SIMATIC S7-400

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Brochures

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

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

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

Overview

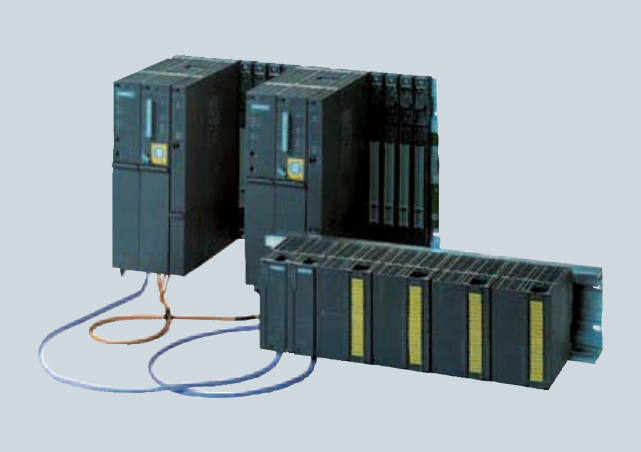
- The power PLC for the mid to high-end performance ranges.
- The solution for even the most demanding tasks.
- With a comprehensive range of modules and performance-graded CPUs for optimal adaptation to the automation task.
- Flexible in use through simple implementation of distributed structures; user-friendly connection methods.
- 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 rack.
  The overall performance power of an S7-400 is spread by means of multicomputing. For example, complex tasks can be broken down into technologies such open-loop control, computing or communication, and assigned to different CPUs. Each 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 many communication lines. This makes it possible, for example, to have one communication line for HMI and programming tasks, one for high-performance and equidistant motion control components, and one "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. There are high-level languages such as SCL available for this purpose and graphical engineering tools for sequential controls, state diagrams, and technology-oriented diagrams.

S7-400H

- Fault-tolerant automation system with redundant configuration
- For applications with high failure 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 standard-availability I/Os: Single-sided configuration
- Hot standby: Automatic reaction-free switching to the standby unit in the event of a fault
- Configuration with 2 separate or one divided central controller
- Connection of switched I/O via redundant PROFIBUS DP

Overview (continued)

S7-400F/FH



- Failsafe automation system for plant with high safety requirements
- Complies with safety requirements up to SIL 3 to IEC 61508, AK6 to DIN V 19250 and Cat. 4 to EN 954-1
- If required, also fault tolerant through redundant configuration
- Without additional wiring of the failsafe I/O:
  Failsafe communication via PROFIBUS DP with *PROFI*Safe profile.
- Based on S7-400H and ET 200M, includes failsafe modules
- Standard modules for non-safety-related applications can also be used in the automation system
- Isolating module for common use of failsafe and standard modules in safety operation on an ET 200M

Technical specifications

General technical specifications	
Degree of protection	IP20
Ambient temperature	0 … +60 °C
Relative humidity	5 … 95 %, no condensation
Atmospheric pressure	860 … 1080 hPa
Electromagnetic compatibility	EU Directive 89/336/EWG; • per EN 50082-2 (noise immunity), testing per : IEC 61000-4-2, IEC 61000-4-4, IEC 61000-4-3, IEC 61000-4-6, IEC 61000-4-5; Emitted interference to EN 50081-2, limit values according to EN 55011, Class A, Group 1
Mechanical tolerance	
• Vibration, tested per/with	IEC 68, Part 2-6/10 to 58 Hz; constant amplitude 0.075 mm; 58 to 150 Hz; constant acceleration 1 g; Duration of vibrations: 10 frequency cycles per axis in the direction of each of the three mutually normal axes
• Impact, tested per/with	IEC 68, Part 2-27/semi-sinusoidal: impact 15 g (peak value), duration 11 ms

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

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

CPU 412

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	6ES7 412-2XJ05-0AB0
Product status		
Hardware product status	1	
Firmware version	V5.0	V5.0
associated programming package	STEP7 V5.3 SP2 or higher with HW-update	STEP7 V5.3 SP2 or higher with HW-update
Feeding of external buffer voltage to CPU	5 to 15 V DC	5 to 15 V DC
Current consumption		
from backplane bus DC 5 V, max.	0.6 A	1.1 A
from interface DC 5 V, max.	90 mA; At the DP interface	90 mA; At each DP interface
Current consumption/ power loss		
Power loss, typ.	2.5 W	4 W
Backup battery		
• Buffer current, typ.	125 µA; (up to 40 °C)	125 µA; Valid up to 40°C
• Buffer current, max.	550 µA	550 µA; Dealt with in the module data manual with the secondary conditions and the factors of influence
Memory		
Type of storage		
RAM		
• integrated (for program)	144 Kibyte	256 Kibyte
• integrated (for data)	144 Kibyte	256 Kibyte
• expandable	No	No
Load memory		
• expandable FEPROM	Yes	Yes
• expandable FEPROM, max.	64 MByte	64 MByte
• integrated RAM, max.	512 Kibyte	512 Kibyte
• expandable RAM	Yes	Yes
• expandable RAM, max.	64 MByte	64 MByte

	6ES7 412-1XJ05-0AB0	6ES7 412-2XJ05-0AB0
Backup		
• present	Yes	Yes
• with battery	Yes	Yes
• without battery	No	No
CPU/blocks		
DB		
• Number, max.	1 500; Number range: 1 to 16,000	3 000; Number range: 1 to 16,000
• Size, max.	64 Kibyte	64 Kibyte
FB		
• Number, max.	750; Number range: 0 to 7999	1 500; Number range: 0 to 7999
• Size, max.	64 Kibyte	64 Kibyte
FC		
• Number, max.	750; Number range: 0 to 7,999	1 500; Number range: 0 to 7,999
• Size, max.	64 Kibyte	64 Kibyte
OB		
• Size, max.	64 Kibyte	64 Kibyte
Nesting depth		
• per priority class	24	24
• additional within an error OB	1	1
CPU/processing times		
for bit operations, min.	75 ns	75 ns
for word operations, min.	75 ns	75 ns
for fixed point arithmetic, min.	75 ns	75 ns
for floating point arithmetic, min.	225 ns	225 ns

Technical specifications (continued)

	6ES7 412-1XJ05-0AB0	6ES7 412-2XJ05-0AB0
Times/counters and their remanence		
S7 counter		
• Number	2 048	2 048
• Remanence		
- adjustable	Yes	Yes
- lower limit	0	0
- upper limit	2 047	2 047
- preset	Z 0 to Z 7	Z 0 to Z 7
• Counting range		
- lower limit	0	0
- upper limit	999	999
IEC counter		
• present	Yes	Yes
• Type	SFB	SFB
S7 times		
• Number	2 048	2 048
• Remanence		
- adjustable	Yes	Yes
- lower limit	0	0
- upper limit	2 047	2 047
- preset		No times retentive
• Time range		
- lower limit	10 ms	10 ms
- upper limit	9 990 s	9 990 s
IEC timer		
• present	Yes	Yes
• Type	SFB	SFB
Data areas and their remanence		
remanent data area, total	Total working and load memory	Total working and load memory (with backup battery)
Flag		
• Number, max.	4 Kibyte	4 Kibyte
• Remanence available	Yes	Yes
• Number of clock memories	8; (in 1 memory byte)	8; (in 1 memory byte)
Address area		
I/O address area		
• Inputs	4 Kibyte	4 Kibyte
• Outputs	4 Kibyte	4 Kibyte
• of which, distributed		
- MPI/DP interface, inputs	2 Kibyte	2 Kibyte
- MPI/DP interface, outputs	2 Kibyte	2 Kibyte
- DP interface, inputs		4 Kibyte
- DP interface, outputs		4 Kibyte

	6ES7 412-1XJ05-0AB0	6ES7 412-2XJ05-0AB0
Process image		
• Inputs, adjustable	4 Kibyte	4 Kibyte
• Outputs, adjustable	4 Kibyte	4 Kibyte
• Inputs, preset	128 byte	128 byte
• Outputs, preset	128 byte	128 byte
• consistent data, max.	244 byte	244 byte
• Access to consistent data in process image	Yes	Yes
Subprocess images		
• Number of subprocess images, max.	15	15
Digital channels		
• Inputs	32 768	32 768
• Outputs	32 768	32 768
• Inputs, of which central	32 768	32 768
• Outputs, of which central	32 768	32 768
Analog channels		
• Inputs	2 048	2 048
• Outputs	2 048	2 048
• Inputs, of which central	2 048	2 048
• Outputs, of which central	2 048	2 048
Hardware config.		
connectable OPs	31	31
Central devices, max.	1	1
Expansion devices, max.	21	21
Multicomputing	Yes; Max. 4 CPUs (with UR1 or UR2)	Yes; Max. 4 CPUs (with UR1 or UR2)
IM		
• Number of connectable IMs (total), max.	6	6
• Number of connectable IM 460s, max.	6	6
• Number of connectable IM 463s, max.	4; IM 463-2	4; IM 463-2
Number of DP masters		
• integrated	1	2
• via IM 467	4	4
• via CP	10; CP 443-5 Extended	10; CP 443-5 Extended
• Mixed mode IM + CP permitted	No; IM 467 cannot be used with CP 443-5 Ext.; IM 467 cannot be used with CP 443-1 EX40 in PN IO mode	No; IM 467 cannot be used with CP 443-5 Ext.; IM 467 cannot be used with CP 443-1 EX40 in PN IO mode
• via interface module	0	0
• Number of pluggable S5 modules (via adapter capsule in central device), max.	6	6

Technical specifications (continued)

	6ES7 412-1XJ05-0AB0	6ES7 412-2XJ05-0AB0
Number of IO controllers		
• integrated	0	
• via CP	4; Via CP 443-1 EX 41 in PN mode; max. 4 in central controller	Via CP 443-1 EX 41 in PN mode; max. 4 in central controller
Number of operable FMs and CPs (recommended)		
• FM	Limited due to number of slots and number of connections	Limited due to number of slots and number of connections
• CP, point-to-point	Limited due to number of slots and number of connections	Limited due to number of slots and number of connections
• PROFIBUS and Ethernet CPs	14; Of which 10 CPs max. or IMs as DP master, 4 PN controller maximum	14; Of which 10 CP or IM max. as DP master and PN controller
Time		
Clock		
• Hardware clock (real-time clock)	Yes	Yes
• buffered and synchronizable	Yes	Yes
• Resolution	1 ms	1 ms
Operating hours counter		
• Number	8	8
Clock synchronization		
• supports	Yes	Yes
• to MPI, Master	Yes	Yes
• to MPI, Slave	Yes	Yes
• to DP, Master	Yes	Yes
• to DP, Slave	Yes	Yes
• in AS, Master	Yes	Yes
• in AS, Slave	Yes	Yes
• on Ethernet via NTP	No; Via CP	No; Via CP
S7 message functions		
Number of login stations for message functions, max.	31; Max. 31 with alarm_S and alarm_D (OP's); max. 8 with alarm_8	31; Max. 31 with alarm_S and alarm_D (OP's); max. 8 with alarm_8 and alarm_P (e.g. WinCC)
Symbol-related messages	Yes	Yes
Number of messages		
• overall, max.	512	512
Block related messages	Yes	Yes
Alarm 8-blocks	Yes	Yes
Instrumentation & control messages	Yes	Yes

	6ES7 412-1XJ05-0AB0	6ES7 412-2XJ05-0AB0
Test commissioning functions		
Status/control		
• Status/control variable	Yes	Yes
Forcing		
• Forcing	Yes	Yes
Status block	Yes	Yes
Single step	Yes	Yes
Number of breakpoints	4	4
Diagnostic buffer		
• present	Yes	Yes
• Number of entries, max.	200	400
• adjustable	Yes	Yes
• preset	120	120
Communication functions		
PG/OP communication	Yes	Yes
Routing	Yes	Yes
Global data communication		
• supported	Yes	Yes
• Size of GD packets, max.	54 byte	54 byte
S7 basic communication		
• supported	Yes	Yes
• Useful data per job, max.	76 byte	76 byte
S7 communication		
• supported	Yes	Yes
• Useful data per job, max.	64 Kibyte	64 Kibyte
S5-compatible communication		
• supported	Yes; Via FC AG_SEND and AG_RECV, max. via 10 CP 443-1 or 443-5	Yes; (via CP max. 10 and FC AG_SEND and FC AG_RECV)
• Useful data per job, max.	8 Kibyte	8 Kibyte
Standard communication (FMS)		
• supported	Yes; Via CP and loadable FB	Yes; Via CP and loadable FB
Web server		
• Web server	No; Via CP	No; Via CP
• ISO-on-TCP (RFC1006)	Via CP 443-1 Adv. and loadable FB	Via CP 443-1 Adv. and loadable FB
- Number of connections, max.	30	
- Data length, max.	1 452 byte	1452
Number of connections		
• overall	32	32

Technical specifications (continued)

	6ES7 412-1XJ05-0AB0	6ES7 412-2XJ05-0AB0
1st interface		
Physics	RS 485 / PROFIBUS	RS 485 / PROFIBUS
isolated	Yes	Yes
Functionality		
• MPI	Yes	Yes
• DP master	Yes	Yes
• DP slave	Yes	Yes
MPI		
• Number of connections	32	32
• Services		
- PG/OP communication	Yes	Yes
- Routing	Yes	Yes
- Global data communication	Yes	Yes
- S7 basic communication	Yes	Yes
- S7 communication	Yes	Yes
• Transmission speeds, max.	12 MBit/s	12 MBit/s
DP master		
• Number of connections, max.	16	16
• Services		
- PG/OP communication	Yes	Yes
- Routing	Yes	Yes
- S7 basic communication	Yes	Yes
- S7 communication	Yes	Yes
- equidistance support	Yes	Yes
- Activation/deactivation of DP slaves	Yes	Yes
- direct data exchange (cross traffic)	Yes	Yes
• Transmission speeds, max.	12 MBit/s	12 MBit/s
• Number of DP slaves, max.	32; Max. 544 slots	32
• Address area		
- Inputs, max.	2 Kibyte	2 Kibyte
- Outputs, max.	2 Kibyte	2 Kibyte
• Useful data per DP slave		
- Inputs, max.	244 byte	244 byte
- Outputs, max.	244 byte	244 byte
DP slave		
• Number of connections	16	16
• Services		
- PG/OP communication	Yes	Yes
- Routing	Yes	Yes
• Transmission speeds, max.	12 MBit/s	12 MBit/s
• Transfer memory		
- Inputs	244 byte	244 byte
- Outputs	244 byte	244 byte
• Address area, max.	32; Virtual slots	32
• Useful data per address area, max.	32 byte	32 byte
• Useful data per address area, of which consistent, max.	32 byte	32 byte

