• Transmission speed, 20 mA (TTY)		
- with 3964 (R) protocol, max.	19.2 kbit/s	19.2 kbit/s
- with ASCII protocol, max.	19.2 kbit/s	19.2 kbit/s
- with printer driver, max.,	19.2 kbit/s	19.2 kbit/s
- with RK 512 protocol, max.		19.2 kbit/s

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Technical specifications (continued)

	6ES7 441-1AA05-0AE0 CP 441-1	6ES7 441-2AA05-0AE0 CP 441-2
• Transmission speed, RS 422/485		
- with 3964 (R) protocol, max.	115.2 kbit/s	115.2 kbit/s
- with ASCII protocol, max.	115.2 kbit/s	115.2 kbit/s
- with printer driver, max.,	115.2 kbit/s	115.2 kbit/s
- with RK 512 protocol, max.		115.2 kbit/s
• Transmission speed, RS232		
- with 3964 (R) protocol, max.	115.2 kbit/s	115.2 kbit/s
- with ASCII protocol, max.	115.2 kbit/s	115.2 kbit/s
- with printer driver, max.,	115.2 kbit/s	115.2 kbit/s
- with RK 512 protocol, max.		115.2 kbit/s
Ambient conditions		
Operating temperature		
• Min.	0 °C	0 °C
• max.	60 °C	60 °C
Relative humidity		
• Operation, max.	95 %	95 %
Dimensions		
Width	25 mm	25 mm
Height	290 mm	290 mm
Depth	210 mm	210 mm
Weight		
Weight, approx.	580 g; Interface modules: 80 g	580 g; Interface modules: 80 g

Ordering data

	Order No.
CP 441-1 communications module	**6ES7 441-1AA05-0AE0**
With 1 variable interface for interface submodules; including configuration package on CD	
CP 441-2 communications module	**6ES7 441-2AA05-0AE0**
With 2 variable interfaces for interface submodules; including configuration package on CD	
Interface submodules	
RS 232C (V.24)	**6ES7 963-1AA10-0AA0**
20 mA (TTY)	**6ES7 963-2AA10-0AA0**
RS 422/485 (X.27)	**6ES7 963-3AA10-0AA0**
RS 232 connecting cable	
5 m	**6ES7 902-1AB00-0AA0**
10 m	**6ES7 902-1AC00-0AA0**
15 m	**6ES7 902-1AD00-0AA0**

	Order No.
TTY connecting cable	
5 m	**6ES7 902-2AB00-0AA0**
10 m	**6ES7 902-2AC00-0AA0**
50 m	**6ES7 902-2AG00-0AA0**
RS 422/485 connecting cable	
5 m	**6ES7 902-3AB00-0AA0**
10 m	**6ES7 902-3AC00-0AA0**
50 m	**6ES7 902-3AG00-0AA0**
Loadable drivers for CP 441-2	
Modbus master (RTU format)	
• Single license	**6ES7 870-1AA01-0YA0**
• Single license, without software or documentation	**6ES7 870-1AA01-0YA1**
Modbus slave (RTU format)	
• Single license	**6ES7 870-1AB01-0YA0**
• Single license, without software or documentation	**6ES7 870-1AB01-0YA1**

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Loadable drivers for CP 441-2 and CP 341

Overview

- Drivers for Modbus protocol with RTU message format; communication as master or slave
- Downloadable onto CP 341 and CP 441-2 (6ES7 441-2AA04-0AE0)

Technical specifications

Parameterization software	Loadable drivers for CP 441-2 and CP 341
Type of license	Simple license, copy license
Target system	SIMATIC CP 341, SIMATIC CP 441-2

Technical specifications	Modbus Master
	• Modbus protocol with RTU format
	• Master/slave coupling: SIMATIC S7 is master
	• Function codes implemented: 01, 02, 03, 04, 05, 06, 07, 08, 11,12,15,16
	• No V.24 control and signal lines
	• CRC polynomial: $x^{16} + x^{15} + x^2 + 1$
	• Interfaces: TTY (20 mA); V.24 (RS 232 C); X.27 (RS 422/485) 2-wire or 4-wire
	• Receive mailbox specified on BRCV
	• Character delay time 3.5 characters or multiple thereof
	• Broadcast message possible
Adjustable parameters	• Transmission rate 300 bit/s up to 76800 bit/s (TTY up to 19200 bit/s)
	• Character frame
	• With/without RS 485 operation for 2-wire connections
	• With/without modem operation (ignore smudge characters)
	• Response monitoring time 100 ms to 25.5 s in steps of 100 ms
	• Factor for the character delay time 1-10
	• Default setting of receive line when using the X.27 interface module

	Modbus slave
	• Modbus protocol with RTU format
	• Master/slave coupling: SIMATIC S7 is slave
	• Function codes implemented: 01, 02, 03, 04, 05, 06, 08, 15, 16
	• No V.24 control and signal line
	• CRC polynomial: $x^{16} + x^{15} + x^2 + 1$
	• Interfaces: TTY (20 mA), V.24 (RS 232C), X.27 (RS 422/485) 2-wire or 4-wire
	• Communications FB 180, instance DB 180 (use of a multi-instance)
	• Conversion of the Modbus data address to S7 data areas. Data areas which can be processed: DB, bit memories, outputs, inputs, timers, counters
	• Character delay time 3.5 characters or multiple thereof
Adjustable parameters	• Transmission rate 300 bit/s up to 76800 bit/s (TTY up to 19200 bit/s)
	• Character frame
	• Slave address of CP (1 to 255)
	• With/without RS 485 operation for 2-wire connection
	• With/without modem operation (ignore smudge characters)
	• Factor for the character delay time 1-10
	• Number of work DB (for FB processing)
	• Enabling of memory areas for writing by the master
	• Default setting of receive line when using the X.27 interface module
	• Conversion of Modbus addresses to S7 data areas

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Ordering data	Order No.
Modbus Master V3.1	
Task: Communication via Modbus protocol with RTU format, SIMATIC S7 as master Requirement: CP 341 or CP 441-2; STEP 7 V4.02 and higher Delivery package: Driver program/documentation, English, German, French	
Single license	**6ES7 870-1AA01-0YA0**
Single license, without software and documentation	**6ES7 870-1AA01-0YA1**
Modbus Slave V3.1	
Task: Communication via Modbus protocol with RTU format, SIMATIC S7 as slave Requirement: CP 341 or CP 441-2; STEP 7 V4.02 and higher Delivery package: Driver program/documentation, English, German, French	
Single license	**6ES7 870-1AB01-0YA0**
Single license, without software and documentation	**6ES7 870-1AB01-0YA1**

	Order No.
SIMATIC Manual Collection	**6ES7 998-8XC01-8YE0**
Electronic manuals on DVD, multilingual: 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	
SIMATIC Manual Collection update service for 1 year	**6ES7 998-8XC01-8YE2**
Current "Manual Collection" DVD and the three subsequent updates	

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CP 443-5 Basic

Overview

DP-M	DP-S	FMS	PG/OP	S7/S5	
		●	●	●	

- Connection of the S7-400 to PROFIBUS
- Communication services:
  - PG/OP communication
  - S7 communication
  - Open communication (SEND/RECEIVE)
  - PROFIBUS FMS
- Time synchronization
- Easy programming and configuration over PROFIBUS
- Cross-network programming device communication through S7 routing
- Can be easily integrated into the SIMATIC S7-400 system
- Modules can be replaced without the need for a PG
- SIMATIC H system operation for redundant S7 communication

Technical specifications

Order No.	6GK7 443-5FX02-0XE0
Product-type designation	**CP 443-5 Basic**
Transmission rate	
Transmission rate at interface 1 in accordance with PROFIBUS	9.6 kbit/s … 12 Mbit/s
Interfaces	
Number of electrical connections at interface 1 in accordance with PROFIBUS	1
Design of electrical connection at interface 1 in accordance with PROFIBUS	9-pin Sub-D socket (RS485)
Supply voltage, current consumption, power loss	
Type of voltage of supply voltage	DC
Supply voltage 1 from backplane bus	5 V
Relative symmetrical tolerance at 5 V with DC	5 %
Consumed current from backplane bus at 5 V for DC Typical	1 A
Resistive loss	5.5 W
Permitted ambient conditions	
Ambient temperature	
• during operating	0 … 60 °C
• during storage	-40 … +70 °C
• during transport	-40 … +70 °C
• Comment	-
Relative humidity at 25 °C without condensation during operating maximum	95 %
Protection class IP	IP20
Design, dimensions and weight	
Module format	
Width	25 mm
Height	290 mm
Depth	210 mm
Net weight	0.65 kg
Product properties, functions, components general	
Number of modules	
• per CPU maximum	14
• note	-

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Technical specifications (continued)

Order No.	6GK7 443-5FX02-0XE0
Product-type designation	**CP 443-5 Basic**
Performance data	
Performance data open communication	
Number of possible connections for open communication by means of SEND/RECEIVE blocks maximum	32
Data volume as user data per connection for open communication by means of SEND/RECEIVE blocks maximum	240 byte
Performance data FMS functions	
Number of possible connections for FMS connection maximum	48
Amount of data of the variables	
• for READ job maximum	237 byte
• for WRITE job maximum	233 byte
Number of variables	
• Configurable from server to FMS partner	512
• Loadable from server to FMS partner	2 640
Performance data S7 communication	
Number of possible connections for S7 communication	
• maximum	48
• with PG connections maximum	-
• with PG/OP connections maximum	-
• note	-
Performance data multi-protocol mode	
Number of possible connections of which 2 reserved for PG/OP communication for multi-protocol operation maximum	59
Product functions management, configuration	
Configuration software required	

Ordering data

	Order No.
CP 443-5 Basic communications processor	**6GK7 443-5FX02-0XE0**
Communications processor for connection of S7-400 to PROFIBUS, FMS, open communication, PG/OP and S7 communication; with electronic manual on CD-ROM	
PROFIBUS FastConnect bus connector RS485	
With 90° cable outlet; insulation displacement technology, max. transmission rate 12 Mbit/s (1 unit)	
• Without PG interface	**6ES7 972-0BA52-0XA0**
• With PG interface	**6ES7 972-0BB52-0XA0**
PROFIBUS bus connector IP20	
With connection to PPI, MPI, PROFIBUS	
• Without PG interface	**6ES7 972-0BA12-0XA0**
• With PG interface	**6ES7 972-0BB12-0XA0**
PROFIBUS bus terminal 12M	**6GK1 500-0AA10**
Bus terminal for connection of PROFIBUS nodes at up to 12 Mbit/s with connecting cable	

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CP 443-5 Extended

Overview

DP-M	DP-S	FMS	PG/OP	S7/S5	
●			●	●	

- PROFIBUS DP master with electrical interface for connecting the SIMATIC S7-400 to PROFIBUS at up to 12 Mbit/s (including 45.45 Kbit/s)
- For setting up additional PROFIBUS DP lines
- Communication services:
  - PROFIBUS DP
  - PG/OP communication
  - S7 communication
  - Open communication (SEND/RECEIVE)
- Time synchronization
- Easy programming and configuration over PROFIBUS
- Cross-network programming device communication through S7 routing
- Can be easily integrated into the SIMATIC S7-400 system
- Module replacement without PG
- SIMATIC H system operation for redundant S7 communication or DP master communication
- Data record routing (PROFIBUS DP)
- Adding or modifying distributed I/O during operation

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Technical specifications

Order No.	6GK7 443-5DX05-0XE0
Product-type designation	**CP 443-5 Extended**
Transmission rate	
Transmission rate at interface 1 in accordance with PROFIBUS	9.6 kbit/s … 12 Mbit/s
Interfaces	
Number of electrical connections at interface 1 in accordance with PROFIBUS	1
Design of electrical connection at interface 1 in accordance with PROFIBUS	9-pin Sub-D socket (RS485)
Supply voltage, current consumption, power loss	
Type of voltage of supply voltage	DC
Supply voltage 1 from backplane bus	5 V
Relative symmetrical tolerance at 5 V with DC	5 %
Consumed current from backplane bus at 5 V for DC Typical	0.6 A
Resistive loss	5.5 W
Permitted ambient conditions	
Ambient temperature	
• during operating	0 … 60 °C
• during storage	-40 … +70 °C
• during transport	-40 … +70 °C
• Comment	-
Relative humidity at 25 °C without condensation during operating maximum	95 %
Protection class IP	IP20
Design, dimensions and weight	
Module format	
Width	25 mm
Height	290 mm
Depth	210 mm
Net weight	0.65 kg

Order No.	6GK7 443-5DX05-0XE0
Product-type designation	**CP 443-5 Extended**
Product properties, functions, components general	
Number of modules	
• per CPU maximum	14
• note	The number of CPs that can be operated as DP masters depends on the number of CP 443-1 Advanced processors operating in the S7-400 station as PROFINET IO controllers. Up to 10 CPs can be operated in total: up to 4 as PROFINET IO controllers (CP 443-1 Advanced); up to 10 as DP masters (CP 443-5 Extended)
Performance data	
Performance data open communication	
Number of possible connections for open communication by means of SEND/RECEIVE blocks maximum	32
Data volume as user data per connection for open communication by means of SEND/RECEIVE blocks maximum	240 byte
Performance data PROFIBUS DP	
Service as DP master DPV1	Yes
Number of DP slaves on DP master usable	125
Amount of data	
• of the address area of the inputs as DP master overall	4 096 byte
• of the address area of the outputs as DP master overall	4 096 byte
• of the address area of the inputs per DP slave	244 byte
• of the address area of the outputs per DP slave	244 byte

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Technical specifications (continued)

Order No.	6GK7 443-5DX05-0XE0
Product-type designation	**CP 443-5 Extended**
Performance data S7 communication	
Number of possible connections for S7 communication	
• maximum	48
• with PG connections maximum	-
• with PG/OP connections maximum	-
• note	-
Performance data multi-protocol mode	
Number of active connections with multi-protocol mode	
• without DP maximum	59
• with DP maximum	54

Order No.	6GK7 443-5DX05-0XE0
Product-type designation	**CP 443-5 Extended**
Product functions management, configuration	
Configuration software required	STEP 7 V5.4 SP4 or higher, or STEP 7 V11.0 or higher

Ordering data

	Order No.
CP 443-5 Extended communications processor	
for connection of the SIMATIC S7-400 to PROFIBUS	
Extended version for PROFIBUS DP; with electronic manual on CD-ROM	**6GK7 443-5DX05-0XE0**
PROFIBUS FastConnect bus connector RS485	
With 90° cable outlet; insulation displacement technology, max. transmission rate 12 Mbit/s (1 unit)	
• Without PG interface	**6ES7 972-0BA52-0XA0**
• With PG interface	**6ES7 972-0BB52-0XA0**

	Order No.
PROFIBUS bus connector IP20	
With connection to PPI, MPI, PROFIBUS	
• Without PG interface	**6ES7 972-0BA12-0XA0**
• With PG interface	**6ES7 972-0BB12-0XA0**
PROFIBUS bus terminal 12M	**6GK1 500-0AA10**
Bus terminal for connection of PROFIBUS nodes at up to 12 Mbit/s with connecting cable	

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CP 443-1

Overview

ISO	TCP/ UDP	PN	MRP	IT	IP-R	PG/OP	S7/S5
●	●	●	●	●		●	●

Communications processor for connecting a SIMATIC S7-400 to Industrial Ethernet networks, also as PROFINET IO controller or in SIMATIC H systems.