	6ES7 412-1XJ05-0AB0	6ES7 412-2XJ05-0AB0
2nd interface		
Physics		RS 485 / PROFIBUS
isolated		Yes
Functionality		
• DP master		Yes
• DP slave		Yes
DP master		
• Number of connections, max.		16
• Services		
- PG/OP communication		Yes
- Routing		Yes
- S7 basic communication		Yes
- S7 communication		Yes
- equidistance support		Yes
- Activation/deactivation of DP slaves		Yes
- direct data exchange (cross traffic)		Yes
• Transmission speeds, max.		12 MBit/s
• Number of DP slaves, max.		64
• Address area		
- Inputs, max.		4 Kibyte
- Outputs, max.		4 Kibyte
• Useful data per DP slave		
- Inputs, max.		244 byte
- Outputs, max.		244 byte
DP slave		
• Number of connections		16
• Services		
- Routing		Yes
- Programming		Yes
• GSD file		http://support.automation.siemens.com/WW/view/en/113652
• Transmission speeds, max.		12 MBit/s
• Transfer memory		
- Inputs		244 byte
- Outputs		244 byte
• Address area, max.		32
• Useful data per address area, max.		32 byte
• Useful data per address area, of which consistent, max.		32 byte
Isochronous mode		
Useful data per isochronous slave, max.	244 byte	244 byte
equidistance	Yes	Yes
shortest clock pulse	1.5 ms; 0.5 ms without use of SFC 126, 127	1.5 ms; 0.5 ms without use of SFC 126, 127

Technical specifications (continued)

	6ES7 412-1XJ05-0AB0	6ES7 412-2XJ05-0AB0
CiR configuration in RUN		
CiR synchronization time, basic load	100 ms	100 ms
CiR synchronization time, time per I/O slave	200 µs	200 µs
CPU/programming		
Configuration software		
• STEP 7	Yes	Yes
Programming language		
• LAD	Yes	Yes
• FUP	Yes	Yes
• AWL	Yes	Yes
• SCL	Yes	Yes
• CFC	Yes	Yes
• GRAPH	Yes	Yes
• HiGraph	Yes	Yes
Nesting levels	7	7
User program protection/ password protection	Yes	Yes
Dimensions		
Required slots	1	1
Dimensions		
• Width	25 mm	25 mm
• Height	290 mm	290 mm
• Depth	219 mm	219 mm
Weights		
• Weight, approx.	720 g	720 g

Ordering data	Order No.
CPU 412-1	**6ES7 412-1XJ05-0AB0**
Main memory 288 KB, power supply 24 V DC, MPI/PROFIBUS DP master interface, slot for memory card, incl. slot number labels	
CPU 412-2	**6ES7 412-2XJ05-0AB0**
Main memory 512 KB, power supply 24 V DC, MPI/PROFIBUS DP master interface, 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 connecting SIMATIC S7 and the PG through MPI; 5 m in length	
Slot number plates	**6ES7 912-0AA00-0AA0**
1 set (spare part)	
Manual "SIMATIC S7-400 automation system"	
incl. instruction list	
German	**6ES7 498-8AA05-8AA0**
English	**6ES7 498-8AA05-8BA0**
French	**6ES7 498-8AA05-8CA0**
Spanish	**6ES7 498-8AA05-8DA0**
Italian	**6ES7 498-8AA05-8EA0**
S7-400 instructions list	
German	**6ES7 498-8AA05-8AN0**
English	**6ES7 498-8AA05-8BN0**
French	**6ES7 498-8AA05-8CN0**
Spanish	**6ES7 498-8AA05-8DN0**
Italian	**6ES7 498-8AA05-8EN0**

		Order No.
Manual "Communication for SIMATIC S7-300/-400"		
German		**6ES7 398-8EA00-8AA0**
English		**6ES7 398-8EA00-8BA0**
French		**6ES7 398-8EA00-8CA0**
Spanish		**6ES7 398-8EA00-8DA0**
Italian		**6ES7 398-8EA00-8EA0**
SIMATIC Manual Collection	B3	**6ES7 998-8XC01-8YE0**
Electronic manuals on DVD, five languages: S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, engineering software, runtime software, PCS 7, SIMATIC HMI, SIMATIC NET		
SIMATIC Manual Collection update service for 1 year	B3	**6ES7 998-8XC01-8YE2**
Current "Manual Collection" DVD and the three subsequent updates		
Brochure "SIMATIC S7-400 automation system - Design and application"		
German		**6ES7 498-8AA00-8AB0**
English		**6ES7 498-8AA00-8BB0**
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 972-0BA41-0XA0**
With PG interface		**6ES7 972-0BB41-0XA0**
RS 485 bus connector with 90° cable outlet for Fast Connect system		
Max. transfer rate 12 Mbit/s		
Without PG interface		**6ES7 972-0BA51-0XA0**
With PG interface		**6ES7 972-0BB51-0XA0**
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 order quantity 20 m		**6XV1 830-0EH10**

B3: Subject to export regulations: AL: N and ECCN: 5D992B1

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	6ES7 414-3XM05-0AB0	6ES7 414-3EM05-0AB0
Product status			
Hardware product status			1
Firmware version	V5.0	V5.0	V5.0
associated programming package	STEP7 V5.3 SP2 or higher with HW-update	STEP7 V5.3 SP2 or higher with HW-update	STEP7 V5.4 SP1 or higher
Feeding of external buffer voltage to CPU	5 to 15 VDC	5 to 15 VDC	5 to 15 VDC
Current consumption			
from backplane bus DC 5 V, max.	1.1 A	1.3 A	1.4 A
from interface DC 5 V, max.	90 mA; At each DP interface	90 mA; At each DP interface	90 mA; At each DP interface
Current consumption/ power loss			
Power loss, typ.	4 W	4.5 W	5.5 W
Backup battery			
• Buffer current, typ.	125 µA; Valid up to 40°C	125 µA; Valid up to 40°C	125 µA; Valid up to 40°C
• Buffer current, max.	550 µA	550 µA	550 µA
Memory			
Type of storage			
RAM			
• integrated (for program)	0.5 MByte	1.4 MByte	1.4 MByte
• integrated (for data)	0.5 MByte	1.4 MByte	1.4 MByte
• expandable	No	No	No
Load memory			
• expandable FEPROM	Yes	Yes	Yes
• expandable FEPROM, max.	64 MByte	64 MByte	64 MByte
• integrated RAM, max.	512 Kibyte	512 Kibyte	512 Kibyte
• expandable RAM	Yes	Yes	Yes
• expandable RAM, max.	64 MByte	64 MByte	64 MByte
Backup			
• present	Yes	Yes	Yes
• with battery	Yes	Yes	Yes; All data
• without battery	No	No	No
CPU/blocks			
DB			
• Number, max.	6 000; Number range: 1 to 16,000	6 000; Number range: 1 to 16,000	6 000; Number range: 1 to 16,000
• Size, max.	64 Kibyte	64 Kibyte	64 Kibyte

Technical specifications (continued)

	6ES7 414-2XK05-0AB0	6ES7 414-3XM05-0AB0	6ES7 414-3EM05-0AB0
FB			
• Number, max.	3 000; Number range: 0 to 7999	3 000; Number range: 0 to 7999	3 000; Number range: 0 to 7999
• Size, max.	64 Kibyte	64 Kibyte	64 Kibyte
FC			
• Number, max.	3 000; Number range: 0 to 7,999	3 000; Number range: 0 to 7999	3 000; Number range: 0 to 7999
• Size, max.	64 Kibyte	64 Kibyte	64 Kibyte
OB			
• Size, max.	64 Kibyte	64 Kibyte	64 Kibyte
Nesting depth			
• per priority class	24	24	24
• additional within an error OB	1	1	1
CPU/processing times			
for bit operations, min.	45 ns	45 ns	45 ns
for word operations, min.	45 ns	45 ns	45 ns
for fixed point arithmetic, min.	45 ns	45 ns	45 ns
for floating point arithmetic, min.	135 ns	135 ns	135 ns
Times/counters and their remanence			
S7 counter			
• Number	2 048	2 048	2 048
• Remanence			
- adjustable	Yes	Yes	Yes
- lower limit	0	0	0
- upper limit	2 047	2 047	2 047
- preset	From Z 0 to Z 7	From Z 0 to Z 7	From Z 0 to Z 7
• Counting range			
- lower limit	0	0	0
- upper limit	999	999	999
IEC counter			
• present	Yes	Yes	Yes
• Type	SFB	SFB	SFB
S7 times			
• Number	2 048	2 048	2 048
• Remanence			
- adjustable	Yes	Yes	Yes
- lower limit	0	0	0
- upper limit	2 047	2 047	2 047
- preset		No times retentive	No times retentive
• Time range			
- lower limit	10 ms	10 ms	10 ms
- upper limit	9 990 s	9 990 s	9 990 s
IEC timer			
• present	Yes	Yes	Yes
• Type	SFB	SFB	SFB
Data areas and their remanence			
remanent data area, total	Total working and load memory (with backup battery)	Total working and load memory (with backup battery)	Total working and load memory (with backup battery)

Technical specifications (continued)

	6ES7 414-2XK05-0AB0	6ES7 414-3XM05-0AB0	6ES7 414-3EM05-0AB0
Flag			
• Number, max.	8 Kibyte	8 Kibyte	8 Kibyte
• Remanence available	Yes	Yes	Yes
• Number of clock memories	8; (in 1 memory byte)	8; (in 1 memory byte)	8; (in 1 memory byte)
Address area			
I/O address area			
• Inputs	8 Kibyte	8 Kibyte	8 Kibyte
• Outputs	8 Kibyte	8 Kibyte	8 Kibyte
• of which, distributed			
- MPI/DPinterface, inputs	2 Kibyte	2 Kibyte	2 Kibyte
- MPI/DP interface, outputs	2 Kibyte	2 Kibyte	2 Kibyte
- DP interface, inputs	6 Kibyte	6 Kibyte	6 Kibyte
- DP interface, outputs	6 Kibyte	6 Kibyte	6 Kibyte
- PN interface, inputs			8 Kibyte
- PN interface, outputs			8 Kibyte
Process image			
• Inputs, adjustable	8 Kibyte	8 Kibyte	8 Kibyte
• Outputs, adjustable	8 Kibyte	8 Kibyte	8 Kibyte
• Inputs, preset	256 byte	256 byte	256 byte
• Outputs, preset	256 byte	256 byte	256 byte
• consistent data, max.	244 byte	244 byte	244 byte
• Access to consistent data in process image	Yes	Yes	Yes
Subprocess images			
• Number of subprocess images, max.	15	15	15
Digital channels			
• Inputs	65 536	65 536	65 536
• Outputs	65 536	65 536	65 536
• Inputs, of which central	65 536	65 536	65 536
• Outputs, of which central	65 536	65 536	65 536
Analog channels			
• Inputs	4 096	4 096	4 096
• Outputs	4 096	4 096	4 096
• Inputs, of which central	4 096	4 096	4 096
• Outputs, of which central	4 096	4 096	4 096
Hardware config.			
connectable OPs	31	31	31
Central devices, max.	1	1	1
Expansion devices, max.	21	21	21
Multicomputing	Yes; Max. 4 CPUs (with UR1 or UR2)	Yes; Max. 4 CPUs (with UR1 or UR2)	Yes; Max. 4 CPUs (with UR1 or UR2)
IM			
• Number of connectable IMs (total), max.	6	6	6
• Number of connectable IM 460s, max.	6	6	6
• Number of connectable IM 463s, max.	4; IM 463-2	4; IM 463-2	4; IM 463-2

Technical specifications (continued)

	6ES7 414-2XK05-0AB0	6ES7 414-3XM05-0AB0	6ES7 414-3EM05-0AB0
Number of DP masters			
• integrated	2	2	1
• via IM 467	4	4	4
• via CP	10; CP 443-5 Extended	10; CP 443-5 Extended	10; CP 443-5 Extended
• Mixed mode IM + CP permitted	No; IM 467 cannot be used with CP 443-5 Ext.; IM 467 cannot be used with CP 443-1 EX40 in PN IO mode	No; IM 467 cannot be used with CP 443-5 Ext.; IM 467 cannot be used with CP 443-1 EX40 in PN IO mode	No; IM 467 cannot be used with CP 443-5 Ext.; IM 467 cannot be used with CP 443-1 EX40 in PN IO mode
• via interface module	0	1	1; IF 964-DP
• Number of pluggable S5 modules (via adapter capsule in central device), max.	6	6	6
Number of IO controllers			
• integrated			1
• via CP	4; Via CP 443-1 EX 41 in PN mode; max. 4 in central controller	4; Via CP 443-1 EX 41 in PN mode; max. 4 in central controller	4; Via CP 443-1 EX 41 in PN mode; max. 4 in central controller
Number of operable FMs and CPs (recommended)			
• FM	Limited due to number of slots and number of connections	Limited due to number of slots and number of connections	Limited due to number of slots and number of connections
• CP, point-to-point	Limited due to number of slots and number of connections	Limited due to number of slots and number of connections	Limited due to number of slots and number of connections
• PROFIBUS and Ethernet CPs	14; Of which 10 CP or IM max. as DP master and PN controller	14; Of which 10 CP or IM max. as DP master and PN controller	14; Of which 10 CP/IM max. as DP master and PN controller
Time			
Clock			
• Hardware clock (real-time clock)	Yes	Yes	Yes
• buffered and synchronizable	Yes	Yes	Yes
• Resolution	1 ms	1 ms	1 ms
Operating hours counter			
• Number	8	8	8
Clock synchronization			
• supports	Yes	Yes	Yes
• to MPI, Master	Yes	Yes	Yes
• to MPI, Slave	Yes	Yes	Yes
• to DP, Master	Yes	Yes	Yes
• to DP, Slave	Yes	Yes	Yes
• in AS, Master	Yes	Yes	Yes
• in AS, Slave	Yes	Yes	Yes
• on Ethernet via NTP			Yes; as client
• to IF 964 DP		Yes	Yes
S7 message functions			
Number of login stations for message functions, max.	31; Max. 31 with alarm_S and alarm_D (OP's); max. 8 with alarm_8 and alarm_P (e.g. WinCC)	31; Max. 31 with alarm_S and alarm_D (OP's); max. 8 with alarm_8 and alarm_P (e.g. WinCC)	31; Max. 31 with alarm_S and alarm_D (OP's); max. 8 with alarm_8 and alarm_P (e.g. WinCC)
Symbol-related messages	Yes	Yes	Yes
Number of messages			
• overall, max.	512	512	512
Block related messages	Yes	Yes	Yes
Alarm 8-blocks	Yes	Yes	Yes
Instrumentation & control messages	Yes	Yes	Yes

Technical specifications (continued)

	6ES7 414-2XK05-0AB0	6ES7 414-3XM05-0AB0	6ES7 414-3EM05-0AB0
Test commissioning functions			
Status/control			
• Status/control variable	Yes	Yes	Yes
Forcing			
• Forcing	Yes	Yes	Yes
Status block	Yes	Yes	Yes
Single step	Yes	Yes	Yes
Number of breakpoints	4	4	4
Diagnostic buffer			
• present	Yes	Yes	Yes
• Number of entries, max.	400	3 200	3 200
• adjustable	Yes	Yes	Yes
• preset	120	120	120
Communication functions			
PG/OP communication	Yes	Yes	Yes
Routing	Yes	Yes	Yes
Global data communication			
• supported	Yes	Yes	Yes
• Size of GD packets, max.	54 byte	54 byte	54 byte
S7 basic communication			
• supported	Yes	Yes	Yes
• Useful data per job, max.	76 byte	76 byte	76 byte
S7 communication			
• supported	Yes	Yes	Yes
• Useful data per job, max.	64 Kibyte	64 Kibyte	64 Kibyte
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)
• Useful data per job, max.	8 Kibyte	8 Kibyte	8 Kibyte
Standard communication (FMS)			
• supported	Yes; Via CP and loadable FB	Yes; Via CP and loadable FB	Yes; Via CP and loadable FB
Web server			
• Web server	No; Via CP	No; Via CP	Yes
Open IE communication			
• TCP/IP			Yes
- Number of connections, max.			32
- Data length, max.			32 Kibyte
• ISO-on-TCP (RFC1006)	Via CP 443-1 Adv. and loadable FB	Via CP 443-1 Adv. and loadable FB	Yes
- Number of connections, max.			32
- Data length, max.	1452	1452	32 Kibyte; 1452 bytes via CP 443-1 Adv.
• UDP			Yes
- Number of connections, max.			32
- Data length, max.			1 472 byte
Number of connections			
• overall	32	32	32
PROFINET CBA (at set setpoint communication load)			
• Number of remote interconnection partners			32
• Number of functions, master/slave			150
• Total of all master/slave connections			4 500

Technical specifications (continued)

	6ES7 414-2XK05-0AB0	6ES7 414-3XM05-0AB0	6ES7 414-3EM05-0AB0
PROFINET CBA (at set setpoint communication load)			
• Data length of all incoming connections master/slave, max.			45 000 byte
• Data length of all outgoing connections master/slave, max.			45 000 byte
• Number of device-internal and PROFIBUS interconnections			1 000
• Data length of device-internal and PROFIBUS interconnections, max.			16 000 byte
• Data length per connection, max.			2 000 byte
• Remote interconnections with acyclic transmission			
- Sampling frequency: sampling interval, min.			200 ms; Depending on preset communcation load, number of interconnections and data length used
- Number of incoming interconnections			250
- Number of outgoing interconnections			250
- Data length of all incoming interconnections, max.			8 000 byte
- Data length of all outgoing interconnections, max.			8 000 byte
- Data length per connection, max.			2 000 byte
• Remote interconnections with cyclic transmission			
- Transmission frequency: transmission interval, min.			1 ms; Depending on preset communication load, number of interconnections and data length used
- Number of incoming interconnections			300
- Number of outgoing interconnections			300
- Data length of all incoming interconnections, max.			4 800 byte
- Data length of all outgoing interconnections, max.			4 800 byte
- Data length per connection, max.			250 byte
• HMI variables via PROFINET (acyclic)			
- Number of log-in stations for HMI variables (PN OPC/iMap)			2x PN OPC / 1x iMap
- HMI variable updating			500 ms
- Number of HMI variables			1 000
- Data length of all HMI variables, max.			32 000 byte
• PROFIBUS proxy functionality			
- supported			Yes; 32 PROFIBUS slaves max. connectable
- Data length per connection, max.			240 byte; Slave-dependent
1st interface			
Physics	RS 485 / PROFIBUS	RS 485 / PROFIBUS	RS 485 / PROFIBUS + MPI
isolated	Yes	Yes	Yes

Technical specifications (continued)

	6ES7 414-2XK05-0AB0	6ES7 414-3XM05-0AB0	6ES7 414-3EM05-0AB0
Functionality			
• MPI	Yes	Yes	Yes
• DP master	Yes	Yes	Yes
• DP slave	Yes	Yes	Yes
MPI			
• Number of connections	32	32	32; if a diagnostic repeater is used on the line, the number of connection resources on the line is reduced by 1
• Services			
- PG/OP communication	Yes	Yes	Yes
- Routing	Yes	Yes	Yes
- Global data communication	Yes	Yes	Yes
- S7 basic communication	Yes	Yes	Yes
- S7 communication	Yes	Yes	Yes
• Transmission speeds, max.	12 MBit/s	12 MBit/s	12 MBit/s
DP master			
• Number of connections, max.	16	16	16
• Services			
- PG/OP communication	Yes	Yes	Yes
- Routing	Yes	Yes	Yes
- Global data communication	No	No	No
- S7 basic communication	Yes	Yes	Yes
- S7 communication	Yes	Yes	Yes
- equidistance support	Yes	Yes	Yes
- Activation/deactivation of DP slaves	Yes	Yes	Yes
- direct data exchange (cross traffic)	Yes	Yes	Yes
• Transmission speeds, max.	12 MBit/s	12 MBit/s	12 MBit/s
• Number of DP slaves, max.	32	32	32
• Address area			
- Inputs, max.	2 Kibyte	2 Kibyte	2 Kibyte
- Outputs, max.	2 Kibyte	2 Kibyte	2 Kibyte
• Useful data per DP slave			
- Inputs, max.	244 byte	244 byte	244 byte
- Outputs, max.	244 byte	244 byte	244 byte
DP slave			
• Number of connections	16	16	16
• Services			
- PG/OP communication	Yes	Yes	Yes
- Routing	Yes	Yes	Yes
• Transmission speeds, max.	12 MBit/s	12 MBit/s	12 MBit/s
• Transfer memory			
- Inputs	244 byte	244 byte	244 byte
- Outputs	244 byte	244 byte	244 byte
DP slave (continued)			
• Address area, max.	32	32	32; Virtual slots
• Useful data per address area, max.	32 byte	32 byte	32 byte
• Useful data per address area, of which consistent, max.	32 byte	32 byte	32 byte
2nd interface			
Physics	RS 485 / PROFIBUS	RS 485 / PROFIBUS	Ethernet
isolated	Yes	Yes	Yes

Technical specifications (continued)

	6ES7 414-2XK05-0AB0	6ES7 414-3XM05-0AB0	6ES7 414-3EM05-0AB0
Functionality			
• DP master	Yes	Yes	No
• DP slave	Yes	Yes	No
• PROFINET IO controller			Yes
• PROFINET CBA			Yes
• Point-to-point coupling			No
DP master			
• Number of connections, max.	16	16	
• Services			
- PG/OP communication	Yes	Yes	
- Routing	Yes	Yes	
- S7 basic communication	Yes	Yes	
- S7 communication	Yes	Yes	
- equidistance support	Yes	Yes	
- Activation/deactivation of DP slaves	Yes	Yes	
- direct data exchange (cross traffic)	Yes	Yes	
• Transmission speeds, max.	12 MBit/s	12 MBit/s	
• Number of DP slaves, max.	96	96	
• Address area			
- Inputs, max.	6 Kibyte	6 Kibyte	
- Outputs, max.	6 Kibyte	6 Kibyte	
• Useful data per DP slave			
- Inputs, max.	244 byte	244 byte	
- Outputs, max.	244 byte	244 byte	
DP slave			
• Number of connections	16	16	
• Services			
- Routing	Yes	Yes	
- Programming	Yes	Yes	
• GSD file	http://support.automation.siemens.com/WW/view/en/113652	http://support.automation.siemens.com/WW/view/en/113652	
• Transmission speeds, max.	12 MBit/s	12 MBit/s	
• Transfer memory			
- Inputs	244 byte	244 byte	
- Outputs	244 byte	244 byte	
• Address area, max.	32	32	
• Useful data per address area, max.	32 byte	32 byte	
• Useful data per address area, of which consistent, max.	32 byte	32 byte	
PROFINET IO controller			
• Services			
- PG/OP communication			Yes
- Routing			Yes; Routing of PG functions
- S7 communication			Yes
- open IE communication			Yes
• Transmission rate, min.			10 MBit/s
• Transmission speed, max.			100 MBit/s
• Total number of connectable IO Devices, max.			256
• Updating time			250 µs to 512 ms; minimum value dependent on preset communication share for PROFINET I/O, of number of I/O devices and number of configured user data

Technical specifications (continued)

	6ES7 414-2XK05-0AB0	6ES7 414-3XM05-0AB0	6ES7 414-3EM05-0AB0
PROFINET IO controller (cont.)			
• Address area			
- Inputs, max.			8 Kibyte
- Outputs, max.			8 Kibyte
- Useful data consistency, max.			255 byte; incl. net data accompaniers
PROFINET CBA			
• Acyclic transmission			Yes
• cyclic transmission			Yes
3rd interface			
Type of interfaces		Pluggable interface module (IF), technical specifications as for 2nd interface	Pluggable interface module (IF)
pluggable interface module		IF 964-DP (Order No.: 6ES7 964-2AA04-0AB0)	IF 964-DP (Order No.: 6ES7 964-2AA04-0AB0)
Physics			RS 485 / PROFIBUS
isolated			Yes
power supply to interface (15 to 30 V DC), max.			150 mA; max. 150 mA
Number of connection resources			16
Functionality			
• MPI			No
• DP master			Yes
• DP slave			Yes
DP master			
• Number of connections, max.			16
• Services			
- PG/OP communication			Yes
- Routing			Yes
- Global data communication			No
- S7 basic communication			Yes
- S7 communication			Yes
- Equidistance support			Yes
- SYNC/FREEZE			Yes
- Activation/deactivation of DP slaves			Yes
- Direct data exchange			Yes
• Transmission rate, max.			12 MBit/s
• Number of DP slaves, max.			96
• Address area			
- Inputs, max.			6 Kibyte
- Outputs, max.			6 Kibyte
• Useful data per DP slave			
- Useful data per DP slave, max.			244 byte
- Inputs, max.			244 byte
- Outputs, max.			244 byte
- Slots, max.			244
- per slot, max.			128 byte
DP slave			
• Number of connections			16
• Services			
- Routing			Yes
- Status/control			Yes

Technical specifications (continued)

	6ES7 414-2XK05-0AB0	6ES7 414-3XM05-0AB0	6ES7 414-3EM05-0AB0
DP slave (continued)			
• GSD file			http://support.automation.siemens.com/WW/view/en/113652
• Transmission rate, max.			12 MBit/s
• Transfer memory			
- Inputs			244 byte
- Outputs			244 byte
• Address range, max.			32
• Useful data per address area, max.			32 byte
• Useful data per address area, of which consistent, max.			32 byte
Isochronous mode			
Useful data per isochronoous slave, max.	244 byte	244 byte	244 byte
equidistance	Yes	Yes	Yes
shortest clock pulse	1 ms; 0.5 ms without use of SFC 126, 127	1 ms; 0.5 ms without use of SFC 126, 127	1 ms; Without use of SFC 126 and 127 up to 0.5 ms
CiR configuration in RUN			
CiR synchronization time, basic load	100 ms	100 ms	100 ms
CiR synchronization time, time per I/O slave	80 µs	80 µs	80 µs
CPU/programming			
Configuration software			
• STEP 7	Yes	Yes	Yes
Programming language			
• STEP 7			Yes
• LAD	Yes	Yes	Yes
• FUP	Yes	Yes	Yes
• AWL	Yes	Yes	Yes
• SCL	Yes	Yes	Yes
• CFC	Yes	Yes	Yes
• GRAPH	Yes	Yes	Yes
• HiGraph	Yes	Yes	Yes
Nesting levels	7	7	7
User program protection/ password protection	Yes	Yes	Yes
Dimensions			
Required slots	1	2	2
Dimensions			
Dimensions			
• Width	25 mm	50 mm	50 mm
• Height	290 mm	290 mm	290 mm
• Depth	219 mm	219 mm	219 mm
Weights			
• Weight, approx.	720 g	880 g	900 g

CPU 414

Ordering data		Order No.
CPU 414-2		**6ES7 414-2XK05-0AB0**
Main memory 1 MB, power supply 24 V DC, MPI/PROFIBUS DP master interface, slot for memory card, incl. slot number labels		
CPU 414-3		**6ES7 414-3XM05-0AB0**
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		
CPU 414-3 PN/DP		**6ES7 414-3EM05-0AB0**
Main memory 2.8 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		
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 connecting SIMATIC S7 and the PG through MPI; 5 m in length		
IF 964-DP interface module		**6ES7 964-2AA04-0AB0**
For connecting an additional PROFIBUS subnet; for CPU 414-3, CPU 414-3 PN/DP, CPU 416-3, CPU 416-3 PN/DP, CPU 417-4		

		Order No.
Slot number plates		**6ES7 912-0AA00-0AA0**
1 set (spare part)		
Manual "SIMATIC S7-400 automation system"		
incl. instruction list		
German		**6ES7 498-8AA05-8AA0**
English		**6ES7 498-8AA05-8BA0**
French		**6ES7 498-8AA05-8CA0**
Spanish		**6ES7 498-8AA05-8DA0**
Italian		**6ES7 498-8AA05-8EA0**
S7-400 instructions list		
German		**6ES7 498-8AA05-8AN0**
English		**6ES7 498-8AA05-8BN0**
French		**6ES7 498-8AA05-8CN0**
Spanish		**6ES7 498-8AA05-8DN0**
Italian		**6ES7 498-8AA05-8EN0**
Manual "Communication for SIMATIC S7-300/-400"		
German		**6ES7 398-8EA00-8AA0**
English		**6ES7 398-8EA00-8BA0**
French		**6ES7 398-8EA00-8CA0**
Spanish		**6ES7 398-8EA00-8DA0**
Italian		**6ES7 398-8EA00-8EA0**
SIMATIC Manual Collection	B3	**6ES7 998-8XC01-8YE0**
Electronic manuals on DVD, five languages: S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, engineering software, runtime software, PCS 7, SIMATIC HMI, SIMATIC NET		
SIMATIC Manual Collection update service for 1 year	B3	**6ES7 998-8XC01-8YE2**
Current "Manual Collection" DVD and the three subsequent updates		
Brochure "SIMATIC S7-400 automation system - Design and application"		
German		**6ES7 498-8AA00-8AB0**
English		**6ES7 498-8AA00-8BB0**

B3: Subject to export regulations: AL: N and ECCN: 5D992B1

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 972-0BA41-0XA0**
With PG interface	**6ES7 972-0BB41-0XA0**
RS 485 bus connector with 90° cable outlet for FastConnect system	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6ES7 972-0BA51-0XA0**
With PG interface	**6ES7 972-0BB51-0XA0**
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 order quantity 20 m	**6XV1 830-0EH10**
RS 485 repeater for PROFIBUS	**6ES7 972-0AA01-0XA0**
Data transfer rate up to 12 Mbit/s; 24 V DC; IP20 housing	

	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 Catalogs IK PI, CA 01
For establishing MPI/PROFIBUS/PROFINET communication	