The CP supports:

- PG/OP communication
- S7 communication
- Open communication (SEND/RECEIVE)
- PROFINET communication
- IT communication

The communications processor can also be used for redundant S7 communication in SIMATIC H systems and for fail-safe applications (PROFIsafe) in connection with an S7-400 F-CPU.

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Technical specifications

Order No.	6GK7 443-1EX30-0XE0
Product-type designation	**CP 443-1**
Transmission rate	
Transfer rate at the interface 1	10 … 100 Mbit/s
Interfaces	
Number of electrical connections at interface 1 in accordance with Industrial Ethernet	2
Design of electrical connection at interface 1 in accordance with Industrial Ethernet	RJ45 port
Supply voltage, current consumption, power loss	
Type of voltage of supply voltage	DC
Supply voltage 1 from backplane bus	5 V
Relative symmetrical tolerance at 5 V with DC	5 %
Consumed current from backplane bus at 5 V for DC Typical	1.4 A
Resistive loss	8.6 W
Permitted ambient conditions	
Ambient temperature	
• during operating	0 … 60 °C
• during storage	-40 … +70 °C
• during transport	-40 … +70 °C
• Comment	-
Relative humidity at 25 °C without condensation during operating maximum	95 %
Protection class IP	IP20

Order No.	6GK7 443-1EX30-0XE0
Product-type designation	**CP 443-1**
Design, dimensions and weight	
Module format	
Width	25 mm
Height	290 mm
Depth	210 mm
Net weight	0.7 kg
Product properties, functions, components general	
Number of modules	
• per CPU maximum	14
• note	max. 4 as PN IO ctrl.
Performance data	
Performance data open communication	
Number of possible connections for open communication by means of SEND/RECEIVE blocks maximum	64
Data volume	
• as user data per ISO connection for open communication by means of SEND/RECEIVE blocks maximum	8 Kibyte
• as user data per ISO on TCP connection for open communication by means of SEND/RECEIVE blocks maximum	8 Kibyte
• as user data per TCP connection for open communication by means of SEND/RECEIVE blocks maximum	8 Kibyte
• as user data per UDP connection for open IE communication by means of SEND/RECEIVE blocks maximum	2 Kibyte
Number of possible connections for open communication by means of T blocks maximum	64

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Technical specifications (continued)

Order No.	6GK7 443-1EX30-0XE0
Product-type designation	**CP 443-1**
Data volume as user data per ISO on TCP connection for open communication by means of T blocks maximum	1 452 byte
Number of Multicast stations	-
Performance data S7 communication	
Number of possible connections for S7 communication	
• maximum	128
• with PG connections maximum	2
• with PG/OP connections maximum	-
• note	when using several CPUs
Performance data multi-protocol mode	
Number of active connections with multiprotocol mode	128
Performance data PROFINET communication as PN IO-Controller	
Product function PROFINET IO controller	Yes
Number of PN IO-Devices on PROFINET IO-Controller usable total	128
Number of PN IO IRT-Devices on PROFINET IO-Controller usable	64
Number of external PN IO lines with PROFINET per rack	4
Data volume	
• as useful data for input variables as PROFINET IO controller maximum	4 Kibyte
• as useful data for output variables with PROFINET IO controller maximum	4 Kibyte
• as useful data for input variables per PN IO device with PROFINET IO controller maximum	1 433 byte
• as useful data for output variables per PN IO device with PROFINET IO controller maximum	1 433 byte
• as user data for input variable per PN IO device per submodule as PROFINET IO controller maximum	240 byte
• as user data for output variables per PN IO device per submodule as PROFINET IO controller maximum	240 byte

Order No.	6GK7 443-1EX30-0XE0
Product-type designation	**CP 443-1**
Product functions management, configuration	
Product function MIB support	Yes
Protocol is supported	
• SNMP v1	Yes
• DCP	Yes
• LLDP	Yes
Configuration software required	STEP 7 V5.5 SP2 HF1 or higher, or STEP 7 V11.0
Identification & maintenance	
• I&M0 - device-specific information	-
• I&M1 - plant identification/location name	-
Product functions Diagnosis	
Product function Web-based diagnostics	Yes
Product functions switch	
Product feature switch	Yes
Product function	
• switch-managed	No
• for IRT PROFINET IO switch	Yes
• Configuration with STEP 7	Yes
Product functions Redundancy	
Product function	
• Ring redundancy	Yes
• Redundancy manager	Yes
• MRP redundancy protocol	Yes
Product functions Security	
Product function	
• ACL - IP-based	Yes
• switchoff of non-required services	Yes
• blocking of communication via physical ports	Yes
• log file for unauthorized access	No
Product functions Time	
Product function	
• SICLOCK support	Yes
• pass on time synchronization	Yes
Protocol is supported NTP	Yes

Ordering data

	Order No.
CP 443-1 communications processor	**6GK7 443-1EX30-0XE0**
For connecting SIMATIC S7-400 to Industrial Ethernet through TCP/IP, ISO and UDP; PROFINET IO Controller, MRP; integrated real-time switch ERTEC with two ports; 2 x RJ45 interface; S7 communication, open communication (SEND/RECEIVE) with FETCH/WRITE, with and without RFC 1006, DHCP, SNMP V2, diagnostics, multicast, access protection over IP access list, initialization over LAN 10/100 Mbit/s with electronic manual on DVD	

	Order No.
SOFTNET S7 for Industrial Ethernet	
Software for S7 and open communication, including OPC server, PG/OP communication and NCM PC, runtime software, software and electronic manual on CD-ROM, license key on a USB stick, Class A	
SOFTNET-IE S7 V8.2	
for 32/64-bit: Windows 7 Professional/Ultimate; for 64-bit: Windows 2008 Server R2; German/English	
up to 64 connections	
• Single License for one installation	**6GK1 704-1CW08-2AA0**

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Ordering data

	Order No.
SOFTNET-S7 Edition 2008 (V7.1) for Industrial Ethernet	
For 32-bit Windows XP Professional SP2/3; Windows 2003 Server R2, SP2; Windows Vista Business/Ultimate SP1; Windows 2008 Server; German/English	
up to 64 connections	
• Single License for one installation	**6GK1 704-1CW71-3AA0**
Software Update Service	**6GK1 704-1CW00-3AL0**
For 1 year with automatic extension; requirement: current software version	
Upgrade	
• From Edition 2006 to Edition 2008 or V8.1	**6GK1 704-1CW00-3AE0**
• From V6.0, V6.1, V6.2 or V6.3 to Edition 2008 or V8.1	**6GK1 704-1CW00-3AE1**
SOFTNET-IE S7 Lean Edition V8.2	
Up to eight connections	
• Single License for one installation	**6GK1 704-1LW08-2AA0**
SOFTNET-S7 Lean Edition 2008 (V7.1) for Industrial Ethernet	
Up to eight connections	
• Single License for one installation	**6GK1 704-1LW71-3AA0**
Software Update Service	**6GK1 704-1LW00-3AL0**
For 1 year with automatic extension; requirement: current software version	
Upgrade	
• From Edition 2006 to Edition 2008 or V8.1	**6GK1 704-1LW00-3AE0**
• From V6.0, V6.1, V6.2 or V6.3 to Edition 2008 or V8.1	**6GK1 704-1LW00-3AE1**

	Order No.
IE FC TP Standard Cable GP 2x2	**6XV1 840-2AH10**
4-core, shielded TP installation cable for connection to IE FC RJ45 outlet / IE FC RJ45 plug; PROFINET-compliant; with UL approval; sold by the meter max. length 1000 m, minimum order 20 m	
Industrial Ethernet Switch SCALANCE X204-2	**6GK5 204-2BB10-2AA3**
Industrial Ethernet switches with integral SNMP access, online diagnostics, copper cable diagnostics and PROFINET diagnostics for configuring line, star and ring topologies; four 10/100 Mbit/s RJ45 ports and two fiber-optic cable ports	
IE FC RJ45 Plug 180 2x2	
RJ45 plug connector for Industrial Ethernet with a rugged metal housing and integrated insulation-displacement/terminal contacts for connecting Industrial Ethernet FC installation cables; with a 180° cable outlet; for network components and CPs/CPUs with Industrial Ethernet interface	
• 1 pack = 1 unit	**6GK1 901-1BB10-2AA0**
• 1 pack = 10 units	**6GK1 901-1BB10-2AB0**
• 1 pack = 50 units	**6GK1 901-1BB10-2AE0**
IE FC Stripping Tool	**6GK1 901-1GA00**
Preadjusted stripping tool for fast stripping of the Industrial Ethernet FC cables	

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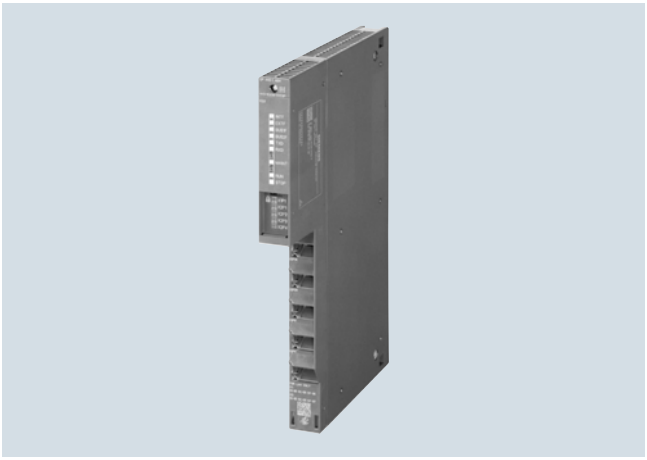
Overview



ISO	TCP/ UDP	PN	MRP	IT	IP-R	PG/OP	S7/S5
●	●	●	●	●	●	●	●

Communications processor for connecting a SIMATIC S7-400 to Industrial Ethernet networks, also as PROFINET IO controller or in SIMATIC H systems.

The CP supports:

- PG/OP communication
- S7 communication
- Open communication (SEND/RECEIVE)
- PROFINET communication
- IT communication
- Security functionality, firewall and VPN

The communications processor can also be used for redundant S7 communication in SIMATIC H systems and for fail-safe applications (PROFIsafe) in connection with an S7-400 F-CPU. In addition, the CP 443-1 Advanced provides e-mail functions and user-created Web pages, offering ideal support for maintenance and quality assurance. The Internet functions such as FTP even allow connection to the most diverse PC-based systems.
This CP is therefore the bridge between the field level and the management level for the S7-400. The CP 443-1 Advanced connects seamlessly to the security structures of the office and IT worlds.

Technical specifications

Order No.	6GK7 443-1GX30-0XE0
Product-type designation	**CP 443-1 Advanced**
Transmission rate	
Transfer rate	
• at the interface 1	10 … 1 000 Mbit/s
• at the interface 2	10 … 100 Mbit/s
Interfaces	
Number of electrical connections	
• at interface 1 in accordance with Industrial Ethernet	1
• at interface 2 in accordance with Industrial Ethernet	4
Design of electrical connection	
• at interface 1 in accordance with Industrial Ethernet	RJ45 port
• at interface 2 in accordance with Industrial Ethernet	RJ45 port
design of the removable storage C-PLUG	Yes
Supply voltage, current consumption, power loss	
Type of voltage of supply voltage	DC
Supply voltage 1 from backplane bus	5 V
Relative symmetrical tolerance at 5 V with DC	5 %
Consumed current from backplane bus at 5 V for DC Typical	1.8 A
Resistive loss	7.25 W

Order No.	6GK7 443-1GX30-0XE0
Product-type designation	**CP 443-1 Advanced**
Permitted ambient conditions	
Ambient temperature	
• during operating	0 … 60 °C
• during storage	-40 … +70 °C
• during transport	-40 … +70 °C
• Comment	-
Relative humidity at 25 °C without condensation during operating maximum	95 %
Protection class IP	IP20
Design, dimensions and weight	
Module format	
Width	25 mm
Height	290 mm
Depth	210 mm
Net weight	0.7 kg
Product properties, functions, components general	
Number of modules	
• per CPU maximum	14
• note	max. 4 as PN IO ctrl.