CPU 416

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	6ES7 416-3XR05-0AB0	6ES7 416-3ER05-0AB0
Product status			
Firmware version	V5.0	V5.0	V5.0
associated programming package	STEP7 V5.3 SP2 or higher with HW-update	STEP7 V5.3 SP2 or higher with HW-update	STEP7 V5.4 SP1 or higher
Feeding of external buffer voltage to CPU	5 to 15 V DC	5 to 15 V DC	5 to 15 V DC
Current consumption			
from backplane bus DC 5 V, max.	1.1 A	1.3 A	1.4 A
from interface DC 5 V, max.	90 mA; At each DP interface	90 mA; At each DP interface	90 mA; At each DP interface
Current consumption/ power loss			
Power loss, typ.	4 W	4.5 W	5.5 W
Backup battery			
• Buffer current, typ.	125 µA; Valid up to 40°C	125 µA; Valid up to 40°C	125 µA; Valid up to 40°C
• Buffer current, max.	550 µA	550 µA	550 µA
Memory			
Type of storage			
RAM			
• integrated (for program)	2.8 MByte	5.6 MByte	5.6 MByte
• integrated (for data)	2.8 MByte	5.6 MByte	5.6 MByte
• expandable	No	No	No
Load memory			
• expandable FEPROM	Yes	Yes	Yes; with Memory Card (FLASH)
• expandable FEPROM, max.	64 MByte	64 MByte	64 MByte
• integrated RAM, max.	1 MByte	1 MByte	1 MByte
• expandable RAM	Yes	Yes	Yes; With Memory Card (RAM)
• expandable RAM, max.	64 MByte	64 MByte	64 MByte
Backup			
• present	Yes	Yes	Yes
• with battery	Yes	Yes	Yes
• without battery	No	No	No
CPU/blocks			
DB			
• Number, max.	10 000; Number range: 1 to 16,000	10 000; Number range: 1 to 16,000	10 000; Number range: 1 to 16,000
• Size, max.	64 Kibyte	64 Kibyte	64 Kibyte

Technical specifications (continued)

	6ES7 416-2XN05-0AB0	6ES7 416-3XR05-0AB0	6ES7 416-3ER05-0AB0
FB			
• Number, max.	5 000; Number range: 0 to 7999	5 000; Number range: 0 to 7999	5 000; Number range: 0 to 7999
• Size, max.	64 Kibyte	64 Kibyte	64 Kibyte
FC			
• Number, max.	5 000; Number range: 0 to 7999	5 000; Number range: 0 to 7999	5 000; Number range: 0 to 7,999
• Size, max.	64 Kibyte	64 Kibyte	64 Kibyte
OB			
• Size, max.	64 Kibyte	64 Kibyte	64 Kibyte
Nesting depth			
• per priority class	24	24	24
• additional within an error OB	2	2	2
CPU/processing times			
for bit operations, min.	30 ns	30 ns	30 ns
for word operations, min.	30 ns	30 ns	30 ns
for fixed point arithmetic, min.	30 ns	30 ns	30 ns
for floating point arithmetic, min.	90 ns	90 ns	90 ns
Times/counters and their remanence			
S7 counter			
• Number	2 048	2 048	2 048
• Remanence			
- adjustable	Yes	Yes	Yes
- lower limit	0	0	0
- upper limit	2 047	2 047	2 047
- preset	From Z 0 to Z 7	From Z 0 to Z 7	From Z 0 to Z 7
• Counting range			
- lower limit	0	0	0
- upper limit	999	999	999
IEC counter			
• present	Yes	Yes	Yes
• Type	SFB	SFB	SFB
S7 times			
• Number	2 048	2 048	2 048
• Remanence			
- adjustable	Yes	Yes	Yes
- lower limit	0	0	0
- upper limit	2 047	2 047	2 047
- preset	No times retentive	No times retentive	No times retentive
• Time range			
- lower limit	10 ms	10 ms	10 ms
- upper limit	9 990 s	9 990 s	9 990 s
IEC timer			
• present	Yes	Yes	Yes
• Type	SFB	SFB	SFB
Data areas and their remanence			
remanent data area, total	Total working and load memory (with backup battery)	Total working and load memory (with backup battery)	Total working and load memory (with backup battery)

Technical specifications (continued)

	6ES7 416-2XN05-0AB0	6ES7 416-3XR05-0AB0	6ES7 416-3ER05-0AB0
Flag			
• Number, max.	16 Kibyte	16 Kibyte	16 Kibyte; Size of bit memory address area
• Remanence available	Yes	Yes	Yes
• Number of clock memories	8; (in 1 memory byte)	8; (in 1 memory byte)	8; (in 1 memory byte)
Address area			
I/O address area			
• Inputs	16 Kibyte	16 Kibyte	16 Kibyte
• Outputs	16 Kibyte	16 Kibyte	16 Kibyte
• of which, distributed			
- MPI/DPinterface, inputs	2 Kibyte	2 Kibyte	2 Kibyte
- MPI/DP interface, outputs	2 Kibyte	2 Kibyte	2 Kibyte
- DP interface, inputs	8 Kibyte	8 Kibyte	8 Kibyte
- DP interface, outputs	8 Kibyte	8 Kibyte	8 Kibyte
- PN interface, inputs			8 Kibyte
- PN interface, outputs			8 Kibyte
Process image			
• Inputs, adjustable	16 Kibyte	16 Kibyte	16 Kibyte
• Outputs, adjustable	16 Kibyte	16 Kibyte	16 Kibyte
• Inputs, preset	512 byte	512 byte	512 byte
• Outputs, preset	512 byte	512 byte	512 byte
• consistent data, max.	244 byte	244 byte	244 byte
• Access to consistent data in process image	Yes	Yes	Yes
Subprocess images			
• Number of subprocess images, max.	15	15	15
Digital channels			
• Inputs	131 072	131 072	131 072
• Outputs	131 072	131 072	131 072
• Inputs, of which central	131 072	131 072	131 072
• Outputs, of which central	131 072	131 072	131 072
Analog channels			
• Inputs	8 192	8 192	8 192
• Outputs	8 192	8 192	8 192
• Inputs, of which central	8 192	8 192	8 192
• Outputs, of which central	8 192	8 192	8 192
Hardware config.			
connectable OPs	63	63	63
Central devices, max.	1	1	1
Expansion devices, max.	21	21	21
Multicomputing	Yes; Max. 4 CPUs (with UR1 or UR2)	Yes; Max. 4 CPUs (with UR1 or UR2)	Yes; Max. 4 CPUs (with UR1 or UR2)
IM			
• Number of connectable IMs (total), max.	6	6	6
• Number of connectable IM 460s, max.	6	6	6
• Number of connectable IM 463s, max.	4; IM 463-2	4; IM 463-2	4; IM 463-2

Technical specifications (continued)

	6ES7 416-2XN05-0AB0	6ES7 416-3XR05-0AB0	6ES7 416-3ER05-0AB0
Number of DP masters			
• integrated	2	2	1
• via IM 467	4	4	4
• via CP	10; CP 443-5 Extended	10; CP 443-5 Extended	10; CP 443-5 Extended
• Mixed mode IM + CP permitted	No; IM 467 cannot be used with CP 443-5 Ext.; IM 467 cannot be used with CP 443-1 EX40 in PN IO mode	No; IM 467 cannot be used with CP 443-5 Ext.; IM 467 cannot be used with CP 443-1 EX40 in PN IO mode	No; IM 467 cannot be used with CP 443-5 Ext.; IM 467 cannot be used with CP 443-1 EX40 in PN IO mode
• via interface module	0	1	1; IF 964-DP
• Number of pluggable S5 modules (via adapter capsule in central device), max.	6	6	6
Number of IO controllers			
• integrated			1
• via CP	4; Via CP 443-1 EX 41 in PN mode; max. 4 in central controller	4; Via CP 443-1 EX 41 in PN mode; max. 4 in central controller	4; Via CP 443-1 EX 41 in PN mode; max. 4 in central controller
Number of operable FMs and CPs (recommended)			
• FM	Limited due to number of slots and number of connections	Limited due to number of slots and number of connections	Limited due to number of slots and number of connections
• CP, point-to-point	Limited due to number of slots and number of connections	Limited due to number of slots and number of connections	Limited due to number of slots and number of connections
• PROFIBUS and Ethernet CPs	14; Of which 10 CP or IM max. as DP master and PN controller	14; Of which 10 CP or IM max. as DP master and PN controller	14; Of which 10 CP/IM max. as DP master and PN controller
Time			
Clock			
• Hardware clock (real-time clock)	Yes	Yes	Yes
• buffered and synchronizable	Yes	Yes	Yes
• Resolution	1 ms	1 ms	1 ms
Operating hours counter			
• Number	8	8	8
Clock synchronization			
• supports	Yes	Yes	Yes
• to MPI, Master	Yes	Yes	Yes
• to MPI, Slave	Yes	Yes	Yes
• to DP, Master	Yes	Yes	Yes
• to DP, Slave	Yes	Yes	Yes
• in AS, Master	Yes	Yes	Yes
• in AS, Slave	Yes	Yes	Yes
• on Ethernet via NTP	Via CP	Via CP	Yes; as client
• to IF 964 DP		Yes	Yes
S7 message functions			
Number of login stations for message functions, max.	63; Max. 63 with ALARM_S and ALARM_D (OPs); max. 12 with ALARM_8 and ALARM_P (e.g. WinCC)	63; Max. 63 with ALARM_S and ALARM_D (OPs); max. 12 with ALARM_8 and ALARM_P (e.g. WinCC)	63; Max. 63 with ALARM_S and ALARM_D (OPs); max. 12 with ALARM_8 and ALARM_P (e.g. WinCC)
Symbol-related messages	Yes	Yes	Yes
Number of messages			
• overall, max.	1 024	1 024	1 024
Block related messages	Yes	Yes	Yes
Alarm 8-blocks	Yes	Yes	Yes
Instrumentation & control messages	Yes	Yes	Yes

Technical specifications (continued)

	6ES7 416-2XN05-0AB0	6ES7 416-3XR05-0AB0	6ES7 416-3ER05-0AB0
Test commissioning functions			
Status/control			
• Status/control variable	Yes	Yes	Yes
Forcing			
• Forcing	Yes	Yes	Yes
Status block	Yes	Yes	Yes
Single step	Yes	Yes	Yes
Number of breakpoints	4	4	4
Diagnostic buffer			
• present	Yes	Yes	Yes
• Number of entries, max.	3 200	3 200	3 200
• adjustable	Yes	Yes	Yes
• preset	120	120	120
Communication functions			
PG/OP communication	Yes	Yes	Yes
Routing	Yes	Yes	Yes
Global data communication			
• supported	Yes	Yes	Yes
• Size of GD packets, max.	54 byte	54 byte	54 byte
S7 basic communication			
• supported	Yes	Yes	Yes
• Useful data per job, max.	76 byte	76 byte	76 byte
S7 communication			
• supported	Yes	Yes	Yes
• Useful data per job, max.	64 Kibyte	64 Kibyte	64 Kibyte
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)
• Useful data per job, max.	8 Kibyte	8 Kibyte	8 Kibyte
Standard communication (FMS)			
• supported	Yes; Via CP and loadable FB	Yes; Via CP and loadable FB	Yes; Via CP and loadable FB
• Web server	No; Via CP	No; Via CP	Yes; Read-only function
Open IE communication			
• TCP/IP			Yes
- Number of connections, max.			64
- Data length, max.			32 Kibyte
• ISO-on-TCP (RFC1006)	Via CP 443-1 Adv. and loadable FB	Via CP 443-1 Adv. and loadable FB	Yes
- Number of connections, max.			64
- Data length, max.	1452	1452	32 Kibyte; 1452 bytes via CP 443-1 Adv.
• UDP			Yes
- Number of connections, max.			64
- Data length, max.			1 472 byte
Number of connections			
• overall	64	64	64

Technical specifications (continued)

	6ES7 416-2XN05-0AB0	6ES7 416-3XR05-0AB0	6ES7 416-3ER05-0AB0
PROFINET CBA (at set setpoint communication load)			
• Number of remote interconnection partners			32
• Number of functions, master/slave			150
• Total of all master/slave connections			6 000
• Data length of all incoming connections master/slave, max.			65 000 byte
• Data length of all outgoing connections master/slave, max.			65 000 byte
• Number of device-internal and PROFIBUS interconnections			1 000
• Data length of device-internal and PROFIBUS interconnections, max.			16 000 byte
• Data length per connection, max.			2 000 byte
• Remote interconnections with acyclic transmission			
- Sampling frequency: sampling interval, min.			200 ms; Depending on preset communcation load, number of interconnections and data length used
- Number of incoming interconnections			500
- Number of outgoing interconnections			500
- Data length of all incoming interconnections, max.			16 000 byte
- Data length of all outgoing interconnections, max.			16 000 byte
- Data length per connection, max.			2 000 byte
• Remote interconnections with cyclic transmission			
- Transmission frequency: transmission interval, min.			1 ms; Depending on preset communication load, number of interconnections and data length used
- Number of incoming interconnections			300
- Number of outgoing interconnections			300
- Data length of all incoming interconnections, max.			4 800 byte
- Data length of all outgoing interconnections, max.			4 800 byte
- Data length per connection, max.			250 byte
• HMI variables via PROFINET (acyclic)			
- Number of log-in stations for HMI variables (PN OPC/iMap)			2x PN OPC/1x iMap
- HMI variable updating			500 ms
- Number of HMI variables			1 500
- Data length of all HMI variables, max.			48 000 byte

Technical specifications (continued)

	6ES7 416-2XN05-0AB0	6ES7 416-3XR05-0AB0	6ES7 416-3ER05-0AB0
• PROFIBUS proxy functionality			
- supported			Yes; 32 PROFIBUS slaves max. connectable
- Data length per connection, max.			240 byte; Slave-dependent
1st interface			
Physics	RS 485 / PROFIBUS	RS 485 / PROFIBUS	RS 485 / PROFIBUS + MPI
isolated	Yes	Yes	Yes
Functionality			
• MPI	Yes	Yes	Yes
• DP master	Yes	Yes	Yes
• DP slave	Yes	Yes	Yes
MPI			
• Number of connections	44	44	44
• Services			
- PG/OP communication	Yes	Yes	Yes
- Routing	Yes	Yes	Yes
- Global data communication	Yes	Yes	Yes
- S7 basic communication	Yes	Yes	Yes
- S7 communication	Yes	Yes	Yes
• Transmission speeds, max.	12 MBit/s	12 MBit/s	12 MBit/s
DP master			
• Number of connections, max.	32	32	32; if a diagnostic repeater is used on the line, the number of connection resources on the line is reduced by 1
• Services			
- PG/OP communication	Yes	Yes	Yes
- Routing	Yes	Yes	Yes
- Global data communication	No	No	No
- S7 basic communication	Yes	Yes	Yes
- S7 communication	Yes	Yes	Yes
- equidistance support	Yes	Yes	Yes
- Activation/deactivation of DP slaves	Yes	Yes	Yes
- direct data exchange (cross traffic)	Yes	Yes	Yes
• Transmission speeds, max.	12 MBit/s	12 MBit/s	12 MBit/s
• Number of DP slaves, max.	32	32	32
• Address area			
- Inputs, max.	2 Kibyte	2 Kibyte	2 Kibyte
- Outputs, max.	2 Kibyte	2 Kibyte	2 Kibyte
• Useful data per DP slave			
- Inputs, max.	244 byte	244 byte	244 byte
- Outputs, max.	244 byte	244 byte	244 byte
DP slave			
• Number of connections	32	32	32
• Services			
- PG/OP communication	Yes	Yes	Yes; with interface active
- Routing	Yes	Yes	Yes; with interface active
• Transmission speeds, max.	12 MBit/s	12 MBit/s	12 MBit/s
• Transfer memory			
- Inputs	244 byte	244 byte	244 byte
- Outputs	244 byte	244 byte	244 byte