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Technical specifications (continued)

Order No.	6GK7 443-1GX30-0XE0
Product-type designation	**CP 443-1 Advanced**
Performance data	
Performance data open communication	
Number of possible connections for open communication by means of SEND/RECEIVE blocks maximum	64
Data volume	
• as user data per ISO connection for open communication by means of SEND/RECEIVE blocks maximum	8 Kibyte
• as user data per ISO on TCP connection for open communication by means of SEND/RECEIVE blocks maximum	8 Kibyte
• as user data per TCP connection for open communication by means of SEND/RECEIVE blocks maximum	8 Kibyte
• as user data per UDP connection for open IE communication by means of SEND/RECEIVE blocks maximum	2 Kibyte
Number of possible connections for open communication by means of T blocks maximum	64
Data volume as user data per ISO on TCP connection for open communication by means of T blocks maximum	1 452 byte
Number of Multicast stations	-
Performance data S7 communication	
Number of possible connections for S7 communication	
• maximum	128
• with PG connections maximum	2
• with PG/OP connections maximum	-
• note	when using several CPUs
Performance data multi-protocol mode	
Number of active connections with multiprotocol mode	128
Performance data IT functions	
Number of possible connections	
• as client by means of FTP maximum	20
• as server	
- by means of FTP maximum	10
- by means of HTTP maximum	4
• as e-mail client maximum	1
Amount of data as useful data for e-mail maximum	8 Kibyte
Storage capacity of user memory	
• as flash memory file system	30 Mibyte
• as RAM	16 Mibyte
• additionally buffered as RAM via central backup battery	512 Kibyte
Number of possible write cycles flash memory cells	100 000

Order No.	6GK7 443-1GX30-0XE0
Product-type designation	**CP 443-1 Advanced**
Performance data PROFINET communication as PN IO-Controller	
Product function PROFINET IO controller	Yes
Number of PN IO-Devices on PROFINET IO-Controller usable total	128
Number of PN IO IRT-Devices on PROFINET IO-Controller usable	64
Number of external PN IO lines with PROFINET per rack	4
Data volume	
• as useful data for input variables as PROFINET IO controller maximum	8 Kibyte
• as useful data for output variables with PROFINET IO controller maximum	8 Kibyte
• as useful data for input variables per PN IO device with PROFINET IO controller maximum	1 433 byte
• as useful data for output variables per PN IO device with PROFINET IO controller maximum	1 433 byte
• as user data for input variable per PN IO device per submodule as PROFINET IO controller maximum	240 byte
• as user data for output variables per PN IO device per submodule as PROFINET IO controller maximum	240 byte
Performance data PROFINET CBA	
Number of remote connection partners with PROFINET CBA	64
Number of connections with PROFINET CBA total	600
Amount of data	
• as useful data for digital inputs with PROFINET CBA maximum	8 Kibyte
• as useful data for digital outputs in the case of PROFINET CBA max.	8 Kibyte
• as useful data for arrays and data types	
- in the case of acyclic transmission with PROFINET CBA maximum	8 Kibyte
- in the case of cyclic transmission with PROFINET CBA maximum	250 byte
- in the case of local interconnection with PROFINET CBA maximum	2 400 byte
Performance data PROFINET CBA remote connection with acyclic transmission	
Updating time of the remote interconnections in the case of acyclic transmission with PROFINET CBA	0.1 s
Number of remote connections to input variables with acyclic transmission with PROFINET CBA maximum	150
Number of remote connections to output variables with acyclic transmission with PROFINET CBA maximum	150

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Technical specifications (continued)

Order No.	6GK7 443-1GX30-0XE0
Product-type designation	**CP 443-1 Advanced**
Amount of data	
• as useful data for remote interconnections with input variables in the case of acyclic transmission with PROFINET CBA	8 Kibyte
• as useful data for remote interconnections with output variables in the case of acyclic transmission with PROFINET CBA	8 Kibyte
Performance data PROFINET CBA remote connection with cyclic transmission	
Updating time of the remote interconnections in the case of acyclic transmission with PROFINET CBA	10 ms
Number of remote connections to input variables with cyclic transmission with PROFINET CBA maximum	250
Number of remote connections to output variables with cyclic transmission with PROFINET CBA maximum	250
Amount of data	
• as useful data for remote interconnections with input variables in the case of cyclic transmission with PROFINET CBA max.	2 000 byte
• as useful data for remote interconnections with output variables in the case of cyclic transmission with PROFINET CBA maximum	2 000 byte
Performance data PROFINET CBA HMI variables via PROFINET acyclic	
Number of connectable HMI stations for HMI variables with acyclic transmission with PROFINET CBA	3
Updating time of the HMI variables in the case of acyclic transmission with PROFINET CBA	500 ms
Number of HMI variables with acyclic transmission with PROFINET CBA maximum	200
Amount of data as useful data for HMI variables in the case of acyclic transmission with PROFINET CBA maximum	8 Kibyte
Performance data PROFINET CBA device-internal connections	
Number of internal connections with PROFINET CBA maximum	300
Data volume of internal connections with PROFINET CBA maximum	2 400 byte
Performance data PROFINET CBA connections to constants	
Number of connections to constants with PROFINET CBA maximum	500
Amount of data as useful data for interconnections with constants in the case of PROFINET CBA maximum	4 000 byte
Performance data PROFINET CBA PROFIBUS proxy functionality	
Product function with PROFINET CBA PROFIBUS proxy functionality	No

Order No.	6GK7 443-1GX30-0XE0
Product-type designation	**CP 443-1 Advanced**
Product functions management, configuration	
Product function MIB support	Yes
Protocol is supported	
• SNMP v1	Yes
• DCP	Yes
• LLDP	Yes
Configuration software	
• required	STEP 7 V5.5 SP2 HF1 or higher, or STEP 7 V11.0 or higher
• for PROFINET CBA required	SIMATIC iMap V3.0 SP1 and higher
Identification & maintenance	
• I&M0 - device-specific information	-
• I&M1 - plant identification/location name	-
Product functions Diagnosis	
Product function Web-based diagnostics	Yes
Product functions switch	
Product feature switch	Yes
Product function	
• switch-managed	No
• for IRT PROFINET IO switch	Yes
• Configuration with STEP 7	Yes
Product functions Redundancy	
Product function	
• Ring redundancy	Yes
• Redundancy manager	Yes
• MRP redundancy protocol	Yes
Product functions Security	
Design of the firewall	stateful inspection
Product function with VPN connection	IPSec
Type of encryption algorithms with VPN connection	AES-256, AES-192, AES-128, 3DES-168, DES-56
Type of authentication procedure with VPN connection	Preshared key (PSK), X.509v3 certificates
Type of hashing algorithms with VPN connection	MD5, SHA-1
Number of possible connections for VPN connection	32
Product function	
• password protection for Web applications	Yes
• ACL - IP-based	Yes
• ACL - IP-based for PLC/routing	Yes
• switchoff of non-required services	Yes
• blocking of communication via physical ports	Yes
• log file for unauthorized access	No
Product functions Time	
Product function	
• SICLOCK support	Yes
• pass on time synchronization	Yes
Protocol is supported NTP	Yes

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CP 443-1 Advanced

Ordering data	Order No.
CP 443-1 Advanced communications processor For connecting the SIMATIC S7-400 CPU to Industrial Ethernet: 1 x 10/100/1000 Mbit/s; 4 x 10/100 Mbit/s (IE SWITCH); RJ45 ports; ISO; TCP; UDP; PROFINET IO controller, S7 communication; open communication (SEND/RECEIVE); S7 routing; IP configuration via DHCP/block; IP Access Control List; time synchronization; expanded web diagnostics; Fast Startup; PROFIenergy support; IP routing; FTP; web server; e-mail; PROFINET CBA	
• With security functionality (firewall and VPN)	**6GK7 443-1GX30-0XE0**
SOFTNET S7 for Industrial Ethernet Software for S7 and open communication, including OPC server, PG/OP communication and NCM PC, runtime software, software and electronic manual on CD-ROM, license key on a USB stick, Class A	
SOFTNET-IE S7 V8.2 For 32/64-bit Windows 7 Professional/Ultimate; For 64-bit: Windows 2008 Server R2; German/English Up to 64 connections	
• Single License for one installation	**6GK1 704-1CW08-2AA0**
SOFTNET-S7 Edition 2008 (V7.1) for Industrial Ethernet For 32-bit Windows XP Professional SP2/3; Windows 2003 Server R2, SP2; Windows Vista Business/Ultimate SP1; Windows 2008 Server; German/English Up to 64 connections	
• Single License for one installation	**6GK1 704-1CW71-3AA0**
Software Update Service For 1 year with automatic extension; requirement: current software version	**6GK1 704-1CW00-3AL0**
Upgrade	
• From Edition 2006 to Edition 2008 or V8.1	**6GK1 704-1CW00-3AE0**
• From V6.0, V6.1, V6.2 or V6.3 to Edition 2008 or V8.1	**6GK1 704-1CW00-3AE1**
SOFTNET-IE S7 Lean Edition V8.2 Up to eight connections	
• Single License for one installation	**6GK1 704-1LW08-2AA0**
SOFTNET-S7 Lean Edition 2008 (V7.1) for Industrial Ethernet Up to eight connections	
• Single License for one installation	**6GK1 704-1LW71-3AA0**
Software Update Service For 1 year with automatic extension; requirement: current software version	**6GK1 704-1LW00-3AL0**
Upgrade	
• From Edition 2006 to Edition 2008 or V8.1	**6GK1 704-1LW00-3AE0**
• From V6.0, V6.1, V6.2 or V6.3 to Edition 2008 or V8.1	**6GK1 704-1LW00-3AE1**
Accessories	
IE FC TP Standard Cable GP 2x2 (type A) 4-core, shielded TP installation cable for connection to IE FC outlet RJ45/IE FC RJ45 plug; PROFINET-compatible; with UL approval; sold in meters, max. quantity 1000 m, minimum order 20 m	**6XV1 840-2AH10**
IE FC TP standard cable GP 4x2 8-core, shielded TP installation cable for connection to IE FC RJ45 Modular Outlet for universal application; with UL approval; sold by the meter, max quantity 1000 m, minimum order 20 m	
• AWG22, for connection to IE FC RJ45 Modular Outlet	**6XV1 870-2E**
• AWG24, for connection to IE FC RJ45 Plug 4 x 2	**6XV1 878-2A**
IE FC RJ45 Plug 180 2x2 RJ45 plug connector for Industrial Ethernet with a rugged metal housing and integrated insulation-displacement/terminal contacts for connecting Industrial Ethernet FC installation cables; with a 180° cable outlet; for network components and CPs/CPUs with Industrial Ethernet interface	
• 1 pack = 1 unit	**6GK1 901-1BB10-2AA0**
• 1 pack = 10 units	**6GK1 901-1BB10-2AB0**
• 1 pack = 50 units	**6GK1 901-1BB10-2AE0**
IE FC RJ45 Plug 4 x 2 RJ45 plug connector for Industrial Ethernet (10/100/1000 Mbit/s) with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; 180° cable outlet; for network components and CPs/CPUs with Industrial Ethernet interface	
• 1 pack = 1 unit	**6GK1 901-1BB11-2AA0**
• 1 pack = 10 units	**6GK1 901-1BB11-2AB0**
• 1 pack = 50 units	**6GK1 901-1BB11-2AE0**

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Ordering data

	Order No.
IE FC Stripping Tool Preadjusted stripping tool for fast stripping of Industrial Ethernet FC cables	**6GK1 901-1GA00**
Industrial Ethernet Switch SCALANCE X204-2 with four 10/100 Mbit/s RJ45 ports and two fiber-optic cable ports	**6GK5 204-2BB10-2AA3**
Industrial Ethernet Switch SCALANCE X308-2 2 x 1000 Mbit/s multimode fiber-optic cable ports (SC sockets), 1 x 10/100/1000 Mbit/s RJ45 port, 7 x 10/100 Mbit/s RJ45 ports; for glass fiber-optic cable (multimode) up to max. 750 m	**6GK5 308-2FL00-2AA3**

	Order No.
SIMATIC iMap V3.0 for configuring PROFINET CBA, Requirement: Windows 2000 Prof. with Service Pack 4 or later or Windows XP Prof. with Service Pack 1 or later or Windows 2003 Server with Service Pack 1 or later; on PG or PC with Pentium processor, min. 1 GHz; STEP 7 V5.3 or later with Service Pack 3, PN OPC Server V6.3 or later Available in: German, English, with electronic documentation	
• Single license	**6ES7 820-0CC04-0YA5**
• Software Update Service	**6ES7 820-0CC01-0YX2**
• Upgrade to V3.0, Single license	**6ES7 820-0CC04-0YE5**

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SCALANCE M87x UMTS router

Overview

- UMTS, EGPRS (Edge GPRS) and GPRS router for wireless IP communication of Industrial Ethernet-based PLCs over UMTS/GSM mobile wireless networks
- High data transfer rate thanks to UMTS
- Integrated security functions with firewall
- *SCALANCE M875:*
  Use both as VPN server and as client (IPsec)

Technical specifications

Order No.	6GK5 873-0AA10-1AA2	6GK5 875-0AA10-1AA2
Product-type designation	**SCALANCE M873**	**SCALANCE M875**
Transmission rate		
Transfer rate		
• 1 for Industrial Ethernet	10 Mbit/s	10 Mbit/s
• 2 for Industrial Ethernet	100 Mbit/s	100 Mbit/s
• for GSM transmission	9 600 bit/s	9 600 bit/s
• with GPRS transmission		
- with downlink maximum	85.6 kbit/s	85.6 kbit/s
- with uplink maximum	85.6 kbit/s	42.8 kbit/s
• with eGPRS transmission		
- with downlink maximum	236.8 kbit/s	236.8 kbit/s
- with uplink maximum	236.8 kbit/s	118 kbit/s
• with UMTS transmission		
- with downlink maximum	3.6 Mbit/s	14.4 Mbit/s
- with uplink maximum	0.384 Mbit/s	5.76 Mbit/s
Interfaces		
Number of electrical connections		
• for network components and terminal equipment	1	2
• for external antenna(s)	1	2
• for power supply	1	1
Design of electrical connection		
• for network components and terminal equipment		
• for external antenna(s)	SMA antenna socket (50 ohms)	SMA antenna socket (50 ohms)
• for power supply	Terminal block	Terminal block
Inputs/outputs		
Number of electrical connections		
• for digital input signals	1	1
• for digital output signals	1	1
Design of electrical connection		
• for digital input signals	Terminal block	Terminal block
• for digital output signals	Terminal block	Terminal block

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Technical specifications (continued)

Order No.	6GK5 873-0AA10-1AA2	6GK5 875-0AA10-1AA2
Product-type designation	**SCALANCE M873**	**SCALANCE M875**
WAN connection		
Type of mobile wireless network is supported GSM	Yes	Yes
Type of mobile wireless service is supported		
• GPRS	Yes	Yes
• eGPRS	Yes	Yes
Type of mobile wireless network is supported UMTS	Yes	Yes
Type of mobile wireless service is supported		
• HSDPA	Yes	Yes
• HSUPA	No	Yes
Operating frequency		
• for GSM transmission		
- 850 MHz	Yes	Yes
- 900 MHz	Yes	Yes
- 1800 MHz	Yes	Yes
- 1900 MHz	Yes	Yes
• for UMTS transmission		
- 800 MHz	No	Yes
- 850 MHz	Yes	Yes
- 900 MHz	No	No
- 1700 MHz	No	Yes
- 1900 MHz	Yes	Yes
- 2100 MHz	Yes	Yes
Type of GPRS time slot method Multislot Class 10	-	-
Supply voltage, current consumption, power loss		
Type of voltage of supply voltage	DC	DC
Supply voltage	24 V	24 V
• minimum	12 V	12 V
• maximum	30 V	30 V
Consumed current maximum	450 mA	450 mA
Active power loss typical	4 W	4 W
Permitted ambient conditions		
Ambient temperature		
• during operating	-20 … +60 °C	-40 … +75 °C
• during storage	-40 … +70 °C	-40 … +85 °C
Relative humidity at 25 °C during operating maximum	95 %	95 %
Protection class IP	IP20	IP20
Design, dimensions and weight		
Design	compact	compact
Depth	114 mm	114 mm
Height	99 mm	99 mm
Width	45 mm	45 mm
Net weight	280 g	280 g
Type of mounting 35 mm DIN rail mounting	-	-
Type of mounting	-	-

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Technical specifications (continued)

Order No.	6GK5 873-0AA10-1AA2	6GK5 875-0AA10-1AA2
Product-type designation	**SCALANCE M873**	**SCALANCE M875**
Product properties, functions, components general		
Product function DynDNS client	Yes	Yes
Product functions management, configuration		
Product function		
• CLI	No	No
• web-based management	Yes	Yes
• MIB support	No	No
• TRAPs via email	No	No
Protocol is supported		
• Telnet	No	No
• HTTP	No	No
• HTTPS	Yes	Yes
Type of configuration	Web interface	Web interface
Product functions Diagnosis		
Product function		
• Statistics Packet Size	No	No
• Statistics packet type	No	No
• Error statistics	No	No
• SysLog	Yes	Yes
• Packet Filter Log	Yes	Yes
Product functions DHCP		
Product function		
• DHCP client	Yes	Yes
• DHCP server - internal network	Yes	Yes
Product functions Routing		
Router function		
• NAT (IP masquerading)	Yes	Yes
• Port Forwarding	Yes	Yes
• NAT traversal	Yes	Yes
• 1:1 NAT	Yes	Yes
• DNS cache	Yes	Yes
Product functions Security		
Design of the firewall		
Product function		
• Password protection	Yes	Yes
• packet filter	Yes	Yes
• Broadcast/Multicast/Unicast Limiter	-	-
• broadcast blocking	-	-
Suitability for installation Virtual Private Network	No	Yes
Product function with VPN connection	F	T
Number of possible connections for VPN connection	-	10
Number of network stations for internal network with VPN connection maximum	-	-
Type of authentication with Virtual Private Network PSK	No	Yes
Protocol will be supported IPse c tunnel and transport mode	No	Yes

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Technical specifications (continued)

Order No.	6GK5 873-0AA10-1AA2	6GK5 875-0AA10-1AA2
Product-type designation	**SCALANCE M873**	**SCALANCE M875**
Key length		
• with IPsec DES with Virtual Private Network	-	56 bit
• 1 with IPsec AES with Virtual Private Network	-	128 bit
• 2 with IPsec AES with Virtual Private Network	-	192 bit
• 3 with IPsec AES with Virtual Private Network	-	256 bit
Type of Internet key exchange with Virtual Private Network main mode	No	Yes
Key length with IPsec 3DES with Virtual Private Network	-	168 bit
Type of Internet key exchange with Virtual Private Network quick mode	No	Yes
Type of packet authentication with Virtual Private Network	-	
IETF profile with Virtual Private Network X.509v3 certificate	No	Yes
Product functions Time		
Router function NTP	Yes	Yes
Standards, specifications, approvals		
Standard		
• for EMC	-	-
• for EMC from FM	-	-
• for hazardous zone	-	-
• for safety of CSA and UL	-	
• for hazardous area of CSA and UL	-	-
• for emitted interference	EN55022 Class A	EN55022 Class A
• for interference immunity	EN 61000-6-2	EN 61000-6-2
Verification of suitability	EN 61000-6-2	EN 61000-6-2
• CE mark	Yes	Yes
• C-Tick	-	-
• E1 approval	Yes	Yes
• e1 approval	Yes	Yes
• Railway application in accordance with EN 50155	No	Yes

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SCALANCE M87x UMTS router

Ordering data	Order No.
SCALANCE M 87x UMTS router	
UMTS router for wireless IP communication between Industrial Ethernet-based programmable controllers via UMTS/GSM mobile radio networks; EGPRS Multislot Class 12	
• **SCALANCE M873**[1] with integral firewall; 1 x RJ45 port, 1 x antenna connection	**6GK5 873-0AA10-1AA2**
• **SCALANCE M875**[1] with integral firewall and VPN with IPsec; 2 x RJ45 ports, 2 x antenna connections	**6GK5 875-0AA10-1AA2**
Accessories	
IE FC RJ45 Plug 180	
RJ45 plug-in connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 180° cable outlet; for network components and CPs/CPUs with Industrial Ethernet interface	
• 1 pack = 1 unit	**6GK1 901-1BB10-2AA0**
• 1 pack = 10 units	**6GK1 901-1BB10-2AB0**
• 1 pack = 50 units	**6GK1 901-1BB10-2AE0**
ANT794-4MR antenna	**6NH9 860-1AA00**
Omnidirectional antenna for GSM (2G) and UMTS (3G) networks; weather-resistant for indoor and outdoor use; 5 m cable with fixed connection to antenna; SMA connector; including mounting bracket, screws, wall plugs	
SCALANCE S Industrial Security Modules	
For protection of programmable controllers and automation networks, and for safeguarding of industrial communication; configuring tool and electronic manual on CD-ROM; German, English, French, Italian, Spanish	
• **SCALANCE S612** uses the stateful inspection firewall to protect network segments against unauthorized access; protects up to 32 devices up to 64 VPN tunnels simultaneously	**6GK5 612-0BA10-2AA3**
• **SCALANCE S623**[2] uses the stateful inspection firewall to protect network segments against unauthorized access; protects up to 64 devices and up to 128 VPN tunnels simultaneously; enhanced temperature range (-20 to +70 °C)	**6GK5 623-0BA10-2AA3**

	Order No.
CP 343-1 Advanced	**6GK7 343-1GX31-0XE0**
For connecting the SIMATIC S7-300 CPU to Industrial Ethernet; 1 x 10/100/1000 Mbit/s; 2 x 10/100 Mbit/s (IE switch); RJ45 ports; TCP; UDP; ISO; PROFINET IO-Controller and Device, S7 communication (client + server); open communication (SEND/RECEIVE); S7 routing; IP configuration via DHCP/block; extended Web diagnostics; time synchronization; IP Access Control List; IP routing; FTP; e-mail; PROFINET CBA; C-Plug; mit Security (Firewall + VPN) und PROFIenergy (Controller + Device)	
CP 443-1 Advanced	**6GK7 443-1GX30-0XE0**
for connecting the SIMATIC S7-400 CPU to Industrial Ethernet: 1 x 10/100/1000 Mbit/s; 4 x 10/100 Mbit/s (IE SWITCH); RJ45 ports; ISO; TCP; UDP; PROFINET IO controller, S7 communication; open communication (SEND/RECEIVE); S7 routing; IP configuration via DHCP/block; IP Access Control List; time synchronization; expanded Web diagnostics; Fast Startup; PROFIenergy support; IP routing; FTP; Web server; e-mail; PROFINET CBA; mit Security (Firewall/VPN)	
IE TP Cord RJ45/RJ45	
TP cable 4 x 2 with 2 RJ45 connectors	
• 0.5 m	**6XV1 870-3QE50**
• 1 m	**6XV1 870-3QH10**
• 2 m	**6XV1 870-3QH20**
• 6 m	**6XV1 870-3QH60**
• 10 m	**6XV1 870-3QN10**

[1] Please note national approvals under www.siemens.com/wireless-approvals

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Overview

ISO	TCP/ UDP	PN	MRP	IT	IP-R	PG/OP	S7/S5
●	●	●	●	●		●	●

- Connection of SIMATIC S7-400 to Industrial Ethernet
  - 2 x RJ45 interface for 10/100 Mbit/s full/half-duplex connection with auto-sensing/auto-negotiation and auto-crossover function
  - Integrated real-time switch ERTEC with two ports
  - Multi-protocol operation for ISO, TCP/IP, UDP and PROFINET IO protocols
  - Adjustable Keep Alive function
- Communication services:
  - Open communication (ISO, TCP/IP, and UDP)
  - PROFINET IO Controller with real-time properties RT and IRT
  - PG/OP communication: Cross-network by means of S7 routing
  - S7 communication
- Media redundancy (MRP);
  the CP supports the media redundancy procedure MRP within an Ethernet network with ring topology.
- Multicast for UDP
- Access protection via configurable access list
- Support for fail-safe programmable controllers together with SIMATIC S7-400 CPU 416F-3PN/DP
- Module replacement without PG
- Operation in the SIMATIC H system for redundant S7-communication
- Configuration with STEP 7
- Diagnostics possibilities in STEP 7 and via web browser
- Automatic CPU-clock setting via Industrial Ethernet with NTP or SIMATIC procedure
- Integration of network management systems via SNMP (MIB II diagnostic information)

Note:

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

SIPLUS CP 443-1	
Order No.	**6AG1 443-1EX20-4XE0**
Order number based on	**6GK7 443-1EX20-0XE0**
Ambient temperature range	0 ... +60 °C
Conformal coating	Coating of the printed circuit boards and the electronic components
Technical data	The technical data of the standard product applies, except for the ambient conditions
Ambient conditions	
Relative humidity	100%, condensation/frost permissible. No commissioning if condensation present.
Biologically active substances, compliance with EN 60721-3-3	Class 3B2 mold spores, fungal spores (excluding fauna). The supplied plug covers must remain in place over the unused interfaces during operation!
Chemically active substances, compliance with EN 60721-3-3	Class 3C4 incl. salt spray in accordance with EN60068-2-52 (degree of severity 3). The supplied plug covers must remain in place over the unused interfaces during operation!
Mechanically active substances, compliance with EN 60721-3-3	Class 3S4 incl. sand, dust. The supplied plug covers must remain in place over the unused interfaces during operation!
Air pressure (depending on the highest positive temperature range specified)	1080 ... 795 hPa (-1000 ... +2000 m) see ambient temperature range 795 ... 658 hPa (+2000 ... +3500 m) derating 10 K 658 ... 540 hPa (+3500 ... +5000 m) derating 20 K

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

Ordering data	**Order No.**
SIPLUS CP 443-1 communications processor (medial exposure) For connecting SIMATIC S7-400 to Industrial Ethernet through TCP/IP, ISO and UDP; PROFINET IO Controller, MRP; integrated real-time switch ERTEC with two ports; 2 x RJ45 interface; S7 communication, open communication (SEND/RECEIVE) with FETCH/WRITE, with and without RFC 1006, DHCP, SNMP V2, diagnostics, multicast, access protection over IP access list, initialization over LAN 10/100 Mbit/s with electronic manual on DVD	**6AG1 443-1EX20-4XE0**
Accessories	See SIMATIC CP 443-1, page 6/113

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SIPLUS CP 443-1 Advanced

Overview

ISO	TCP/ UDP	PN	MRP	IT	IP-R	PG/OP	S7/S5
●	●	●	●	●	●	●	●

- Connection of SIMATIC S7-400 to Industrial Ethernet
  - Multi-protocol operation for ISO, TCP/IP, UDP and PROFINET IO protocols
  - Adjustable keep-alive function
- Two separate interfaces (integrated network separation):
  - Gigabit interface with one RJ45 port with 10/100/1 000 Mbit/s, full/half-duplex with auto-sensing capability
  - PROFINET interface with four RJ45 ports with 10/100 Mbit/s, full/half duplex with autosensing and autocrossover functionality via integrated 4-port switch
- Communication services via both interfaces
  - Open communication (ISO, TCP/IP and UDP), multicast with UDP, including routing between both interfaces
  - PG/OP communication:
    Cross-network by means of S7 routing
  - S7 communication (client, server, multiplexing) including routing between both interfaces
  - IT communication:
    HTTP communication supports access to process data via own Web pages;
    e-mail client function, sending of e-mails with authentication directly from user program;
    FTP communication supports program-controlled FTP client communication;
    access to data blocks through FTP server
- Communication services via PROFINET interface
  - PROFINET IO controller with real-time properties (RT and IRT)
  - PROFINET CBA
  - IP address assignment via DHCP, simple PC tool or via the user program (e.g. HMI)
  - Support of the prioritized startup of PROFINET IO devices
  - Configuration with STEP 7
- Media redundancy (MRP);
  the CP supports the media redundancy procedure MRP within an Ethernet network with ring topology.
- Access protection by means of configurable IP access list
- Module replacement without programming device;
  all information is stored on the C-PLUG
  (also file system for IT functions)
- Extensive diagnostic functions for all modules in the rack
- Integration into network management systems through the support of SNMP V1 MIB-II
- Operation in the SIMATIC H system for redundant S7-communication
- Operation in fail-safe applications (PROFIsafe) in combination with SIMATIC S7-400 CPU 416F

Note:

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

SIPLUS CP 443-1 Advanced	
Order No.	**6AG1 443-1GX20-4XE0**
Order number based on	**6GK7 443-1GX20-0XE0**
Ambient temperature range	0 ... +60 °C
Conformal coating	Coating of the printed circuit boards and the electronic components
Technical data	The technical data of the standard product applies, except for the ambient conditions
Ambient conditions	
Relative humidity	100%, condensation/frost permissible. No commissioning if condensation present.
Biologically active substances, compliance with EN 60721-3-3	Class 3B2 mold and fungal spores (excluding fauna). The supplied plug covers must remain in place over the unused interfaces during operation!
Chemically active substances, compliance with EN 60721-3-3	Class 3C4 incl. salt spray in accordance with EN60068-2-52 (degree of severity 3). The supplied plug covers must remain in place over the unused interfaces during operation!
Mechanically active substances, compliance with EN 60721-3-3	Class 3S4 incl. sand, dust. The supplied plug covers must remain in place over the unused interfaces during operation!
Air pressure (depending on the highest positive temperature range specified)	1 080 ... 795 hPa (-1 000 ... +2 000 m) see ambient temperature range 795 ... 658 hPa (+2 000 ... +3 500 m) derating 10 K 658 ... 540 hPa (+3 500 ... +5 000 m) derating 20 K

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

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Ordering data	Order No.
SIPLUS CP 443-1 Advanced communications processor (medial exposure) For the connection of SIMATIC S7-400 to Industrial Ethernet; PROFINET IO Controller with RT and IRT, MRP, PROFINET CBA, TCP/IP, ISO and UDP; S7 communication, open communication (SEND/ RECEIVE) with FETCH/WRITE, with and without RFC 1006, diagnostic expansions, multicast, clock synchronization via SIMATIC procedure or NTP, access protection via IP access list, FTP client/server, HTTP server, HTML diagnostics, SNMP, DHCP, e-mail, data storage on C-PLUG; PROFINET interface: 4 x RJ45 (10/100 Mbit/s) over switch; Gigabit interface: 1 x RJ45 (10/100/1000 Mbit/s); with electronic manual on DVD	
• For use with SIMATIC S7-400 CPU, V5.2 and higher	**6AG1 443-1GX20-4XE0**

	Order No.
Accessories	See SIMATIC CP 443-1 Advanced, page 6/118

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Front connectors

Overview

- For simple and user-friendly connection of sensors and actuators
- For retaining the wiring when replacing modules
- With coding to avoid mistakes when replacing modules

Ordering data

	Order No.
Front connectors	
48-pin for signal modules, function modules; 1 unit	
• With screw contacts	**6ES7 492-1AL00-0AA0**
• With spring-loaded terminals	**6ES7 492-1BL00-0AA0**
• With crimp contacts	**6ES7 492-1CL00-0AA0**
48-pin for signal modules, function modules; 84 units per pack	
• With screw contacts	**6ES7 492-1AL00-1AB0**
• With crimp contacts	**6ES7 492-1CL00-1AB0**
for 6ES7 431-7KF00-0AB0; spare part, included in scope of delivery; 1 piece	**6ES7 431-7KF00-6AA0**
Crimp contacts	**6XX3 070**
250 units	
Crimping tool	**6XX3 071**
for crimping the contacts	
Front cover for front connector	**6ES7 492-2XL00-0AA0**
6 units	
Connection terminal for modules	**6ES7 490-1BA00-0AA0**
6 units	
SIMATIC Manual Collection	**6ES7 998-8XC01-8YE0**
Electronic manuals on DVD, multilingual: 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	
SIMATIC Manual Collection update service for 1 year	**6ES7 998-8XC01-8YE2**
Current "Manual Collection" DVD and the three subsequent updates	

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Overview

Wiring of SIMATIC S7 I/O modules with the sensors/actuators is a significant factor with respect to time/cost overhead, configuring, control cabinet installation, procurement and ease of service.