Technical specifications (continued)

	6ES7 416-2XN05-0AB0	6ES7 416-3XR05-0AB0	6ES7 416-3ER05-0AB0
DP slave (continued)			
• Address area, max.	32	32	32; Virtual slots
• Useful data per address area, max.	32 byte	32 byte	32 byte
• Useful data per address area, of which consistent, max.	32 byte	32 byte	32 byte
2nd interface			
Physics	RS 485 / PROFIBUS	RS 485 / PROFIBUS	Ethernet
isolated	Yes	Yes	Yes
Functionality			
• DP master	Yes	Yes	No
• DP slave	Yes	Yes	No
• PROFINET IO controller			Yes
• PROFINET CBA			Yes
• Point-to-point coupling			No
DP master			
• Number of connections, max.	32	32	
• Services			
- PG/OP communication	Yes	Yes	
- Routing	Yes	Yes	
- S7 basic communication	Yes	Yes	
- S7 communication	Yes	Yes	
- equidistance support	Yes	Yes	
- Activation/deactivation of DP slaves	Yes	Yes	
- direct data exchange (cross traffic)	Yes	Yes	
• Transmission speeds, max.	12 MBit/s	12 MBit/s	
• Number of DP slaves, max.	125	125	
• Address area			
- Inputs, max.	8 Kibyte	8 Kibyte	
- Outputs, max.	8 Kibyte	8 Kibyte	
• Useful data per DP slave			
- Inputs, max.	244 byte	244 byte	
- Outputs, max.	244 byte	244 byte	
DP slave			
• Number of connections	32	32	
• Services			
- Routing	Yes	Yes	
- Programming	Yes	Yes	
• GSD file	http://support.automation.siemens.com/WW/view/en/113652	http://support.automation.siemens.com/WW/view/en/113652	
• Transmission speeds, max.	12 MBit/s	12 MBit/s	
• Transfer memory			
- Inputs	244 byte	244 byte	
- Outputs	244 byte	244 byte	
• Address area, max.	32	32	
• Useful data per address area, max.	32 byte	32 byte	
• Useful data per address area, of which consistent, max.	32 byte	32 byte	
PROFINET IO-Controller			
• Services			
- PG/OP communication			Yes
- Routing			Yes; Routing of PG functions
- S7 communication			Yes
- open IE communication			Yes

Technical specifications (continued)

	6ES7 416-2XN05-0AB0	6ES7 416-3XR05-0AB0	6ES7 416-3ER05-0AB0
PROFINET IO-Controller (cont.)			
• Transmission rate, min.			10 MBit/s
• Transmission speed, max.			100 MBit/s
• Total number of connectable IO Devices, max.			256
• Updating time			250 µs to 512 ms; minimum value dependent on preset communication share for PROFINET I/O, of number of I/O devices and number of configured user data
• Address area			
- Inputs, max.			8 Kibyte
- Outputs, max.			8 Kibyte
- Useful data consistency, max.			255 byte; incl. net data accompaniers
PROFINET CBA			
• Acyclic transmission			Yes
• cyclic transmission			Yes
3rd interface			
Type of interfaces		Pluggable interface module (IF), technical specifications as for 2nd interface	Pluggable interface module (IF), technical specifications as for 2nd interface
pluggable interface module		IF 964-DP (Order No.: 6ES7 964-2AA04-0AB0)	IF 964-DP (Order No.: 6ES7 964-2AA04-0AB0)
Physics			RS 485 / PROFIBUS
isolated			Yes
power supply to interface (15 to 30 V DC), max.			150 mA
Number of connection resources			32
Functionality			
• MPI			No
• DP master			Yes
• DP slave			Yes
DP master			
• Number of connections, max.			32
• Services			
- PG/OP communication			Yes
- Routing			Yes
- Global data communication			No
- S7 basic communication			Yes
- S7 communication			Yes
- Equidistance support			Yes
- SYNC/FREEZE			Yes
- Activation/deactivation of DP slaves			Yes
- Direct data exchange			Yes
• Transmission rate, max.			12 MBit/s
• Number of DP slaves, max.			125
• Address area			
- Inputs, max.			8 Kibyte
- Outputs, max.			8 Kibyte
• Useful data per DP slave			
- Useful data per DP slave, max.			244 byte
- Inputs, max.			244 byte
- Outputs, max.			244 byte

Technical specifications (continued)

	6ES7 416-2XN05-0AB0	6ES7 416-3XR05-0AB0	6ES7 416-3ER05-0AB0
• Useful data per DP slave (cont.)			
- Slots, max.			244
- per slot, max.			128 byte
DP slave			
• Number of connections			32
• Services			
- Routing			Yes; When interface active
- Status/control			Yes; When interface active
• GSD file			http://support.automation.siemens.com/WW/view/en/113652
• Transmission rate, max.			12 MBit/s
• Transfer memory			
- Inputs			244 byte
- Outputs			244 byte
• Address range, max.			32
• Useful data per address area, max.			32 byte
• Useful data per address area, of which consistent, max.			32 byte
Isochronous mode			
Useful data per isochronoous slave, max.	244 byte	244 byte	244 byte
equidistance	Yes	Yes	Yes
shortest clock pulse	1 ms; 0.5 ms without use of SFC 126, 127	1 ms; 0.5 ms without use of SFC 126, 127	1 ms; Without use of SFC 126 and 127 up to 0.5 ms
CiR configuration in RUN			
CiR synchronization time, basic load	100 ms	100 ms	100 ms
CiR synchronization time, time per I/O slave	40 µs	40 µs	40 µs
CPU/programming			
Configuration software			
• STEP 7	Yes	Yes	Yes
Programming language			
• STEP 7			Yes
• LAD	Yes	Yes	Yes
• FUP	Yes	Yes	Yes
• AWL	Yes	Yes	Yes
• SCL	Yes	Yes	Yes
• CFC	Yes	Yes	Yes
• GRAPH	Yes	Yes	Yes
• HiGraph	Yes	Yes	Yes
Nesting levels	7	7	7
User program protection/password protection	Yes	Yes	Yes
Dimensions			
Required slots	1	2	2
Dimensions			
Dimensions			
• Width	25 mm	50 mm	50 mm
• Height	290 mm	290 mm	290 mm
• Depth	219 mm	219 mm	219 mm
Weights			
• Weight, approx.	720 g	880 g	900 g

CPU 416

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 11.2 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 416-3ER05-0AB0**
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 connecting SIMATIC S7 and the PG through MPI; 5 m in length	**6ES7 901-0BF00-0AA0**
IF 964-DP interface module For connecting an additional PROFIBUS subnet; 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**
Manual "SIMATIC S7-400 automation system" incl. instruction list		
German		**6ES7 498-8AA05-8AA0**
English		**6ES7 498-8AA05-8BA0**
French		**6ES7 498-8AA05-8CA0**
Spanish		**6ES7 498-8AA05-8DA0**
Italian		**6ES7 498-8AA05-8EA0**
S7-400 instructions list		
German		**6ES7 498-8AA05-8AN0**
English		**6ES7 498-8AA05-8BN0**
French		**6ES7 498-8AA05-8CN0**
Spanish		**6ES7 498-8AA05-8DN0**
Italian		**6ES7 498-8AA05-8EN0**
Manual "Communication for SIMATIC S7-300/-400"		
German		**6ES7 398-8EA00-8AA0**
English		**6ES7 398-8EA00-8BA0**
French		**6ES7 398-8EA00-8CA0**
Spanish		**6ES7 398-8EA00-8DA0**
Italian		**6ES7 398-8EA00-8EA0**
SIMATIC Manual Collection Electronic manuals on DVD, five languages: S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, engineering software, runtime software, PCS 7, SIMATIC HMI, SIMATIC NET	B3	**6ES7 998-8XC01-8YE0**
SIMATIC Manual Collection update service for 1 year Current "Manual Collection" DVD and the three subsequent updates	B3	**6ES7 998-8XC01-8YE2**
Brochure "SIMATIC S7-400 automation system - Design and application"		
German		**6ES7 498-8AA00-8AB0**
English		**6ES7 498-8AA00-8BB0**
PROFIBUS bus components		see CPU 414, page 5/21
PROFINET bus components		see CPU 414, page 5/21

B3: Subject to export regulations: AL: N and ECCN: 5D992B1

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
Product status	
Firmware version	V5.0
associated programming package	STEP7 V5.3 SP2 or higher with HW-update
Feeding of external buffer voltage to CPU	5 to 15 V DC
Current consumption	
from backplane bus DC 5 V, max.	1.8 A
Current consumption/ power loss	
Power loss, max.	6 W
Backup battery	
• Buffer current, typ.	225 µA; Valid up to 40°C
• Buffer current, max.	750 µA
Memory	
Type of storage	
RAM	
• integrated (for program)	15 MByte
• integrated (for data)	15 MByte
• expandable	No
Load memory	
• expandable FEPROM	Yes
• expandable FEPROM, max.	64 MByte
• integrated RAM, max.	1 MByte
• expandable RAM	Yes
• expandable RAM, max.	64 MByte
Backup	
• present	Yes
• with battery	Yes
• without battery	No
CPU/blocks	
DB	
• Number, max.	16 000; Number range: 1 to 16,000
• Size, max.	64 Kibyte

	6ES7 417-4XT05-0AB0
FB	
• Number, max.	8 000; Number range: 0 to 7999
• Size, max.	64 Kibyte
FC	
• Number, max.	8 000; Number range: 0 to 7,999
• Size, max.	64 Kibyte
OB	
• Size, max.	64 Kibyte
Nesting depth	
• per priority class	24
• additional within an error OB	2
CPU/processing times	
for bit operations, min.	18 ns
for word operations, min.	18 ns
for fixed point arithmetic, min.	18 ns
for floating point arithmetic, min.	54 ns
Times/counters and their remanence	
S7 counter	
• Number	2 048
• Remanence	
- adjustable	Yes
- lower limit	0
- upper limit	2 047
- preset	From Z 0 to Z 7
• Counting range	
- lower limit	0
- upper limit	999
IEC counter	
• present	Yes
• Type	SFB

CPU 417

Technical specifications (continued)

	6ES7 417-4XT05-0AB0
S7 times	
• Number	2 048
• Remanence	
- adjustable	Yes
- lower limit	0
- upper limit	2 047
- preset	No times retentive
• Time range	
- lower limit	10 ms
- upper limit	9 990 s
IEC timer	
• present	Yes
• Type	SFB
Data areas and their remanence	
remanent data area, total	Total working and load memory (with backup battery)
Flag	
• Number, max.	16 Kibyte
• Remanence available	Yes
• Number of clock memories	8; (in 1 memory byte)
Address area	
I/O address area	
• Inputs	16 Kibyte
• Outputs	16 Kibyte
• of which, distributed	
- MPI/DPinterface, inputs	2 Kibyte
- MPI/DP interface, outputs	2 Kibyte
- DP interface, inputs	8 Kibyte
- DP interface, outputs	8 Kibyte
Process image	
• Inputs, adjustable	16 Kibyte
• Outputs, adjustable	16 Kibyte
• Inputs, preset	1 024 byte
• Outputs, preset	1 024 byte
• consistent data, max.	244 byte
• Access to consistent data in process image	Yes
Subprocess images	
• Number of subprocess images, max.	15
Digital channels	
• Inputs	131 072
• Outputs	131 072
• Inputs, of which central	131 072
• Outputs, of which central	131 072
Analog channels	
• Inputs	8 192
• Outputs	8 192
• Inputs, of which central	8 192
• Outputs, of which central	8 192

	6ES7 417-4XT05-0AB0
Hardware config.	
connectable OPs	63
Central devices, max.	1
Expansion devices, max.	21
Multicomputing	Yes; Max. 4 CPUs (with UR1 or UR2)
IM	
• Number of connectable IMs (total), max.	6
• Number of connectable IM 460s, max.	6
• Number of connectable IM 463s, max.	4; IM 463-2
Number of DP masters	
• integrated	2
• via IM 467	4
• via CP	10; CP 443-5 Extended
• Mixed mode IM + CP permitted	No; IM 467 cannot be used with CP 443-5 Ext.; IM 467 cannot be used with CP 443-1 EX40 in PN IO mode
• via interface module	2
• Number of pluggable S5 modules (via adapter capsule in central device), max.	6
Number of IO controllers	
• via CP	4; Via CP 443-1 EX 41 in PN mode; max. 4 in central controller
Number of operable FMs and CPs (recommended)	
• FM	Limited due to number of slots and number of connections
• CP, point-to-point	Limited due to number of slots and number of connections
• PROFIBUS and Ethernet CPs	14; Of which 10 CP or IM max. as DP master and PN controller
Time	
Clock	
• Hardware clock (real-time clock)	Yes
• buffered and synchronizable	Yes
• Resolution	1 ms
Operating hours counter	
• Number	8
Clock synchronization	
• supports	Yes
• to MPI, Master	Yes
• to MPI, Slave	Yes
• to DP, Master	Yes
• to DP, Slave	Yes
• in AS, Master	Yes
• in AS, Slave	Yes
• on Ethernet via NTP	Via CP
• to IF 964 DP	Yes

Technical specifications (continued)

	6ES7 417-4XT05-0AB0
S7 message functions	
Number of login stations for message functions, max.	63; Max. 63 with ALARM_S and ALARM_D (OPs); max. 16 with ALARM_8 and ALARM_P (e.g. WinCC)
Symbol-related messages	Yes
Number of messages	
• overall, max.	1 024
Block related messages	Yes
Alarm 8-blocks	Yes
Instrumentation & control messages	Yes
Test commissioning functions	
Status/control	
• Status/control variable	Yes
Forcing	
• Forcing	Yes
Status block	Yes
Single step	Yes
Number of breakpoints	4
Diagnostic buffer	
• present	Yes
• Number of entries, max.	3 200
• adjustable	Yes
• preset	120
Communication functions	
PG/OP communication	Yes
Routing	Yes
Global data communication	
• supported	Yes
• Size of GD packets, max.	54 byte
S7 basic communication	
• supported	Yes
• Useful data per job, max.	76 byte
S7 communication	
• supported	Yes
• Useful data per job, max.	64 Kibyte
S5-compatible communication	
• supported	Yes; (via CP max. 10 and FC AG_SEND and FC AG_RECV)
• Useful data per job, max.	8 Kibyte
Standard communication (FMS)	
• supported	Yes; Via CP and loadable FB
• Web server	No; Via CP
• ISO-on-TCP (RFC1006)	Via CP 443-1 Adv. and loadable FB
- Data length, max.	1452
Number of connections	
• overall	64