With SIMATIC TOP connect system cabling, it is simple and quick to establish a reliable connection for your SIMATIC S7-300/400.

With the TIA Selection Tool, a mouse click is all that is required to configure the connection from the SIMATIC S7 module to the I/O. The program automatically checks for plausibility and generates a parts list for the selected connection components that can then be ordered in the Industry Mall.

Further information can be found on the Internet at

www.siemens.com/tia-selection-tool

Design

The flexible connection lets you quickly connect sensors and actuators inside the control cabinet with the SIMATIC S7-400.

The flexible connection consists of:

- Front connector with screw-type or crimp connection
- Front connector with fixed single cores
- Single cores also available with UL/CSA-certified cores

The blue wires are numbered sequentially and can be routed direct to each element in the control cabinet. The numbering of the single cores corresponds to the coding of the front connector contacts.

In comparison to conventional single wiring, there is a cost saving of 50% for assembly, since the single cores that have already been checked on the connector are fixed.

Thus no complex pre-assembly of up to two times 46 single cores per module is necessary.

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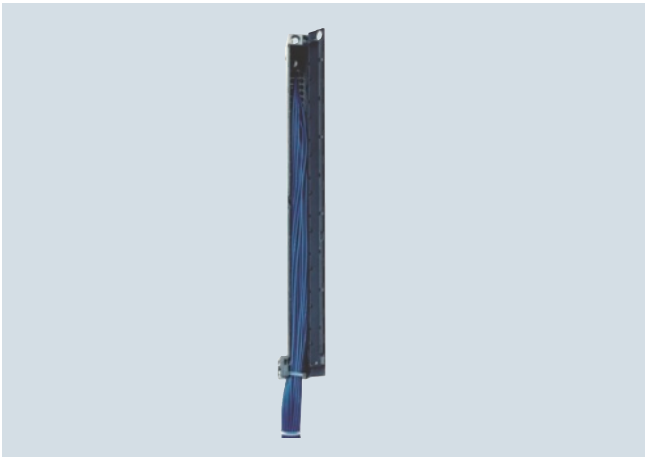
Flexible connection

Overview



The flexible connection guarantees a fast and direct connection from the input/output modules of the SIMATIC S7-300/400 to the individual elements in the cabinet.

Already attached single cores reduce the wiring effort.

The core cross-sections of 0,5 mm^2 also allow higher currents.

Technical specifications

Front connector with single cores	
Rated operating voltage	24 V DC
Max. permissible continuous current with simultaneous load on all cores	1.0 A
Permissible ambient temperature	0 to +60 C
Core type	H05V-K or with UL style 1007/1569 CSA TR64
Number of cores	46
Core cross-section	0.5 mm^2, Cu
Bundle diameter in mm	approx. 17
Core color	Blue, RAL 5010
Designation of cores	Numbered 3 to 48 (adapter contact = core number)
Assembly	Screw-type or crimp contacts

Ordering data

Ordering data	Order No.
Front connector with single cores for 32-channel module SIMATIC S7-400, 46 x 0.5 mm^2	
Core type H05V-K	
Screw connection	
Packaging unit: 1 unit Length:	
• 2.5 m	**6ES7 922-4BC50-0AD0**
• 3.2 m	**6ES7 922-4BD20-0AD0**
• 5 m	**6ES7 922-4BF00-0AD0**
• Custom lengths	on request
Packaging unit: 5 units Length:	
• 2.5 m	**6ES7 922-4BC50-5AD0**
• 3.2 m	**6ES7 922-4BD20-5AD0**
• 5 m	**6ES7 922-4BF00-5AD0**
Crimp connection	
Packaging unit: 1 unit Length:	
• 2.5 m	**6ES7 922-4BC50-0AE0**
• 3.2 m	**6ES7 922-4BD20-0AE0**
• 5 m	**6ES7 922-4BF00-0AE0**
• Custom lengths	on request
Packaging unit: 5 units Length:	
• 2.5 m	**6ES7 922-4BC50-5AE0**
• 3.2 m	**6ES7 922-4BD20-5AE0**
• 5 m	**6ES7 922-4BF00-5AE0**
Core type UL/CSA-certified	
Screw-type version	
Packaging unit: 1 unit	
• 3.2 m	**6ES7 922-4BD20-0UD0**
• 5 m	**6ES7 922-4BF00-0UD0**
• Custom lengths	on request

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Overview

- The basic mechanical framework of the SIMATIC S7-400/S7-400H
- For accommodating the modules, supplying them with operating voltage and connecting them via the backplane bus
- Several versions for configuring central controllers and expansion racks

UR1 (Universal Rack)

- For setting up central controllers and expansion units
- For holding up to 18 modules
- Also suitable for S7-400H
- Also available as aluminum rack

UR2 (Universal Rack)

- For setting up central controllers and expansion units
- For holding up to 9 modules
- Also suitable for S7-400H.
- Also available as aluminum rack

CR2 (Central Rack)

- For setting up central controllers
- For holding up to 18 modules
- Segmented rack:
  For operating two mutually independent S7-400 CPUs without S7-400 Multicomputing, but with communication between the CPUs over the backplane bus (C bus). Both CPUs can address their own local I/O modules (segmented P bus).

CR3 (Central Rack)

- For configuring central racks
- Optimized for distributed automation solutions due to holding up to 4 modules

UR2-H

- For configuring a complete S7-400H system in one subrack
- Also suitable for S7-400:
  Operation of 2 separate CPUs with their own I/O (separate P and C buses)
- Can also be used as an expansion unit
- For holding up to 18 modules
- Also available as aluminum rack

ER1 (Extension Rack)

- For setting up expansion units economically
- For holding up to 18 modules with restricted functionality
- Also suitable for S7-400H
- Also available as aluminum rack

ER2 (Extension Rack)

- For setting up expansion units economically
- For holding up to 9 modules with restricted functionality
- Also suitable for S7-400H
- Also available as aluminum rack

Technical specifications

	6ES7 400-1TA01-0AA0	6ES7 400-1TA11-0AA0	6ES7 400-1JA01-0AA0	6ES7 400-1JA11-0AA0	6ES7 401-2TA01-0AA0	6ES7 401-1DA01-0AA0
Hardware configuration						
Number of single-width slots, max.	18	18	9	9	18; 2 segments with 8 or 10 slots	4
Rack						
• Communication bus	Yes	Yes	Yes	Yes	Yes	Yes
• P bus	Yes	Yes	Yes	Yes	Yes	Yes
Dimensions						
Width	482.5 mm	482.5 mm	257.5 mm	257.5 mm	482.5 mm	130 mm
Height	290 mm	290 mm	290 mm	290 mm	290 mm	290 mm
Depth	27.5 mm	27.5 mm	27.5 mm	27.5 mm	27.5 mm	27.5 mm
Weight						
Weight, approx.	4 200 g	3 000 g	2 200 g	1 500 g	4 200 g	750 g

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Technical specifications (continued)

	6ES7 400-2JA00-0AA0	6ES7 400-2JA10-0AA0	6ES7 403-1TA01-0AA0	6ES7 403-1TA11-0AA0	6ES7 403-1JA01-0AA0	6ES7 403-1JA11-0AA0
Hardware configuration						
Number of single-width slots, max.	18	18	18	18	9	9
Rack						
• Communication bus	Yes	Yes				
• P bus	Yes	Yes	Yes	Yes	Yes	Yes
Dimensions						
Width	482.5 mm	482.5 mm	482.5 mm	482.5 mm	257.5 mm	257.5 mm
Height	290 mm	290 mm	290 mm	290 mm	290 mm	290 mm
Depth	27.5 mm	27.5 mm	27.5 mm	27.5 mm	27.5 mm	27.5 mm
Weight						
Weight, approx.	4 200 g	3 000 g	4 200 g	2 500 g	2 200 g	1 250 g

Ordering data

	Order No.
UR1 rack for central controllers and expansion units, 18 slots	**6ES7 400-1TA01-0AA0**
UR1 aluminum rack for central controllers and expansion units, 18 slots	**6ES7 400-1TA11-0AA0**
UR2 rack for central controllers and expansion units, 9 slots	**6ES7 400-1JA01-0AA0**
UR2 aluminum rack for central controllers and expansion units, 9 slots	**6ES7 400-1JA11-0AA0**
CR2 rack for segmented central controllers, 18 slots, 2 local segments	**6ES7 401-2TA01-0AA0**
CR3 rack for central controllers and expansion units, 4 slots; optimized for distributed automation solutions	**6ES7 401-1DA01-0AA0**

	Order No.
UR2-H rack for split CCs, 18 slots	**6ES7 400-2JA00-0AA0**
UR2-H aluminum rack for split CCs, 18 slots	**6ES7 400-2JA10-0AA0**
ER1 rack for expansion units, P bus only, 18 slots	**6ES7 403-1TA01-0AA0**
ER1 aluminum rack for expansion units, P bus only, 18 slots	**6ES7 403-1TA11-0AA0**
ER2 rack for expansion units, P bus only, 9 slots	**6ES7 403-1JA01-0AA0**
ER2 aluminum rack for expansion units, P bus only, 9 slots	**6ES7 403-1JA11-0AA0**
Slot cover 10 units (spare part)	**6ES7 490-1AA00-0AA0**

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Overview

- Fans for the SIMATIC S7-400
- Necessary when using modules that generate an extremely large amount of heat

Technical specifications

	6ES7 408-1TA01-0XA0	6ES7 408-1TB00-0XA0
Supply voltage		
24 V DC	Yes	
permissible range, lower limit (DC)	19.2 V	
permissible range, upper limit (DC)	30 V	
120 V AC		Yes
230 V AC		Yes
Line frequency		
• Frequency of the supply voltage		63 Hz
Input current		
Inrush current, typ.	0.9 A; at 24 V	0.6 A at rated voltage 230 VAC: 1.15 A at rated voltage 120 VAC
Power losses		
Power loss, max.	11 W	20 W
Digital outputs		
Relay outputs		
• Rated input voltage of relay coil L+ (DC)	24 V	24 V
• Switching capacity of contacts		
- Switching frequency/contacts/at ohmic load/maximum	200 mA	200 mA
Dimensions		
Width	482.5 mm	482.5 mm
Height	109.5 mm	109.5 mm
Depth	235 mm	235 mm
Weight		
Weight, approx.	1.6 kg	2 kg

Ordering data

	Order No.
Fan subassembly	
for all racks; Supply voltage	
24 V DC	**6ES7 408-1TA01-0XA0**
120 / 230 V AC	**6ES7 408-1TB00-0XA0**
Dust filter	**6ES7 408-1TA00-7AA0**
10 pieces	

	Order No.
Replacement fan	**6ES7 408-1TA00-6AA0**
Spare part	
Cable duct	**6ES7 408-0TA00-0AA0**
Same design as fan subassembly, but without fans or electronic units	

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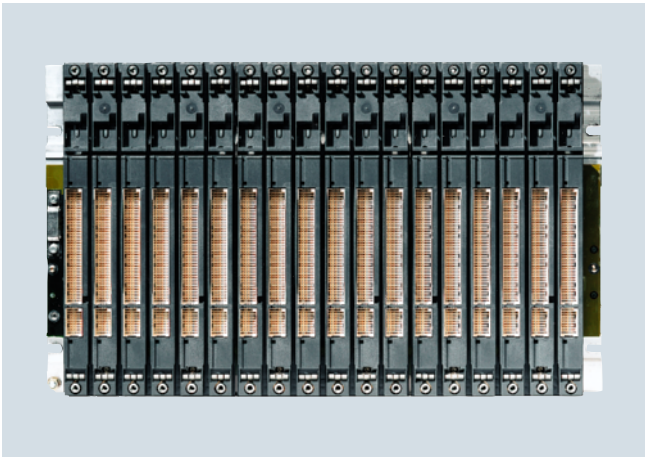
SIPLUS racks

Overview



- The mechanical basic structure of SIPLUS S7-400/S7-400H
- For accommodating the modules, operating voltage supply, and connection of the modules via a backplane bus
- Several versions for setting up central controllers and expansion units
- SIPLUS rack material: Aluminum

Note:

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

SIPLUS S7-400 rack				
Order No.	**6AG1 400-1JA11-7AA0**	**6AG1 400-1TA11-7AA0**	**6AG1 400-2JA10-4AA0**	**6AG1 400-2JA10-7AA0**
Order No. based on	**6ES7 400-1JA11-0AA0**	**6ES7 400-1TA11-0AA0**	**6ES7 400-2JA10-0AA0**	**6ES7 400-2JA10-0AA0**
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	0 ... +60 °C	-25 ... +70 °C
Conformal coating	Coating of the printed circuit boards and the electronic components			
Technical data	The technical data of the standard product applies, except for the ambient conditions			
Ambient conditions				
Relative humidity	100%, condensation/frost permissible. No commissioning if condensation present.			
Biologically active substances, compliance with EN 60721-3-3	Class 3B2 mold and fungal spores (excluding fauna). The supplied plug covers must remain in place over the unused interfaces during operation!			
Chemically active substances, compliance with EN 60721-3-3	Class 3C4 incl. salt spray in accordance with EN60068-2-52 (degree of severity 3). The supplied plug covers must remain in place over the unused interfaces during operation!			
Mechanically active substances, compliance with EN 60721-3-3	Class 3S4 incl. sand, dust. The supplied plug covers must remain in place over the unused interfaces during operation!			
Air pressure (depending on the highest positive temperature range specified)	1080 ... 795 hPa (-1000 ... +2000 m) see ambient temperature range 795 ... 658 hPa (+2000 ... +3500 m) derating 10 K 658 ... 540 hPa (+3500 ... +5000 m) derating 20 K			

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

Ordering data

	Order No.
SIPLUS S7-400 rack (extended temperature range and medial exposure)	
Ambient temperature range -25 ... +70 °C	
UR1 aluminum rack for central controllers and expansion units, 18 slots	**6AG1 400-1TA11-7AA0**
UR2 aluminum rack for central controllers and expansion units, 9 slots	**6AG1 400-1JA11-7AA0**
UR2-H aluminum rack for central controllers and expansion units, 9 slots	**6AG1 400-2JA10-7AA0**

	Order No.
Ambient temperature range 0 ... +60 °C	
UR2-H aluminum rack for central controllers and expansion units, 9 slots	**6AG1 400-2JA10-4AA0**
Accessories	See SIMATIC rack S7-400, page 6/132

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Overview

- Send interface module for central expansion to 5 m
- Transmission of P and K bus
- Can be plugged into the central controller
- Up to 8 expansion racks can be connected (up to 4 per interface)
- Can be used exclusively with IM 461-0

Technical specifications

	6ES7 460-0AA01-0AB0
Input current	
from backplane bus 5 V DC, max.	140 mA
Power losses	
Power loss, max.	700 mW
Hardware configuration	
Cable length between first and last interface module, max.	5 m
Dimensions	
Width	25 mm
Height	290 mm
Depth	217 mm
Weight	
Weight, approx.	600 g

Ordering data

	Order No.
IM 460-0 interface module	**6ES7 460-0AA01-0AB0**
Send interface module for central connection up to 5 m; with C bus transmission	
468-1 connecting cable	
between IM 460-0 and IM 461-0; IM 460-3 and IM 461-3	
0.75 m	**6ES7 468-1AH50-0AA0**
1.5 m	**6ES7 468-1BB50-0AA0**
5 m	**6ES7 468-1BF00-0AA0**

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IM 461-0

Overview

- Receive interface for centralized expansion up to 5 m
- Transmission of P and K bus
- Can be plugged into expansion rack
- To be used exclusively with IM 460-0

Technical specifications

	6ES7 461-0AA01-0AA0
Input current	
from backplane bus 5 V DC, max.	290 mA
Power losses	
Power loss, max.	1 450 mW
Hardware configuration	
Cable length between first and last interface module, max.	5 m
Dimensions	
Width	25 mm
Height	290 mm
Depth	217 mm
Weight	
Weight, approx.	610 g

Ordering data

	Order No.
IM 461-0 interface module	**6ES7 461-0AA01-0AA0**
Receive interface module for central connection up to 5 m; with C bus transmission	
468-1 connecting cable	
between IM 460-0 and IM 461-0; IM 460-3 and IM 461-3	
0.75 m	**6ES7 468-1AH50-0AA0**
1.5 m	**6ES7 468-1BB50-0AA0**
5 m	**6ES7 468-1BF00-0AA0**
Terminating connector	**6ES7 461-0AA00-7AA0**
for IM 461-0	

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Overview

- Send interface module for central expansion to 1.5 m
- Transmission of P bus
- With voltage supply for expansion units
- Can be plugged into the central controller
- Up to 2 expansion racks can be connected (up to 1 per interface)
- Can be used exclusively with IM 461-1

Technical specifications

	6ES7 460-1BA01-0AB0
Input current	
from backplane bus 5 V DC, max.	85 mA
Power losses	
Power loss, max.	425 mW
Hardware configuration	
Cable length between first and last interface module, max.	1.5 m
Dimensions	
Width	25 mm
Height	290 mm
Depth	217 mm
Weight	
Weight, approx.	600 g

Ordering data

	Order No.
IM 460-1 interface module	**6ES7 460-1BA01-0AB0**
Send interface module for central connection up to 1.5 m; with 5 V power supply, without C bus transmission	
468-3 connecting cable	
between IM 460-1 and IM 461-1	
0.75 m	**6ES7 468-3AH50-0AA0**
1.5 m	**6ES7 468-3BB50-0AA0**

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IM 461-1

Overview

- Receive interface for central expansion up to 1.5 m
- Transmission of P bus
- With voltage supply for expansion racks
- Can be plugged into expansion rack
- Can be used exclusively with IM 460-1

Technical specifications

	6ES7 461-1BA01-0AA0
Input current	
from backplane bus 5 V DC, max.	120 mA
Power losses	
Power loss, max.	600 mW
Hardware configuration	
Cable length between first and last interface module, max.	1.5 m
Dimensions	
Width	25 mm
Height	290 mm
Depth	217 mm
Weight	
Weight, approx.	610 g

Ordering data

	Order No.
IM 461-1 interface module	**6ES7 461-1BA01-0AA0**
Receive IM for central coupling up to max. 1.5 m; without C bus transfer	
468-3 connecting cable	
For connecting IM 460-1 and IM 461-1	
0.75 m	**6ES7 468-3AH50-0AA0**
1.5 m	**6ES7 468-3BB50-0AA0**

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Overview

- Send interface module for distributed expansion to 102 m
- Transmission of K and P bus
- Can be plugged into the central controller
- Up to 8 expansion racks can be connected (up to 4 per interface)
- Can be used exclusively with IM 461-3

Technical specifications

	6ES7 460-3AA01-0AB0
Input current	
from backplane bus 5 V DC, max.	1 550 mA
Power losses	
Power loss, max.	7 750 mW
Hardware configuration	
Cable length between first and last interface module, max.	102.25 m
Dimensions	
Width	25 mm
Height	290 mm
Depth	217 mm
Weight	
Weight, approx.	630 g

Ordering data

	Order No.
IM 460-3 interface module	**6ES7 460-3AA01-0AB0**
Send interface module for distributed connection up to 102 m; with C bus transmission	
468-1 connecting cable	
between IM 460-3 and IM 461-3	
0.75 m	**6ES7 468-1AH50-0AA0**
1.5 m	**6ES7 468-1BB50-0AA0**
5 m	**6ES7 468-1BF00-0AA0**
10 m	**6ES7 468-1CB00-0AA0**
25 m	**6ES7 468-1CC50-0AA0**
50 m	**6ES7 468-1CF00-0AA0**
100 m	**6ES7 468-1DB00-0AA0**

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IM 461-3

Overview

- Receive interface for distributed expansion up to 102 m
- Transmission of data from the P-bus and C-bus
- Can be plugged into expansion rack
- To be used exclusively with IM 460-3

Technical specifications

	6ES7 461-3AA01-0AA0
Input current	
from backplane bus 5 V DC, max.	620 mA
Power losses	
Power loss, max.	3 100 mW
Hardware configuration	
Cable length between first and last interface module, max.	102.25 m
Dimensions	
Width	25 mm
Height	290 mm
Depth	217 mm
Weight	
Weight, approx.	620 g

Ordering data

	Order No.
IM 461-3 interface module	**6ES7 461-3AA01-0AA0**
Receiving interface module for distributed connection up to 102 m; with C bus transmission	
468-1 connecting cable	
between IM 460-3 and IM 461-3	
0.75 m	**6ES7 468-1AH50-0AA0**
1.5 m	**6ES7 468-1BB50-0AA0**
5 m	**6ES7 468-1BF00-0AA0**
10 m	**6ES7 468-1CB00-0AA0**
25 m	**6ES7 468-1CC50-0AA0**
50 m	**6ES7 468-1CF00-0AA0**
100 m	**6ES7 468-1DB00-0AA0**
Terminating connector	**6ES7 461-3AA00-7AA0**
for IM 461-3	

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Overview

- Send interface for distributed expansion with SIMATIC S5 expansion racks up to 600 m
- Can be plugged into the central controller
- Up to 8 SIMATIC S5 expansion racks can be connected (up to 4 per interface)
- Can be used exclusively with IM 314

Technical specifications

	6ES7 463-2AA00-0AA0
Input current	
from backplane bus 5 V DC, max.	1 320 mA
Power losses	
Power loss, max.	6 600 mW
Hardware configuration	
Cable length between first and last interface module, max.	600 m
Dimensions	
Width	25 mm
Height	290 mm
Depth	217 mm
Weight	
Weight, approx.	360 g

Ordering data

	Order No.
IM 463-2 interface module	**6ES7 463-2AA00-0AA0**
Receiving IM for distributed coupling of SIMATIC S5-EUs up to max. 600 m	

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SIPLUS IM 460-0

Overview

- Send interface module for centralized expansion up to 5 m
- Transfer from P and K Bus
- Plug into central controller
- You may connect up to 8 expansion units (max. 4 per port)
- Usable exclusively with IM 461-0

Note:

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

SIPLUS IM 460-0	
Order number	**6AG1 460-0AA01-2AB0**
Order No. based on	**6ES7 460-0AA01-0AB0**
Ambient temperature range	-25 ... +60 °C
Conformal coating	Coating of the printed circuit boards and the electronic components
Technical data	The technical data of the standard product applies except for the ambient conditions.
Ambient conditions	
Relative humidity	100%, condensation/frost permissible. No commissioning if condensation present.
Biologically active substances, compliance with EN 60721-3-3	Class 3B2 mold and fungal spores (excluding fauna). The supplied plug covers must remain in place over the unused interfaces during operation!
Chemically active substances, compliance with EN 60721-3-3	Class 3C4 incl. salt spray in accordance with EN60068-2-52 (degree of severity 3). The supplied plug covers must remain in place over the unused interfaces during operation!
Mechanically active substances, compliance with EN 60721-3-3	Class 3S4 incl. sand, dust. The supplied plug covers must remain in place over the unused interfaces during operation!
Air pressure (depending on the highest positive temperature range specified)	1080 ... 795 hPa (-1000 ... +2000 m) see ambient temperature range 795 ... 658 hPa (+2000 ... +3500 m) derating 10 K 658 ... 540 hPa (+3500 ... +5000 m) derating 20 K

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

Ordering data

	Order No.
SIPLUS IM 460-0 interface module (extended temperature range and medial exposure) Send IM for central coupling up to 5 m; with C bus transfer	**6AG1 460-0AA01-2AB0**
Accessories	See SIMATIC IM 460-0, page 6/135

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SIPLUS IM 461-0

Overview

- Receive interface connection for central extension up to 5 m
- Transfer from P and K Bus
- Pluggable in extension device
- Usable exclusively with IM 460-0

Note:

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

SIPLUS IM 461	
Order No.	**6AG1 461-0AA01-2AA0**
Order No. based on	**6AG1 461-0AA01-2AA0**
Ambient temperature range	-25 ... +60 °C
Conformal coating	Coating of the printed circuit boards and the electronic components
Technical data	The technical data of the standard product applies except for the ambient conditions.
Ambient conditions	
Relative humidity	100%, condensation/frost permissible. No commissioning if condensation present.
Biologically active substances, compliance with EN 60721-3-3	Class 3B2 mold and fungal spores (excluding fauna). The supplied plug covers must remain in place over the unused interfaces during operation!
Chemically active substances, compliance with EN 60721-3-3	Class 3C4 incl. salt spray in accordance with EN60068-2-52 (degree of severity 3). The supplied plug covers must remain in place over the unused interfaces during operation!
Mechanically active substances, compliance with EN 60721-3-3	Class 3S4 incl. sand, dust. The supplied plug covers must remain in place over the unused interfaces during operation!
Air pressure (depending on the highest positive temperature range specified)	1 080 ... 795 hPa (-1 000 ... +2 000 m) see ambient temperature range 795 ... 658 hPa (+2 000 ... +3 500 m) derating 10 K 658 ... 540 hPa (+3 500 ... +5 000 m) derating 20 K

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

Ordering data

	Order No.
SIPLUS IM 461-0 interface module (extended temperature range and medial exposure) Receiving IM for central coupling up to 5 m; with C bus transfer	**6AG1 461-0AA01-2AA0**
Accessories	See SIMATIC IM 461-0, page 6/136

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PS 405/407 power supply

Overview

- Power supplies for SIMATIC S7-400
- For conversion of AC or DC line voltages to the 5 V DC and 24 V DC operating voltages required
- 4 A, 10 A and 20 A output currents
- In addition:
  - SIPLUS power supply 6AG1 405-0KA02-2AA0 for temperature range of -25 to +60 °C and use under medium load (e.g. chlorine/sulfur atmosphere). Technical specifications similar to 6ES7 405-0KA02-0AA0
  - SIPLUS power supply 6AG1 407-0KA02-4AA0 for use under medium load (e.g. chlorine/sulfur atmosphere). Technical specifications similar to 6ES7 407-0KA02-0AA0
  - SIPLUS power supply 6AG1 407-0KR02-4AA0 for use under medium load (e.g. chlorine/sulfur atmosphere). Technical specifications similar to 6ES7 407-0KR02-0AA0

Technical specifications

	6ES7 405-0DA02-0AA0 PS405, 24 VDC, 5 VDC/4 A	6ES7 405-0KA02-0AA0 PS405, 24/48/60 VDC, 5 VDC/10 A	6ES7 405-0KR02-0AA0 PS405,24/48/60 VDC, 5 VDC/10 A,RED	6ES7 405-0RA02-0AA0 PS405, 24/48/60 VDC, 5 VDC/20 A
Supply voltage				
Rated value, 24 V DC	Yes	Yes	Yes	Yes
Rated value, 48 V DC	Yes	Yes	Yes	Yes
Rated value, 60 V DC	Yes	Yes	Yes	Yes
permissible range, lower limit (DC)	19.2 V; Dynamic 18.5 V	19.2 V; Dynamic 18.5 V	19.2 V; Dynamic 18.5 V	19.2 V; Dynamic 18.5 V
permissible range, upper limit (DC)	72 V; dynamic 75.5 V	72 V; dynamic 75.5 V	72 V; dynamic 75.5 V	72 V; dynamic 75.5 V
Mains buffering				
• Mains/voltage failure stored energy time	20 ms	20 ms	20 ms	20 ms
• Mains buffering according to NAMUR recommendation	Yes	Yes	Yes	Yes
Input current				
Rated value at 24 V DC	2 A	4 A	4 A	7 A
Rated value at 48 V DC	1 000 mA	2 A	2 A	3.2 A
Rated value at 60 V DC	800 mA	1.6 A	1.6 A	2.5 A
Inrush current, max.	18 A; Full width at half maximum 20 ms	18 A; Full width at half maximum 20 ms	18 A; Full width at half maximum 20 ms	56 A; Full width at half maximum 1.5 ms
Output voltage				
Rated value, 5 V DC	Yes	Yes	Yes	Yes
Rated value, 24 V DC	Yes	Yes	Yes	Yes
Output current				
for backplane bus (5 V DC), max.	4 A; no base load required	10 A; no base load required	10 A; no base load required	20 A; no base load required
for backplane bus (24 V DC), max.	0.5 A; idling-proof	1 A; idling-proof	1 A; idling-proof	1 A; idling-proof
Short-circuit protection	Yes	Yes	Yes	Yes
Power				
Power consumption, typ.	48 W	95 W	95 W	168 W
Power losses				
Power loss, typ.	16 W	20 W	20 W	44 W