	6ES7 417-4XT05-0AB0
1st interface	
Physics	RS 485 / PROFIBUS
isolated	Yes
Functionality	
• MPI	Yes
• DP master	Yes
• DP slave	Yes
MPI	
• Number of connections	44
• Services	
- PG/OP communication	Yes
- Routing	Yes
- Global data communication	Yes
- S7 basic communication	Yes
- S7 communication	Yes
• Transmission speeds, max.	12 MBit/s
DP master	
• Number of connections, max.	32
• Services	
- PG/OP communication	Yes
- Routing	Yes
- Global data communication	No
- S7 basic communication	Yes
- S7 communication	Yes
- equidistance support	Yes
- Activation/deactivation of DP slaves	Yes
- direct data exchange (cross traffic)	Yes
• Transmission speeds, max.	12 MBit/s
• Number of DP slaves, max.	32
• Address area	
- Inputs, max.	2 Kibyte
- Outputs, max.	2 Kibyte
• Useful data per DP slave	
- Inputs, max.	244 byte
- Outputs, max.	244 byte
DP slave	
• Number of connections	32
• Services	
- PG/OP communication	Yes
- Routing	Yes
• Transmission speeds, max.	12 MBit/s
• Transfer memory	
- Inputs	244 byte
- Outputs	244 byte
• Address area, max.	32
• Useful data per address area, max.	32 byte
• Useful data per address area, of which consistent, max.	32 byte

CPU 417

Technical specifications (continued)

	6ES7 417-4XT05-0AB0
2nd interface	
Physics	RS 485 / PROFIBUS
isolated	Yes
Functionality	
• DP master	Yes
• DP slave	Yes
DP master	
• Number of connections, max.	32
• Services	
- PG/OP communication	Yes
- Routing	Yes
- S7 basic communication	Yes
- S7 communication	Yes
- equidistance support	Yes
- Activation/deactivation of DP slaves	Yes
- direct data exchange (cross traffic)	Yes
• Transmission speeds, max.	12 MBit/s
• Number of DP slaves, max.	125
• Address area	
- Inputs, max.	8 Kibyte
- Outputs, max.	8 Kibyte
• Useful data per DP slave	
- Inputs, max.	244 byte
- Outputs, max.	244 byte
DP slave	
• Number of connections	32
• Services	
- Routing	Yes
- Programming	Yes
• GSD file	http://support.automation.siemens.com/WW/view/en/113652
• Transmission speeds, max.	12 MBit/s
• Transfer memory	
- Inputs	244 byte
- Outputs	244 byte
• Address area, max.	32
• Useful data per address area, max.	32 byte
• Useful data per address area, of which consistent, max.	32 byte

	6ES7 417-4XT05-0AB0
3rd interface	
Type of interfaces	Pluggable interface module (IF), technical specifications as for 2nd interface
pluggable interface module	IF 964-DP (Order No.: 6ES7 964-2AA04-0AB0)
4th interface	
Type of interface	Pluggable interface module (IF), technical specifications as for 2nd interface
pluggable interface modules	IF 964-DP (Order No.: 6ES7 964-2AA04-0AB0)
Isochronous mode	
Useful data per isochronoous slave, max.	244 byte
equidistance	Yes
shortest clock pulse	1 ms; 0.5 ms without use of SFC 126, 127
CiR configuration in RUN	
CiR synchronization time, basic load	100 ms
CiR synchronization time, time per I/O slave	40 µs
CPU/programming	
Configuration software	
• STEP 7	Yes
Programming language	
• LAD	Yes
• FUP	Yes
• AWL	Yes
• SCL	Yes
• CFC	Yes
• GRAPH	Yes
• HiGraph	Yes
Nesting levels	7
User program protection/password protection	Yes
Dimensions	
Required slots	2
Dimensions	
Dimensions	
• Width	50 mm
• Height	290 mm
• Depth	219 mm
Weights	
• Weight, approx.	920 g

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 max. 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 connecting SIMATIC S7 and the PG through 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)		
Manual "SIMATIC S7-400 automation system"		
incl. instruction list		
German		**6ES7 498-8AA05-8AA0**
English		**6ES7 498-8AA05-8BA0**
French		**6ES7 498-8AA05-8CA0**
Spanish		**6ES7 498-8AA05-8DA0**
Italian		**6ES7 498-8AA05-8EA0**
S7-400 instructions list		
German		**6ES7 498-8AA05-8AN0**
English		**6ES7 498-8AA05-8BN0**
French		**6ES7 498-8AA05-8CN0**
Spanish		**6ES7 498-8AA05-8DN0**
Italian		**6ES7 498-8AA05-8EN0**

		Order No.
Manual "Communication for SIMATIC S7-300/-400"		
German		**6ES7 398-8EA00-8AA0**
English		**6ES7 398-8EA00-8BA0**
French		**6ES7 398-8EA00-8CA0**
Spanish		**6ES7 398-8EA00-8DA0**
Italian		**6ES7 398-8EA00-8EA0**
SIMATIC Manual Collection	B3	**6ES7 998-8XC01-8YE0**
Electronic manuals on DVD, five languages: S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, engineering software, runtime software, PCS 7, SIMATIC HMI, SIMATIC NET		
SIMATIC Manual Collection update service for 1 year	B3	**6ES7 998-8XC01-8YE2**
Current "Manual Collection" DVD and the three subsequent updates		
Brochure "SIMATIC S7-400 automation system - Design and application"		
German		**6ES7 498-8AA00-8AB0**
English		**6ES7 498-8AA00-8BB0**
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 972-0BA41-0XA0**
With PG interface		**6ES7 972-0BB41-0XA0**
RS 485 bus connector with 90° cable outlet for FastConnect system		
Max. transfer rate 12 Mbit/s		
Without PG interface		**6ES7 972-0BA51-0XA0**
With PG interface		**6ES7 972-0BB51-0XA0**
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 order quantity 20 m		**6XV1 830-0EH10**

B3: Subject to export regulations: AL: N and ECCN: 5D992B1

CPU 412H, CPU 414H, CPU 417H

Overview CPU 412-3H

- CPU for the SIMATIC S7-400H and S7-400F/FH
- Can be used in S7-400H fault-tolerant systems
- Can be used with F runtime license as F-enabled CPU in S7-400F/FH safety-related systems
- With combined MPI/PROFIBUS DP master interface
- With 2 connection slots for synchronization modules

Overview CPU 417-4H

- CPU for SIMATIC S7-400H and S7-400F/FH
- Can be used in high availability S7-400H systems
- Can be used with F-runtime license and F-compatible CPU in failsafe S7-400F/FH systems
- With integrated PROFIBUS DP master interface
- With 2 slots for sync modules

Overview CPU 414-4H

- CPU for SIMATIC S7-400H and S7-400F/FH
- Can be used in high availability S7-400H systems
- Can be used with F-runtime license and F-compatible CPU in failsafe S7-400F/FH systems
- With integrated PROFIBUS DP master interface
- With 2 slots for sync modules

Technical specifications

	6ES7 412-3HJ14-0AB0	6ES7 414-4HM14-0AB0	6ES7 417-4HT14-0AB0
Product status			
Hardware product status	1	1	1
Firmware version	V4.5	V4.5	V4.5
associated programming package	STEP7 V5.3 SP2 or higher with HW update	STEP7 V5.3 SP2 or higher with HW update	STEP7 V5.3 SP2 or higher with HW update
Supply voltages			
Rated value			
• DC 24 V	No; Power supply via system power supply	No; Power supply via system power supply	No; Power supply via system power supply
Feeding of external buffer voltage to CPU	5 to 15 V DC	5 to 15 V DC	5 to 15 V DC
Current consumption			
from backplane bus DC 5 V, max.	1.5 A	1.7 A	1.8 A
from interface DC 5 V, max.	90 mA; At each DP interface	90 mA; At each DP interface	90 mA; At each DP interface
Current consumption/ power loss			
Power loss, typ.	5.5 W	6 W	6.5 W
Backup battery			
• Buffer current, typ.	190 µA; Valid up to 40°C	190 µA; Valid up to 40°C	970 µA; Valid up to 40°C
• Buffer current, max.	660 µA	660 µA	1 980 µA
Memory			
Type of storage			
RAM			
• integrated (for program)	512 Kibyte	1.4 MByte	15 MByte
• integrated (for data)	256 Kibyte	1.4 MByte	15 MByte
• expandable	No	No	No
Load memory			
• expandable FEPROM	Yes	Yes	Yes
• expandable FEPROM, max.	64 MByte	64 MByte	64 MByte
• integrated RAM, max.	256 Kibyte	256 Kibyte	256 Kibyte
• expandable RAM	Yes	Yes	Yes
• expandable RAM, max.	64 MByte	64 MByte	64 MByte
Backup			
• present	Yes	Yes	Yes
• with battery	Yes; All data	Yes; All data	Yes; All data
• without battery	No	No	No
CPU/blocks			
DB			
• Number, max.	4 095; Number range: 1 - 4095	4 095; Number range: 1 - 4095	8 191; Number range: 1 - 8191
• Size, max.	64 Kibyte	64 Kibyte	64 Kibyte
FB			
• Number, max.	2 048; Number range: 0 - 2047	2 048; Number range: 0 - 2047	6 144; Number range: 0 - 6143
• Size, max.	64 Kibyte	64 Kibyte	64 Kibyte
FC			
• Number, max.	2 048; Number range: 0 - 2047	2 048; Number range: 0 - 2047	6 144; Number range: 0 - 6143
• Size, max.	64 Kibyte	64 Kibyte	64 Kibyte
OB			
• Size, max.	64 Kibyte	64 Kibyte	64 Kibyte
Nesting depth			
• per priority class	24	24	24
• additional within an error OB	1	1	2

Technical specifications (continued)

	6ES7 412-3HJ14-0AB0	6ES7 414-4HM14-0AB0	6ES7 417-4HT14-0AB0
CPU/processing times			
for bit operations, min.	0.075 µs	0.045 µs	0.018 µs
for word operations, min.	0.075 µs	0.045 µs	0.018 µs
for fixed point arithmetic, min.	0.075 µs	0.045 µs	0.018 µs
for floating point arithmetic, min.	0.225 µs	0.135 µs	0.054 µs
Times/counters and their remanence			
S7 counter			
• Number	2 048	2 048	2 048
• Remanence			
- adjustable	Yes	Yes	Yes
- lower limit	0	0	0
- upper limit	2 047	2 047	2 047
- preset	From Z 0 to Z 7	From Z 0 to Z 7	From Z 0 to Z 7
• Counting range			
- lower limit	0	0	0
- upper limit	999	999	999
IEC counter			
• present	Yes	Yes	Yes
• Type	SFB	SFB	SFB
S7 times			
• Number	2 048	2 048	2 048
• Remanence			
- adjustable	Yes	Yes	Yes
- lower limit	0	0	0
- upper limit	2 047	2 047	2 047
- preset	No timers retentive	No timers retentive	No timers retentive
• Time range			
- lower limit	10 ms	10 ms	10 ms
- upper limit	9 990 s	9 990 s	9 990 s
IEC timer			
• present	Yes	Yes	Yes
• Type	SFB	SFB	SFB
Data areas and their remanence			
remanent data area, total	Total working and load memory (with backup battery)	Total working and load memory (with backup battery)	Total working and load memory (with backup battery)
Flag			
• Number, max.	8 Kibyte	8 Kibyte	16 Kibyte
• Remanence available	Yes	Yes	Yes
• Number of clock memories	8; (in 1 memory byte)	8; (in 1 memory byte)	8; (in 1 memory byte)
Address area			
I/O address area			
• Inputs	8 Kibyte	8 Kibyte	16 Kibyte
• Outputs	8 Kibyte	8 Kibyte	16 Kibyte
• of which, distributed			
- MPI/DPinterface, inputs	2 Kibyte	2 Kibyte	2 Kibyte
- MPI/DP interface, outputs	2 Kibyte	2 Kibyte	2 Kibyte
- DP interface, inputs		6 Kibyte	8 Kibyte
- DP interface, outputs		6 Kibyte	8 Kibyte

Technical specifications (continued)

	6ES7 412-3HJ14-0AB0	6ES7 414-4HM14-0AB0	6ES7 417-4HT14-0AB0
Process image			
• Inputs, adjustable	8 Kibyte	8 Kibyte	16 Kibyte
• Outputs, adjustable	8 Kibyte	8 Kibyte	16 Kibyte
• Inputs, preset	256 byte	256 byte	1 024 byte
• Outputs, preset	256 byte	256 byte	1 024 byte
• consistent data, max.	244 byte	244 byte	244 byte
• Access to consistent data in process image	Yes	Yes	Yes
Subprocess images			
• Number of subprocess images, max.	15	15	15
Digital channels			
• Inputs	65 536	65 536	131 072
• Outputs	65 536	65 536	131 072
• Inputs, of which central	65 536	65 536	131 072
• Outputs, of which central	65 536	65 536	131 072
Analog channels			
• Inputs	4 096	4 096	8 192
• Outputs	4 096	4 096	8 192
• Inputs, of which central	4 096	4 096	8 192
• Outputs, of which central	4 096	4 096	8 192
Hardware config.			
connectable OPs	15 without message processing, 8 with message processing	31 without message processing, 8 with message processing	63 without message processing, 16 with message processing
Central devices, max.	1	1	1
Expansion devices, max.	21	21	21
Multicomputing	No	No	No
IM			
• Number of connectable IMs (total), max.	6	6	6
• Number of connectable IM 460s, max.	6	6	6
• Number of connectable IM 463s, max.	4; Single mode only	4; Single mode only	4; Single mode only
Number of DP masters			
• integrated	1	2	2
• via CP	10	10	10
• Mixed mode IM + CP permitted	No	No	No
• via interface module	0		
Number of operable FMs and CPs (recommended)			
• FM	See manual Automation System S7-400H fault-tolerant systems. Limited due to number of slots and number of connections	See manual Automation System S7-400H fault-tolerant systems. Limited due to number of slots and number of connections	See manual Automation System S7-400H fault-tolerant systems. Limited due to number of slots and number of connections
• CP, point-to-point	See manual Automation System S7-400H fault-tolerant systems. Limited due to number of slots and number of connections	See manual Automation System S7-400H fault-tolerant systems. Limited due to number of slots and number of connections	See manual Automation System S7-400H fault-tolerant systems. Limited due to number of slots and number of connections
• PROFIBUS and Ethernet CPs	14; Of which max. 10 CP as DP master	14; Of which max. 10 CP as DP master	14; Of which max. 10 CP as DP master

Technical specifications (continued)