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Technical specifications (continued)

	6ES7 405-0DA02-0AA0 PS405, 24 VDC, 5 VDC/4 A	6ES7 405-0KA02-0AA0 PS405, 24/48/60 VDC, 5 VDC/10 A	6ES7 405-0KR02-0AA0 PS405,24/48/60 VDC, 5 VDC/10 A,RED	6ES7 405-0RA02-0AA0 PS405, 24/48/60 VDC, 5 VDC/20 A
Backup battery				
• Backup battery				
- Backup battery (optional)	Yes; 1 x lithium AA; 3.6 V/2.3 Ah	Yes; 2 x lithium AA; 3.6 V/2.3 Ah	Yes; 2 x lithium AA; 3.6 V/2.3 Ah	Yes; 2 x lithium AA; 3.6 V/2.3 Ah
Galvanic isolation				
primary/secondary	Yes	Yes	Yes	Yes
Degree and class of protection				
Protection class	1; with protective conductor	1; with protective conductor	1; with protective conductor	1; with protective conductor
Standards, approvals, certificates				
FM approval	Yes; Ta: 0 °C to 60 °C T4	Yes; Ta: 0 °C to 60 °C T4	Yes; Ta: 0 °C to 60 °C T4	Yes; Ta: 0 °C to 60 °C T4
Connection method				
Connecting cables/cross sections	3 x 1.5 mm^2, solid or stranded wire with end sleeve, external diameter 3 to 9 mm	3 x 1.5 mm^2, solid or stranded wire with end sleeve, external diameter 3 to 9 mm	3 x 1.5 mm^2, solid or stranded wire with end sleeve, external diameter 3 to 9 mm	3 x 1.5 mm^2, solid or stranded wire with end sleeve, external diameter 3 to 9 mm
Dimensions				
Width	25 mm	50 mm	50 mm	50 mm
Height	290 mm	290 mm	290 mm	290 mm
Depth	217 mm	217 mm	217 mm	217 mm
Required slots	1	2	2	2
Weight				
Weight, approx.	760 g	1 200 g	1 200 g	1 300 g

	6ES7 407-0DA02-0AA0	6ES7 407-0KA02-0AA0	6ES7 407-0KR02-0AA0	6ES7 407-0RA02-0AA0
Supply voltage				
Rated value, 110 V DC	Yes; Rated value 120 V DC	Yes; Rated value 120 V DC	Yes; Rated value 120 V DC	Yes; Rated value 120 V DC
Rated value, 230 V DC	Yes	Yes	Yes	Yes
permissible range, lower limit (DC)	88 V	88 V	88 V	88 V
permissible range, upper limit (DC)	300 V	300 V	300 V	300 V
Rated value, 120 V AC	Yes	Yes	Yes	Yes
Rated value, 230 V AC	Yes	Yes	Yes	Yes
Line frequency				
• Rated value 50 Hz	Yes	Yes	Yes	Yes
• Rated value 60 Hz	Yes	Yes	Yes	Yes
• Frequency of the supply voltage	47 Hz	47 Hz	47 Hz	47 Hz
• Frequency of the supply voltage	63 Hz	63 Hz	63 Hz	63 Hz
Mains buffering				
• Mains/voltage failure stored energy time	20 ms	20 ms	20 ms	20 ms
• Mains buffering according to NAMUR recommendation	Yes	Yes	Yes	Yes
Input current				
Rated value at 110 V DC	350 mA; at 120 V DC	1 A; at 120 V DC	1 A; at 120 V DC	1.4 A; at 120 V DC
Rated value at 230 V DC	190 mA	0.5 A	0.5 A	0.7 A
Rated value at 120 V AC	0.42 A	0.9 A	0.9 A	1.4 A
Rated value at 230 V AC	0.22 A	0.5 A	0.5 A	0.7 A
Inrush current, max.	8.25 A; Full width at half maximum 5 ms	63 A; Full width at half maximum 1 ms	63 A; Full width at half maximum 1 ms	88 A; Full width at half maximum 1.1 ms
Output voltage				
Rated value, 5 V DC	Yes	Yes	Yes	Yes
Rated value, 24 V DC	Yes	Yes	Yes	Yes

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Technical specifications (continued)

	6ES7 407-0DA02-0AA0	6ES7 407-0KA02-0AA0	6ES7 407-0KR02-0AA0	6ES7 407-0RA02-0AA0
Output current				
for backplane bus (5 V DC), max.	4 A; no base load required	10 A; no base load required	10 A; no base load required	20 A; no base load required
for backplane bus (24 V DC), max.	0.5 A; idling-proof	1 A; idling-proof	1 A; idling-proof	1 A; idling-proof
Short-circuit protection	Yes	Yes	Yes	Yes
Power				
Power consumption, typ.	52 W	95 W	95 W	158 W
Power losses				
Power loss, typ.	20 W	20 W	20 W	35 W
Backup battery				
• Backup battery				
- Backup battery (optional)	Yes; 1 x lithium AA; 3.6 V/2.3 Ah	Yes; 2 x lithium AA; 3.6 V/2.3 Ah	Yes; 2 x lithium AA; 3.6 V/2.3 Ah	Yes; 2 x lithium AA; 3.6 V/2.3 Ah
Galvanic isolation				
primary/secondary	Yes	Yes	Yes	Yes
EMC				
Compliance with line harmonic distortion limits				
• Observance of line harmonic distortion acc. to IEC 61000-3-2, IEC 61000-3-3	Yes	Yes	Yes	Yes
Degree and class of protection				
Protection class	1; with protective conductor	1; with protective conductor	1; with protective conductor	1; with protective conductor
Standards, approvals, certificates				
FM approval	Yes; Ta: 0 °C to 60 °C T4	Yes; Ta: 0 °C to 60 °C T4	Yes; Ta: 0 °C to 60 °C T4	Yes; Ta: 0 °C to 60 °C T4
Connection method				
Connecting cables/cross sections	3 x 1.5 mm2, solid or stranded wire with end sleeve, external diameter 3 to 9 mm	3 x 1.5 mm2, solid or stranded wire with end sleeve, external diameter 3 to 9 mm	3 x 1.5 mm2, solid or stranded wire with end sleeve, external diameter 3 to 9 mm	3 x 1.5 mm2, solid or stranded wire with end sleeve, external diameter 3 to 9 mm
Dimensions				
Width	25 mm	50 mm	50 mm	50 mm
Height	290 mm	290 mm	290 mm	290 mm
Depth	217 mm	217 mm	217 mm	217 mm
Required slots	1	2	2	2
Weight				
Weight, approx.	760 g	1 200 g	1 200 g	1 300 g

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Ordering data	Order No.
PS 405 power supply modules	
24 V DC; 5 V DC, 24 V DC	
4 A	**6ES7 405-0DA02-0AA0**
10 A, wide range	**6ES7 405-0KA02-0AA0**
10 A, redundant, wide range	**6ES7 405-0KR02-0AA0**
20 A, wide range	**6ES7 405-0RA02-0AA0**
Power plug for PS 405	**6ES7 490-0AA00-0AA0**
Spare part	
Backup battery	**6ES7 971-0BA00**
Type AA; 3.6 V/2.3 Ah	

	Order No.
PS 407 power supply modules	
120/230 V AC; 5 V DC, 24 V DC	
4 A	**6ES7 407-0DA02-0AA0**
10 A	**6ES7 407-0KA02-0AA0**
10 A, redundant	**6ES7 407-0KR02-0AA0**
20 A	**6ES7 407-0RA02-0AA0**
Power plug for PS 407	**6ES7 490-0AB00-0AA0**
Spare part	
Backup battery	**6ES7 971-0BA00**
Type AA; 3.6 V/2.3 Ah	
SITOP power supplies	See Catalog KT 01
For the 24 V supply of motors or sensors	
Add-on modules and DC-UPS	See Catalog KT 01
To increase system availability	

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SIPLUS power supplies

Overview

- Power supplies for SIPLUS S7-400
- For conversion of AC or DC line voltages to the 5 V DC and 24 V DC operating voltages required
- 4 A, 10 A and 20 A output currents

Note:

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

SIPLUS S7-400 PS			
Order No.	**6AG1 405-0KA02-7AA0**	**6AG1 407-0KA02-4AA0**	**6AG1 407-0KR02-4AA0**
Order number based on	**6ES7 405-0KA02-0AA0**	**6ES7 407-0KA02-0AA0**	**6ES7 407-0KR02-0AA0**
Ambient temperature range	-25 ... +70 °C	-0 ... +60 °C	-0 ... +60 °C
Conformal coating	Coating of the printed circuit boards and the electronic components		
Technical data	The technical data of the standard product applies, except for the ambient conditions		
Ambient conditions			
Relative humidity	100%, condensation/frost permissible. No commissioning if condensation present.		
Biologically active substances, compliance with EN 60721-3-3	Class 3B2 mold and fungal spores (excluding fauna). The supplied plug covers must remain in place over the unused interfaces during operation!		
Chemically active substances, compliance with EN 60721-3-3	Class 3C4 incl. salt spray in accordance with EN60068-2-52 (degree of severity 3). The supplied plug covers must remain in place over the unused interfaces during operation!		
Mechanically active substances, compliance with EN 60721-3-3	Class 3S4 incl. sand, dust. The supplied plug covers must remain in place over the unused interfaces during operation!		
Air pressure (depending on the highest positive temperature range specified)	1 080 ... 795 hPa (-1 000 ... +2 000 m) see ambient temperature range 795 ... 658 hPa (+2 000 ... +3 500 m) derating 10 K 658 ... 540 hPa (+3 500 ... +5 000 m) derating 20 K		

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

Ordering data

	Order No.
SIPLUS PS 405 power supply modules	
(extended temperature range and medial exposure)	
24 V DC; 5 V DC, 24 V DC	
10 A, wide range	**6AG1 405-0KA02-7AA0**
SIPLUS PS 407 power supply modules	
(medial exposure)	
120/230 V AC; 5 V DC, 24 V DC	
10 A	**6AG1 407-0KA02-4AA0**
10 A, redundant	**6AG1 407-0KR02-4AA0**

	Order No.
Accessories	See SIMATIC PS 405/407 power supply, page 6/147

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Overview

Labeling sheets

- Film sheets for application-specific labeling of SIMATIC S7-400 I/O modules with commercial laser printers
- Single-color films, tear-resistant, dirt-resistant
- Easy handling:
  - Pre-perforated labeling sheets in DIN A4 format to allow easy separation of the labeling strips
  - The separated strips can be inserted directly into the I/O modules
- Different colors for distinction between module types or preferred areas of application:
  The labeling sheets are available in the colors teal, light beige, red and yellow. Yellow is reserved for failsafe systems.

Label cover

- Film to cover and hold user-made labeling strips on normal paper
- Accessories, 10 pieces

Ordering data

Ordering data	Order No.
Labeling sheets	
DIN A4, for printing using laser printer; 10 pieces	
Petrol	**6ES7 492-2AX00-0AA0**
Light beige	**6ES7 492-2BX00-0AA0**
Yellow	**6ES7 492-2CX00-0AA0**
Red	**6ES7 492-2DX00-0AA0**
Cover film for labeling strips	**6ES7 492-2XX00-0AA0**
10 pieces (spare part)	

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Spare parts

Overview

Cover film for labeling strips

- Petrol-colored film for covering and fixing labeling strips created by the user
- On normal paper
- Spare part

Measuring range module for analog input modules

- Pluggable module for selecting the input ranges in the case of analog modules
- 1 module for 2 inputs
- Spare part

Slot cover

- Cover plates for unused slots in module racks
- Spare part, 10 units

Power supply connectors

- Plug for connecting the PS 405 and PS 407 power supply modules to the network
- Spare part

Replacement fan

- Fan unit for installation into the fan subassembly
- Spare part

Ordering data

	Order No.
Cover foil for labeling strip 10 units (spare part)	**6ES7 492-2XX00-0AA0**
Range card for analog input modules 1 card for 2 inputs; 2 units (spare part)	**6ES7 974-0AA00-0AA0**
Slot covers for racks; 10 units (spare part)	**6ES7 490-1AA00-0AA0**
Power plug for PS 405 Spare part	**6ES7 490-0AA00-0AA0**
Power plug for PS 407 Spare part	**6ES7 490-0AB00-0AA0**
Replacement fan Spare part	**6ES7 408-1TA00-6AA0**

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Overview

The ET 200M system with various interface modules is available for the decentralized use of S7-300 I/O modules. Depending on the application purpose, the best suited IM in terms of costs and functions can be selected:

IM 153-1 Standard

The IM 153-1 is one reasonably priced variant that is best suited for most applications in the manufacturing environment. It permits the use of up to 8 S7-300 I/O modules.

IM 153-2 High Feature

For higher requirements in manufacturing technology, such as the use of F-technology or the highest performance in conjunction with clock synchronization, the IM 153-2 High Feature is available. This IM is also designed for use with the PCS 7 in the field of manufacturing applications. This IM can be redundantly used and supports typical functions as they are required in the control field. These include, for example, clock synchronization or time stamping with an accuracy of up to 1ms.

Technical specifications

	6ES7 153-1AA03-0XB0	6ES7 153-2BA02-0XB0	6ES7 153-2BA82-0XB0
General information			
Vendor identification (VendorID)	801Dh	801Eh	801Eh
Supply voltage			
24 V DC	Yes	Yes	Yes
permissible range, lower limit (DC)	20.4 V	20.4 V	20.4 V
permissible range, upper limit (DC)	28.8 V	28.8 V	28.8 V
permissible range (ripple included), lower limit (DC)	20.4 V	20.4 V	20.4 V
permissible range (ripple included), upper limit (DC)	28.8 V	28.8 V	28.8 V
External protection for supply cables (recommendation)	not necessary	2.5 A	2.5 A
Mains buffering			
• Mains/voltage failure stored energy time	5 ms	5 ms	5 ms
Input current			
Current consumption, max.	350 mA; at 24 V DC	650 mA	650 mA
Rated value at 24 V DC	625 mA		
Inrush current, typ.	2.5 A	3 A	3 A
I^2t	0.1 $A^2 \cdot s$	0.1 $A^2 \cdot s$	0.1 $A^2 \cdot s$
Output voltage			
Rated value, 5 V DC	Yes	Yes	Yes
Output current			
for backplane bus (5 V DC), max.	1 A	1.5 A	1.5 A
Power losses			
Power loss, typ.	3 W	5.5 W	5.5 W

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Technical specifications (continued)

	6ES7 153-1AA03-0XB0	6ES7 153-2BA02-0XB0	6ES7 153-2BA82-0XB0
Address area			
Addressing volume			
• Outputs	128 byte	244 byte	244 byte
• Inputs	128 byte	244 byte	244 byte
Hardware configuration			
Number of modules per DP slave interface, max.	8	12	12
Time stamping			
Accuracy		1 ms; 1ms at up to 8 modules; 10ms at up to 12 modules	1 ms; 1ms at up to 8 modules; 10ms at up to 12 modules
Number of message buffers		15	15
Messages per message buffer		20	20
Number of stampable digital inputs, max.		128; Max. 128 signals/station; max. 32 signals/slot	128; Max. 128 signals/station; max. 32 signals/slot
Time format		RFC 1119	RFC 1119
Time resolution		0.466 ns	0.466 ns
Time interval for transmitting the message buffer if a message is present		1 000 ms	1 000 ms
Time stamp on signal change		rising / falling edge as signal entering or exiting	rising / falling edge as signal entering or exiting
Interfaces			
Interface physics, RS 485	Yes	Yes	Yes
Interface physics, FOC	No	No	No
PROFIBUS DP			
• Node addresses	1 to 125 permitted	1 to 125 permitted	1 to 125 permitted
• Automatic detection of transmission speed	Yes	Yes	Yes
• PROFIBUS DP, output current, max.	90 mA	70 mA	70 mA
• Transmission procedure	RS 485	RS 485	RS 485
• Transmission rate, max.	12 Mbit/s	12 Mbit/s	12 Mbit/s
• SYNC capability	Yes	Yes	Yes
• FREECE capability	Yes	Yes	Yes
• Direct data exchange (slave-to-slave communication)	Yes; Sender	Yes; Sender	Yes; Sender
• PROFIBUS DP	9-pin sub D socket	9-pin sub D	9-pin sub D
1st interface			
DP slave			
• GSD file	(for DPV1) SIEM801D.GSD; SI01801D.GSG	SI04801.GSG	SI0480E.GSG
• Automatic baud rate search	Yes	Yes	Yes
Communication functions			
Bus protocol/transmission protocol	PROFIBUS DP to EN 50170	PROFIBUS DP to EN 50170	PROFIBUS DP to EN 50170
Isolation			
Isolation checked with	Isolation voltage 500 V	Isolation voltage 500 V	Isolation voltage 500 V
Degree and class of protection			
IP20	Yes	Yes	Yes
Ambient conditions			
Operating temperature			
• Min.	0 °C	0 °C	-25 °C
• max.	60 °C	60 °C	60 °C
Air pressure			
• Operating altitude above sea level, max.	3 000 m	3 000 m	3 000 m
Dimensions			
Width	40 mm	40 mm	40 mm
Height	125 mm	125 mm	125 mm
Depth	117 mm	117 mm	117 mm
Weight			
Weight, approx.	360 g	360 g	360 g

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Technical specifications (continued)

	6ES7 195-7HD10-0XA0
Accessories	
belongs to product	ET 200M
Dimensions	
Width	97 mm
Height	92 mm
Depth	30 mm
Weight	
Weight, approx.	133 g

	6ES7 195-7HA00-0XA0	6ES7 195-7HB00-0XA0	6ES7 195-7HC00-0XA0
Dimensions			
Width	97 mm	97 mm	97 mm
Height	92 mm	92 mm	92 mm
Depth	30 mm	30 mm	30 mm
Weight			
Weight, approx.	111 g	140 g	127 g

Ordering data

	Order No.
IM 153-1 interface module	
Slave interface for connecting an ET 200M to PROFIBUS DP	
• Standard temperature range	**6ES7 153-1AA03-0XB0**
IM 153-2 interface module	
Slave interface for connecting an ET 200M to PROFIBUS DP; also for use in redundant systems	
• High Feature	**6ES7 153-2BA02-0XB0**
• High Feature with extended temperature range	**6ES7 153-2BA82-0XB0**
Active IM 153/IM 153 bus module	**6ES7 195-7HD10-0XA0**
For two IM 153-2 High Feature modules for designing redundant systems	
Bus module for ET 200M	
• To accommodate a power supply and an IM 153 module for the hot-swapping function during RUN, incl. bus module cover	**6ES7 195-7HA00-0XA0**
• To accommodate two 40-mm wide I/O modules for the hot-swapping function	**6ES7 195-7HB00-0XA0**
• To accommodate one 80-mm wide I/O module for the hot-swapping function	**6ES7 195-7HC00-0XA0**
ET 200M redundancy bundle	**6ES7153-2AR03-0XA0**
Comprising two IM 153-2 High Feature modules and one IM 153/IM 153 bus module	

	Order No.
Accessories	
PROFIBUS bus connector	
90° outgoing cable, terminating resistor with disconnecting function, up to 12 Mbit/s, FastConnect	
Without PG interface	
• 1 unit	**6ES7 972-0BA52-0XA0**
• 100 units	**6ES7 972-0BA52-0XB0**
With PG interface	
• 1 unit	**6ES7 972-0BB52-0XA0**
• 100 units	**6ES7 972-0BB52-0XB0**
SIMATIC DP DIN rail for ET 200M	
Accommodates up to 5 bus modules; for hot-swapping function	
• Length: 483 mm (19“)	**6ES7 195-1GA00-0XA0**
• Length: 530 mm	**6ES7 195-1GF30-0XA0**
• Length: 620 mm	**6ES7 195-1GG30-0XA0**
• Length: 2000 mm	**6ES7 195-1GC00-0XA0**
SIMATIC S7-300 mounting rail	
• Length: 160 mm	**6ES7 390-1AB60-0AA0**
• Length: 480 mm (19“)	**6ES7 390-1AE80-0AA0**
• Length: 530 mm	**6ES7 390-1AF30-0AA0**
• Length: 830 mm	**6ES7 390-1AJ30-0AA0**
• Length: 2000 mm	**6ES7 390-1BC00-0AA0**
S7 Manual Collection	**6ES7 998-8XC01-8YE0**
Electronic manuals on DVD, multi-language: S7-200, TD 200, S7-300, M7-300, C7, S7-400, M7-400, STEP 7, Engineering Tools, Runtime Software, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication)	
S7 Manual Collection, update service for 1 year	**6ES7 998-8XC01-8YE2**
Scope of delivery: Current DVD "S7 Manual Collection" and the three subsequent updates	

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SIPLUS IM 153-1/153-2

Overview

Note:

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

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	SIPLUS IM 153-1	SIPLUS IM 153-2	SIPLUS IM 153-2
Order No.	**6AG1 153-1AA03-2XB0**	**6AG1 153-2BA02-2XY0**	**6AG1 153-2BA02-7XB0**
Order number based on	**6ES7 153-1AA03-0XB0**	**6ES7 153-2BA02-0XB0**	**6ES7 153-2BA02-0XB0**
Ambient temperature range	-40 ... +70 °C Start-up temperature -25 °C	-25 ... +60 °C	-40 ... +70 °C Start-up temperature -25 °C
Compliant with the standards for electronic equipment used on rolling stock (EN 50155, temperature T1, category 1).	No	Yes	No
Conformal coating	Coating of the printed circuit boards and the electronic components		
Technical data	The technical data of the standard product applies except for the ambient conditions.		

SIPLUS bus module	for accommodating a PS and an IM 153	for accommodating two 40 mm wide I/O modules
Order No.	**6AG1 195-7HA00-2XA0**	**6AG1 195-7HB00-7XA0**
Order number based on	**6ES7 195-7HA00-0XA0**	**6ES7 195-7HB00-0XA0**
Ambient temperature range	-40 ... +70 °C	-40 ... +70 °C
Compliant with the standards for electronic equipment used on rolling stock (EN 50155, temperature T1, category 1).	No	Yes
Conformal coating	Coating of the printed circuit boards and the electronic components	
Technical data	The technical data of the standard product applies except for the ambient conditions.	

SIPLUS bus module	for accommodating an 80 mm module	for accommodating two IM 153-2
Order No.	**6AG1 195-7HC00-2XA0**	**6AG1 195-7HD10-2XA0**
Order number based on	**6ES7 195-7HC00-0XA0**	**6ES7 195-7HD10-0XA0**
Ambient temperature range	-40 ... +70 °C	-40 ... +70 °C
Compliant with the standards for electronic equipment used on rolling stock (EN 50155, temperature T1, category 1).	No	Yes
Conformal coating	Coating of the printed circuit boards and the electronic components	
Technical data	The technical data of the standard product applies except for the ambient conditions.	

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Overview (continued)

Ambient conditions	
Relative humidity	100%, condensation/frost permissible. No commissioning if condensation present.
Biologically active substances, compliance with EN 60721-3-3	Class 3B2 mold and fungal spores (excluding fauna). The supplied plug covers must remain in place over the unused interfaces during operation!
Chemically active substances, compliance with EN 60721-3-3	Class 3C4 incl. salt spray in accordance with EN60068-2-52 (degree of severity 3). The supplied plug covers must remain in place over the unused interfaces during operation!
Mechanically active substances, compliance with EN 60721-3-3	Class 3S4 incl. sand, dust. The supplied plug covers must remain in place over the unused interfaces during operation!
Air pressure (depending on the highest positive temperature range specified)	1 080 ... 795 hPa (-1 000 ... +2 000 m) see ambient temperature range 795 ... 658 hPa (+2 000 ... +3 500 m) derating 10 K 658 ... 540 hPa (+3 500 ... +5 000 m) derating 20 K

For technical documentation on SIPLUS, see:

www.siemens.com/siplus-extreme

Ordering data

	Order No.
IM 153-1 interface module	
(extended temperature range and medial exposure)	
Slave interface for connecting an ET 200M to PROFIBUS DP	
• Standard temperature range	**6AG1 153-1AA03-2XB0**
IM 153-2 interface module	
(extended temperature range and medial exposure)	
Slave interface for connecting an ET 200M to PROFIBUS DP; also for use in redundant systems	
• High Feature, -25 ... +60 °C	**6AG1 153-2BA02-2XY0**
• High Feature, -40 ... +70 °C	**6AG1 153-2BA02-7XB0**
Active IM 153/IM 153 bus module	**6AG1 195-7HD10-2XA0**
(extended temperature range and medial exposure)	
For two IM 153-2 High Feature modules for designing redundant systems	
Bus module for ET 200M	
(extended temperature range and medial exposure)	
• To accommodate a power supply and an IM 153 for the hot-swapping function during RUN, incl. bus module cover	**6AG1 195-7HA00-2XA0**
• To accommodate two 40 mm wide I/O modules for the hot-swapping function	**6AG1 195-7HB00-7XA0**
• To accommodate one 80 mm wide I/O module for the hot swapping function	**6AG1 195-7HC00-2XA0**
Accessories	See SIMATIC ET 200M IM 153-1/153-2, page 6/153

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Isolation modules

Overview

- Supports mixed operation of fail-safe signal modules in safety mode and S7-300 standard modules in an ET 200M when Cat. 4 or SIL 3 has to be achieved.
- The isolation module is not required if the safety class or safety category to be achieved is less than SIL 3 or Cat. 4, respectively.

When Cat. 4/SIL 3 is required, the isolation module must be implemented in the following situations:

Application	Isolation module must be used
Central use after CPU 31xF-2 DP or CPU 31xF-2 PN/DP	
• Only fail-safe modules in the tier	Yes, behind the CPU
• Standard and fail-safe modules in the tier	Yes, after the last standard module and before the first fail-safe module
Central use after CPU 31xF-2 DP or CPU 31xF-2 PN/DP in an expansion rack	
• Only fail-safe modules in the tier	Yes, after the IM 36x
• Standard and fail-safe modules in the tier	Yes, after the last standard module and before the first fail-safe module
Distributed behind the IM 153-2 with copper connection	
• Only fail-safe modules in the station	Yes, after the IM 153-2
• Standard and fail-safe modules in the station	Yes, after the last standard module and before the first fail-safe module
Distributed behind the IM 153-2 with fiber-optic connection	
• Only fail-safe modules in the station	No
• Standard and fail-safe modules in the station	Yes, after the last standard module and before the first fail-safe module

Technical specifications

	6ES7 195-7KF00-0XA0
Weight	
Weight, approx.	10 g

Ordering data

	Order No.
Isolation module for simultaneous operation of fail-safe and standard modules in an ET 200M	**6ES7 195-7KF00-0XA0**
Isolation bus module for accommodating the isolating module in an ET 200M	**6ES7 195-7HG00-0XA0**

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Overview

- Permits combined operation of fail-safe signal modules in safety mode and standard S7-300 modules in the same ET 200M system.
- The isolation module is not required if the safety class SIL 3 or safety category < Cat. 4 is to be achieved.

Note:

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

SIPLUS S7-300 isolation module	
Order No.	**6AG1 195-7KF00-2XA0**
Order No. based on	**6ES7 195-7KF00-0XA0**
Ambient temperature range	- 25 ... +60 °C
Conformal coating	Coating of the printed circuit boards and the electronic components
Technical data	The technical data of the standard product applies except for the ambient conditions.
Compliant with the standards for electronic equipment used on rolling stock (EN 50155, temperature T1, category 1)	Yes
Ambient conditions	
Relative humidity	100%, condensation/frost permissible. No commissioning if condensation present.

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

Ordering data

	Order No.
SIPLUS isolation module (extended temperature range and medial exposure) for simultaneous operation of fail-safe and standard modules in the same ET 200M	**6AG1 195-7KF00-2XA0**
Accessories	
SIPLUS ET 200M isolation bus module F	**6AG1 195-7HG00-2XA0**

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Fail-safe I/O modules

Overview

- Failsafe input/output modules for use with the SIMATIC S7-400F/FH
- With integrated safety functions
- Can only be plugged into the ET 200M
- Achievable safety classes in safety operation: SIL 2, SIL 3 to IEC 61508, AK 4, AK 6 to DIN V 19250, Category 3, 4 to EN 954-1
- Use in standard mode with high diagnostics requirements
- Also suitable for redundant operation

For more information, see chap. 5, page 5/88.