	6ES7 412-3HJ14-0AB0	6ES7 414-4HM14-0AB0	6ES7 417-4HT14-0AB0
Time			
Clock			
• Hardware clock (real-time clock)	Yes	Yes	Yes
• buffered and synchronizable	Yes	Yes	Yes
• Resolution	1 ms	1 ms	1 ms
Operating hours counter			
• Number	8	8	8
Clock synchronization			
• supports	Yes	Yes	Yes
• to MPI, Master	Yes	Yes	Yes
• to MPI, Slave	Yes	Yes	Yes
• to DP, Master	Yes	Yes	Yes
• to DP, Slave	Yes	Yes	Yes
• in AS, Master	Yes	Yes	Yes
• in AS, Slave	Yes	Yes	Yes
S7 message functions			
Number of login stations for message functions, max.	8	8	16
Symbol-related messages	No	No	No
Block related messages	Yes	Yes	Yes
Alarm 8-blocks	Yes	Yes	Yes
Instrumentation & control messages	Yes	Yes	Yes
Test commissioning functions			
Status/control			
• Status/control variable	Yes	Yes	Yes
Forcing			
• Forcing	Yes	Yes	Yes
Status block	Yes	Yes	Yes
Single step	Yes	Yes	Yes
Number of breakpoints	4	4	4
Diagnostic buffer			
• present	Yes	Yes	Yes
• Number of entries, max.	3 200	3 200	3 200
• adjustable	Yes	Yes	Yes
• preset	120	120	120
Communication functions			
PG/OP communication	Yes	Yes	Yes
Routing	Yes	Yes	Yes
Global data communication			
• supported	No	No	No
S7 basic communication			
• supported	No	No	No
S7 communication			
• supported	Yes	Yes	Yes
• as server	Yes	Yes	Yes
• as client	Yes	Yes	Yes
• Useful data per job, max.	64 Kibyte	64 Kibyte	64 Kibyte

Technical specifications (continued)

	6ES7 412-3HJ14-0AB0	6ES7 414-4HM14-0AB0	6ES7 417-4HT14-0AB0
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)
• Useful data per job, max.	8 Kibyte	8 Kibyte	8 Kibyte
Standard communication (FMS)			
• supported	Yes; Via CP and loadable FB	Yes; Via CP and loadable FB	Yes; Via CP and loadable FB
Number of connections			
• overall	16	32	64
1st interface			
Physics	RS 485 / PROFIBUS + MPI	RS 485 / PROFIBUS + MPI	RS 485 / PROFIBUS + MPI
isolated	Yes	Yes	Yes
Functionality			
• MPI	Yes	Yes	Yes
• DP master	Yes	Yes	Yes
• DP slave	No	No	No
MPI			
• Number of connections	16	32	44
• Services			
- PG/OP communication	Yes	Yes	Yes
- Routing	Yes	Yes	Yes
- Global data communication	No	No	No
- S7 basic communication	No	No	No
- S7 communication	Yes	Yes	Yes
• Transmission speeds, max.	12 MBit/s	12 MBit/s	12 MBit/s
DP master			
• Number of connections, max.	16	16	32
• Services			
- PG/OP communication	Yes	Yes	Yes
- Routing	Yes	Yes	Yes
- Global data communication	No	No	No
- S7 basic communication	No	No	No
- S7 communication	Yes	Yes	Yes
- S7 communication, as client			Yes
- S7 communication, as server			Yes
- equidistance support	No	No	No
- Activation/deactivation of DP slaves	No	No	No
- direct data exchange (cross traffic)	No	No	No
• Transmission speeds, max.	12 MBit/s	12 MBit/s	12 MBit/s
• Number of DP slaves, max.	32	32	32
• Address area			
- Inputs, max.	2 Kibyte	2 Kibyte	2 Kibyte
- Outputs, max.	2 Kibyte	2 Kibyte	2 Kibyte
• Useful data per DP slave			
- Inputs, max.	244 byte	244 byte	244 byte
- Outputs, max.	244 byte	244 byte	244 byte
DP slave			
• Number of connections	No configuration of CPU as DP slave		

Technical specifications (continued)

	6ES7 412-3HJ14-0AB0	6ES7 414-4HM14-0AB0	6ES7 417-4HT14-0AB0
2nd interface			
Physics		RS 485 / PROFIBUS + MPI	RS 485 / PROFIBUS + MPI
isolated		Yes	Yes
Functionality			
• DP master		Yes	Yes
• DP slave		No	No
DP master			
• Number of connections, max.		16	32
• Services			
- PG/OP communication		Yes	Yes
- Routing		Yes	Yes
- S7 basic communication		No	No
- S7 communication		Yes	Yes
- equidistance support		No	No
- Activation/deactivation of DP slaves		No	
- direct data exchange (cross traffic)		No	No
• Transmission speeds, max.		12 MBit/s	12 MBit/s
• Number of DP slaves, max.		96	125
• Address area			
- Inputs, max.		6 Kibyte	8 Kibyte
- Outputs, max.		6 Kibyte	8 Kibyte
• Useful data per DP slave			
- Inputs, max.		244 byte	244 byte
- Outputs, max.		244 byte	244 byte
3rd interface			
Type of interfaces	Pluggable synchronization submodule (FO)	Pluggable synchronization submodule (FO)	Pluggable synchronization submodule (FO)
pluggable interface module	Synchronization submodule IF 960 6ES7 960-1AA04-0XA0	Synchronization submodule IF 960 6ES7 960-1AA04-0XA0 or 6ES7 960-1AB04-0XA0	Synchronization submodule IF 960 6ES7 960-1AA04-0XA0 or 6ES7 960-1AB04-0XA0
4th interface			
Type of interface	Pluggable synchronization submodule (FO)	Pluggable synchronization submodule (FO)	Pluggable synchronization submodule (FO)
pluggable interface modules	Synchronization submodule IF 960 6ES7 960-1AA04-0XA0	Synchronization submodule IF 960 6ES7 960-1AA04-0XA0 or 6ES7 960-1AB04-0XA0	Synchronization submodule IF 960 6ES7 960-1AA04-0XA0 or 6ES7 960-1AB04-0XA0
Isochronous mode			
equidistance	No		
CiR configuration in RUN			
CiR synchronization time, basic load	150 ms	100 ms	60 ms
CiR synchronization time, time per I/O slave	40 µs	25 µs	10 µs

Technical specifications (continued)

	6ES7 412-3HJ14-0AB0	6ES7 414-4HM14-0AB0	6ES7 417-4HT14-0AB0
CPU/programming			
Configuration software			
• STEP 7	Yes; With hardware update as of STEP7 V5.3 SP2	Yes; With hardware update as of STEP7 V5.3 SP2	Yes; With hardware update as of STEP7 V5.3 SP2
Programming language			
• STEP 7	Yes	Yes	Yes
• LAD	Yes	Yes	Yes
• FUP	Yes	Yes	Yes
• AWL	Yes	Yes	Yes
• SCL	Yes	Yes	Yes
• CFC	Yes	Yes	Yes
• GRAPH	Yes	Yes	Yes
• HiGraph	Yes	Yes	Yes
Nesting levels	8	8	8
User program protection/ password protection	Yes	Yes	Yes
Dimensions			
Required slots	2	2	2
Dimensions			
Dimensions			
• Width	50 mm	50 mm	50 mm
• Height	290 mm	290 mm	290 mm
• Depth	219 mm	219 mm	219 mm
Weights			
• Weight, approx.	990 g	995 g	995 g

CPU 412H, CPU 414H, CPU 417H

Ordering data

		Order No.
CPU 412-3H For S7-400H and S7-400F/FH; 768 KB main memory, combined MPI/PROFIBUS DP master interface, 2 slots for sync modules, slot for memory card, incl. slot number labels		**6ES7 412-3HJ14-0AB0**
CPU 412-3H system bundle Not assembled, comprising: UR2-H rack, 2 x PS 405/407 power supply, 2 x CPU 412-3H, 2 x memory card RAM (1 MB), 4 x sync module (for max. 10 m), 2 x fiber-optic connecting cable for sync modules (1 m), 4 x backup battery		
412H system bundle, 1 MB, 120/230 V AC, 10 A	B7	**6ES7 400-0HR00-4AB0**
412H system bundle, 1 MB, 24/48/60 V DC, 10 A	B7	**6ES7 400-0HR50-4AB0**
CPU 414-4H 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		**6ES7 414-4HM14-0AB0**
CPU 417-4H For S7-400H and S7-400F/FH; 30 MB main memory, MPI/PROFIBUS DP master interface, 2 slots for sync modules, slot for memory card, incl. slot number plates		**6ES7 417-4HT14-0AB0**
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**

		Order No.
MPI cable For connecting SIMATIC S7 and the PG through 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 412-3H, CPU 414-4H or CPU 417-4H		**6ES7 833-1CC00-6YX0**
S7 F systems V6.0 Programming and configuration environment for creating and using safety-related STEP 7 programs for an S7 400H-based target system, Floating License for 1 user, executes with Windows XP Prof SP2, Windows 2000 SP4, Windows Server 2003 SP1/SP2 2 languages (German, English) Type of delivery: Certificate of License as well as software and electronic documentation on CD		**6ES7 833-1CC01-0YA5**
S7 F systems upgrade from V5.x to V6.0 2 languages (German, English), Floating License for 1 user Type of delivery: Certificate of License as well as software and electronic documentation on CD		**6ES7 833-1CC01-0YE5**
Manual "Communication for SIMATIC S7-300/-400"		
German		**6ES7 398-8EA00-8AA0**
English		**6ES7 398-8EA00-8BA0**
French		**6ES7 398-8EA00-8CA0**
Spanish		**6ES7 398-8EA00-8DA0**
Italian		**6ES7 398-8EA00-8EA0**
SIMATIC Manual Collection Electronic manuals on DVD, five languages: S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, engineering software, runtime software, PCS 7, SIMATIC HMI, SIMATIC NET	B3	**6ES7 998-8XC01-8YE0**
SIMATIC Manual Collection update service for 1 year Current "Manual Collection" DVD and the three subsequent updates	B3	**6ES7 998-8XC01-8YE2**

B3: Subject to export regulations: AL: N and ECCN: 5D992B1
B7: Subject to export regulations: AL: N and ECCN: EAR99H

Ordering data	Order No.
Brochure "SIMATIC S7-400 automation system - design and application"	
German	**6ES7 498-8AA00-8AB0**
English	**6ES7 498-8AA00-8BB0**
RS 485 bus connector with 90° cable outlet	
Max. transmission rate 12 Mbit/s	
Without programming device interface	**6ES7 972-0BA12-0XA0**
With programming device interface	**6ES7 972-0BB12-0XA0**
RS 485 bus connector with angular cable outlet	
Max. transmission rate 12 Mbit/s	
Without programming device interface	**6ES7 972-0BA41-0XA0**
With programming device interface	**6ES7 972-0BB41-0XA0**
Max. transmission rate 1.5 Mbit/s	
Without programming device interface	**6ES7 972-0BA30-0XA0**
RS 485 bus connector with 90° cable outlet for FastConnect connection system	
Max. transmission rate 12 Mbit/s	
Without programming device interface	**6ES7 972-0BA51-0XA0**
With programming device interface	**6ES7 972-0BB51-0XA0**

	Order No.
RS 485 bus connector with axial cable outlet	
For SIMATIC OP, for connecting 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**

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 CPU 416F-3 PN/DP) and/or through communication modules (CP 443-5 Ext. and CP 443-1 Adv.)
- Standard modules for non-safety-related applications can be operated centrally and decentralized

5

Technical specifications

	6ES7 416-2FN05-0AB0	6ES7 416-3FR05-0AB0
Product status		
Firmware version	V5.0	V5.0
associated programming package	STEP7 V5.3 SP2 or higher with HW-update	STEP7 V5.4 SP1 or higher
Feeding of external buffer voltage to CPU	5 to 15 V DC	5 to 15 V DC
Current consumption		
from backplane bus DC 5 V, max.	1.1 A	1.3 A
from interface DC 5 V, max.	90 mA; At each DP interface	90 mA; At each DP interface
Current consumption/ power loss		
Power loss, typ.	4 W	4.5 W
Backup battery		
• Buffer current, typ.	125 µA; Valid up to 40°C	125 µA; Valid up to 40°C
• Buffer current, max.	550 µA	550 µA
Memory		
Type of storage		
RAM		
• integrated (for program)	2.8 MByte	5.6 MByte
• integrated (for data)	2.8 MByte	5.6 MByte
• expandable	No	No
Load memory		
• expandable FEPROM	Yes	Yes
• expandable FEPROM, max.	64 MByte	64 MByte
• integrated RAM, max.	1 MByte	1 MByte
• expandable RAM	Yes	Yes
• expandable RAM, max.	64 MByte	64 MByte
Backup		
• present	Yes	Yes
• with battery	Yes	Yes
• without battery	No	No

	6ES7 416-2FN05-0AB0	6ES7 416-3FR05-0AB0
CPU/blocks		
DB		
• Number, max.	10 000; Number range: 1 to 16,000	10 000; Number range: 1 to 16,000
• Size, max.	64 Kibyte	64 Kibyte
FB		
• Number, max.	5 000; Number range: 0 to 7999	5 000; Number range: 0 to 7999
• Size, max.	64 Kibyte	64 Kibyte
FC		
• Number, max.	5 000; Number range: 0 to 7,999	5 000; Number range: 0 to 7,999
• Size, max.	64 Kibyte	64 Kibyte
OB		
• Size, max.	64 Kibyte	64 Kibyte
Nesting depth		
• per priority class	24	24
• additional within an error OB	2	2
CPU/processing times		
for bit operations, min.	30 ns	30 ns
for word operations, min.	30 ns	30 ns
for fixed point arithmetic, min.	30 ns	30 ns
for floating point arithmetic, min.	90 ns	90 ns
Times/counters and their remanence		
S7 counter		
• Number	2 048	2 048

Technical specifications (continued)

	6ES7 416-2FN05-0AB0	6ES7 416-3FR05-0AB0
S7 counter (continued)		
• Remanence		
- adjustable	Yes	Yes
- lower limit	0	0
- upper limit	2 047	2 047
- preset	From Z 0 to Z 7	From Z 0 to Z 7
• Counting range		
- lower limit	0	0
- upper limit	999	999
IEC counter		
• present	Yes	Yes
• Type	SFB	SFB
S7 times		
• Number	2 048	2 048
• Remanence		
- adjustable	Yes	Yes
- lower limit	0	0
- upper limit	2 047	2 047
- preset	No times retentive	No times retentive
• Time range		
- lower limit	10 ms	10 ms
- upper limit	9 990 s	9 990 s
IEC timer		
• present	Yes	Yes
• Type	SFB	SFB
Data areas and their remanence		
remanent data area, total	Total working and load memory (with backup battery)	Total working and load memory (with backup battery)
Flag		
• Number, max.	16 Kibyte	16 Kibyte
• Remanence available	Yes	Yes
• Number of clock memories	8; (in 1 memory byte)	8; (in 1 memory byte)
Address area		
I/O address area		
• Inputs	16 Kibyte	16 Kibyte
• Outputs	16 Kibyte	16 Kibyte
• of which, distributed		
- MPI/DPinterface, inputs	2 Kibyte	2 Kibyte
- MPI/DP interface, outputs	2 Kibyte	2 Kibyte
- DP interface, inputs	8 Kibyte	8 Kibyte
- DP interface, outputs	8 Kibyte	8 Kibyte
Process image		
• Inputs, adjustable	16 Kibyte	16 Kibyte
• Outputs, adjustable	16 Kibyte	16 Kibyte
• Inputs, preset	512 byte	512 byte
• Outputs, preset	512 byte	512 byte
• consistent data, max.	244 byte	244 byte
• Access to consistent data in process image	Yes	Yes

	6ES7 416-2FN05-0AB0	6ES7 416-3FR05-0AB0
Subprocess images		
• Number of subprocess images, max.	15	15
Digital channels		
• Inputs	131 072	131 072
• Outputs	131 072	131 072
• Inputs, of which central	131 072	131 072
• Outputs, of which central	131 072	131 072
Analog channels		
• Inputs	8 192	8 192
• Outputs	8 192	8 192
• Inputs, of which central	8 192	8 192
• Outputs, of which central	8 192	8 192
Hardware config.		
connectable OPs	63	63
Central devices, max.	1	1
Expansion devices, max.	21	21
Multicomputing	Yes; Max. 4 CPUs (with UR1 or UR2)	Yes; Max. 4 CPUs (with UR1 or UR2)
IM		
• Number of connectable IMs (total), max.	6	6
• Number of connectable IM 460s, max.	6	6
• Number of connectable IM 463s, max.	4; IM 463-2	4; IM 463-2
Number of DP masters		
• integrated	2	2
• via IM 467	4	4
• via CP	10; CP 443-5 Extended	10; CP 443-5 Extended
• Mixed mode IM + CP permitted	No; IM 467 cannot be used with CP 443-5 Ext.; IM 467 cannot be used with CP 443-1 EX40 in PN IO mode	No; IM 467 cannot be used with CP 443-5 Ext.; IM 467 cannot be used with CP 443-1 EX40 in PN IO mode
• via interface module	0	1
• Number of pluggable S5 modules (via adapter capsule in central device), max.	6	6
Number of IO controllers		
• integrated		
• via CP	4; Via CP 443-1 EX 41 in PN mode; max. 4 in central controller	4; Via CP 443-1 EX 41 in PN mode; max. 4 in central controller
Number of operable FMs and CPs (recommended)		
• FM	Limited due to number of slots and number of connections	Limited due to number of slots and number of connections

Technical specifications (continued)

	6ES7 416-2FN05-0AB0	6ES7 416-3FR05-0AB0
Number of operable FMs and CPs (recommended) (cont.)		
• CP, point-to-point	Limited due to number of slots and number of connections	Limited due to number of slots and number of connections
• PROFIBUS and Ethernet CPs	14; Of which 10 CP or IM max. as DP master and PN controller	14; Of which 10 CP/IM max. as DP master and PN controller
Time		
Clock		
• Hardware clock (real-time clock)	Yes	Yes
• buffered and synchronizable	Yes	Yes
• Resolution	1 ms	1 ms
Operating hours counter		
• Number	8	8
Clock synchronization		
• supports	Yes	Yes
• to MPI, Master	Yes	Yes
• to MPI, Slave	Yes	Yes
• to DP, Master	Yes	Yes
• to DP, Slave	Yes	Yes
• in AS, Master	Yes	Yes
• in AS, Slave	Yes	Yes
• on Ethernet via NTP	Via CP	Via CP
• to IF 964 DP		Yes
S7 message functions		
Number of login stations for message functions, max.	63; Max. 63 with ALARM_S and ALARM_D (OPs); max. 12 with ALARM_8 and ALARM_P (e.g. WinCC)	63; Max. 63 with ALARM_S and ALARM_D (OPs); max. 12 with ALARM_8 and ALARM_P (e.g. WinCC)
Symbol-related messages	Yes	Yes
Number of messages		
• overall, max.	1 024	1 024
Block related messages	Yes	Yes
Alarm 8-blocks	Yes	Yes
Instrumentation & control messages	Yes	Yes
Test commissioning functions		
Status/control		
• Status/control variable	Yes	Yes
Forcing		
• Forcing	Yes	Yes
Status block	Yes	Yes
Single step	Yes	Yes
Number of breakpoints	4	4

	6ES7 416-2FN05-0AB0	6ES7 416-3FR05-0AB0
Diagnostic buffer		
• present	Yes	Yes
• Number of entries, max.	3 200	3 200
• adjustable	Yes	Yes
• preset	120	120
Communication functions		
PG/OP communication	Yes	Yes
Routing	Yes	Yes
Global data communication		
• supported	Yes	Yes
• Size of GD packets, max.	54 byte	54 byte
S7 basic communication		
• supported	Yes	Yes
• Useful data per job, max.	76 byte	76 byte
S7 communication		
• supported	Yes	Yes
• Useful data per job, max.	64 Kibyte	64 Kibyte
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)
• Useful data per job, max.	8 Kibyte	8 Kibyte
Standard communication (FMS)		
• supported	Yes; Via CP and loadable FB	Yes; Via CP and loadable FB
Web server		
• Web server	No; Via CP	Yes; Read-only function
Open IE communication		
• TCP/IP		Yes
- Number of connections, max.		64
- Data length, max.		32 Kibyte
• ISO-on-TCP (RFC1006)	Via CP 443-1 Adv. and loadable FB	Yes
- Number of connections, max.		64
- Data length, max.	1452	32 Kibyte; 1452 bytes via CP 443-1 Adv.
• UDP		Yes
- Number of connections, max.		64
- Data length, max.		1 472 byte
Number of connections		
• overall	64	64

Technical specifications (continued)

	6ES7 416-2FN05-0AB0	6ES7 416-3FR05-0AB0
PROFINET CBA (at set setpoint communication load)		
• Number of remote inter-connection partners		32
• Number of functions, master/slave		150
• Total of all master/slave connections		6 000
• Data length of all incoming connections master/slave, max.		65 000 byte
• Data length of all outgoing connections master/slave, max.		65 000 byte
• Number of device-internal and PROFIBUS inter-connections		1 000
• Data length of device-internal and PROFIBUS interconnections, max.		16 000 byte
• Data length per connection, max.		2 000 byte
• Remote interconnections with acyclic transmission		
- Transmission frequency: transmission interval, min.		1 ms; Depending on preset communi-cation load, number of interconnections and data length used
- Number of incoming interconnections		300
- Number of outgoing interconnections		300
- Data length of all incoming interconnections, max.		4 800 byte
- Data length of all outgoing interconnections, max.		4 800 byte
- Data length per connection, max.		250 byte
• HMI variables via PROFINET (acyclic)		
- Number of log-in stations for HMI variables (PN OPC/iMap)		2x PN OPC/1x iMap
- HMI variable updating		500 ms
- Number of HMI variables		1 500
- Data length of all HMI variables, max.		48 000 byte
• PROFIBUS proxy functionality		
- supported		Yes; 32 PROFIBUS slaves max. connectable
- Data length per connection, max.		240 byte; Slave-dependent
1st interface		
Physics	RS 485 / PROFIBUS	RS 485 / PROFIBUS + MPI
isolated	Yes	Yes

	6ES7 416-2FN05-0AB0	6ES7 416-3FR05-0AB0
Functionality		
• MPI	Yes	Yes
• DP master	Yes	Yes
• DP slave	Yes	Yes
MPI		
• Number of connections	44	44
• Services		
- PG/OP communication	Yes	Yes
- Routing	Yes	Yes
- Global data communi-cation	Yes	Yes
- S7 basic communication	Yes	Yes
- S7 communication	Yes	Yes
• Transmission speeds, max.	12 MBit/s	12 MBit/s
DP master		
• Number of connections, max.	32	32; if a diagnostic repeater is used on the line, the number of connection resources on the line is reduced by 1
• Services		
- PG/OP communication	Yes	Yes
- Routing	Yes	Yes
- Global data communi-cation	No	No
- S7 basic communication	Yes	Yes
- S7 communication	Yes	Yes
- equidistance support	Yes	Yes
- Activation/deactivation of DP slaves	Yes	Yes
- direct data exchange (cross traffic)	Yes	Yes
• Transmission speeds, max.	12 MBit/s	12 MBit/s
• Number of DP slaves, max.	32	32
• Address area		
- Inputs, max.	2 Kibyte	2 Kibyte
- Outputs, max.	2 Kibyte	2 Kibyte
• Useful data per DP slave		
- Inputs, max.	244 byte	244 byte
- Outputs, max.	244 byte	244 byte
DP slave		
• Number of connections	32	32
• Services		
- PG/OP communication	Yes	Yes; with interface active
- Routing	Yes	Yes; with interface active
• Transmission speeds, max.	12 MBit/s	12 MBit/s
• Transfer memory		
- Inputs	244 byte	244 byte
- Outputs	244 byte	244 byte
• Address area, max.	32	32; Virtual slots
• Useful data per address area, max.	32 byte	32 byte
• Useful data per address area, of which consistent, max.	32 byte	32 byte

CPU 416F

Technical specifications (continued)

	6ES7 416-2FN05-0AB0	6ES7 416-3FR05-0AB0
2nd interface		
Physics	RS 485 / PROFIBUS	Ethernet
isolated	Yes	Yes
Functionality		
• DP master	Yes	No
• DP slave	Yes	No
• PROFINET IO controller		Yes
• PROFINET CBA		Yes
• Point-to-point coupling		No
DP master		
• Number of connections, max.	32	
• Services		
- PG/OP communication	Yes	
- Routing	Yes	
- S7 basic communication	Yes	
- S7 communication	Yes	
- equidistance support	Yes	
- Activation/deactivation of DP slaves	Yes	
- direct data exchange (cross traffic)	Yes	
• Transmission speeds, max.	12 MBit/s	
• Number of DP slaves, max.	125	
• Address area		
- Inputs, max.	8 Kibyte	
- Outputs, max.	8 Kibyte	
• Useful data per DP slave		
- Inputs, max.	244 byte	
- Outputs, max.	244 byte	
DP slave		
• Number of connections	32	
• Services		
- Routing	Yes	
- Programming	Yes	
• GSD file	http://support.automation.siemens.com/WW/view/en/113652	
• Transmission speeds, max.	12 MBit/s	
• Transfer memory		
- Inputs	244 byte	
- Outputs	244 byte	
• Address area, max.	32	
• Useful data per address area, max.	32 byte	
• Useful data per address area, of which consistent, max.	32 byte	

	6ES7 416-2FN05-0AB0	6ES7 416-3FR05-0AB0
PROFINET IO controller		
• Services		
- PG/OP communication		Yes
- Routing		Yes; Routing of PG functions
- S7 communication		Yes
- open IE communication		Yes
• Transmission rate, min.		10 MBit/s
• Transmission speed, max.		100 MBit/s
• Total number of connectable IO Devices, max.		256
• Updating time		250 µs to 512 ms; minimum value dependent on preset communication share for PROFINET I/O, of number of I/O devices and number of configured user data
• Address area		
- Inputs, max.		8 Kibyte
- Outputs, max.		8 Kibyte
- Useful data consistency, max.		255 byte; incl. net data accompaniers
PROFINET CBA		
• Acyclic transmission		Yes
• cyclic transmission		Yes
3rd interface		
Type of interfaces		Pluggable interface module (IF), technical specifications as for 2nd interface
pluggable interface module		IF 964-DP (Order No.: 6ES7 964-2AA04-0AB0)
Physics		RS 485 / PROFIBUS
isolated		Yes
power supply to interface (15 to 30 V DC), max.		150 mA
Number of connection resources		32
Functionality		
• MPI		No
• DP master		Yes
• DP slave		Yes

Technical specifications (continued)

	6ES7 416-2FN05-0AB0	6ES7 416-3FR05-0AB0
DP master		
• Number of connections, max.		32
• Services		
- PG/OP communication		Yes
- Routing		Yes
- Global data communication		No
- S7 basic communication		Yes
- S7 communication		Yes
- Equidistance support		Yes
- SYNC/FREEZE		Yes
- Activation/deactivation of DP slaves		Yes
- Direct data exchange		Yes
• Transmission rate, max.		12 MBit/s
• Number of DP slaves, max.		125
• Address area		
- Inputs, max.		8 Kibyte
- Outputs, max.		8 Kibyte
• Useful data per DP slave		
- Useful data per DP slave, max.		244 byte
- Inputs, max.		244 byte
- Outputs, max.		244 byte
- Slots, max.		244
- per slot, max.		128 byte
DP slave		
• Number of connections		32
• Services		
- Routing		Yes; When interface active
- Status/control		Yes; When interface active
• GSD file		http://support.automation.siemens.com/WW/view/en/113652
• Transmission rate, max.		12 MBit/s
• Transfer memory		
- Inputs		244 byte
- Outputs		244 byte
• Address range, max.		32
• Useful data per address area, max.		32 byte
• Useful data per address area, of which consistent, max.		32 byte

	6ES7 416-2FN05-0AB0	6ES7 416-3FR05-0AB0
Isochronous mode		
Useful data per isochronous slave, max.	244 byte	244 byte
equidistance	Yes	Yes
shortest clock pulse	1 ms; 0.5 ms without use of SFC 126, 127	1 ms; Without use of SFC 126 and 127 up to 0.5 ms
CiR configuration in RUN		
CiR synchronization time, basic load	100 ms	100 ms
CiR synchronization time, time per I/O slave	40 µs	40 µs
CPU/programming		
Configuration software		
• STEP 7	Yes	Yes
Programming language		
• STEP 7		Yes
• LAD	Yes	Yes
• FUP	Yes	Yes
• AWL	Yes	Yes
• SCL	Yes	Yes
• CFC	Yes	Yes
• GRAPH	Yes	Yes
• HiGraph	Yes	Yes
Nesting levels	7	7
User program protection/password protection	Yes	Yes
Dimensions		
Required slots	1	2
Dimensions		
Dimensions		
• Width	25 mm	50 mm
• Height	290 mm	290 mm
• Depth	219 mm	219 mm
Weights		
• Weight, approx.	720 g	900 g

CPU 416F

Ordering data	Order No.
CPU 416F-2	**6ES7 416-2FN05-0AB0**
For configuring safety-related automation systems; main memory 5.6 MB, 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 416-3FR05-0AB0**
For configuring safety-related automation systems; main memory 11.2 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	
Option package S7 F Distributed Safety V5.4	
for generating fail-safe programs for the S7-300F	
Floating License	**6ES7 833-1FC02-0YA5**
Upgrade from V5.x to V5.4	**6ES7 833-1FC02-0YE5**
Software Update Service	**6ES7 833-1FC00-0YX2**
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**

		Order No.
MPI cable		**6ES7 901-0BF00-0AA0**
For connecting SIMATIC S7 and the PG through 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)		
Manual "SIMATIC S7-400 automation system"		
incl. instruction list		
German		**6ES7 498-8AA05-8AA0**
English		**6ES7 498-8AA05-8BA0**
French		**6ES7 498-8AA05-8CA0**
Spanish		**6ES7 498-8AA05-8DA0**
Italian		**6ES7 498-8AA05-8EA0**
S7-400 instructions list		
German		**6ES7 498-8AA05-8AN0**
English		**6ES7 498-8AA05-8BN0**
French		**6ES7 498-8AA05-8CN0**
Spanish		**6ES7 498-8AA05-8DN0**
Italian		**6ES7 498-8AA05-8EN0**
Manual "Communication for SIMATIC S7-300/-400"		
German		**6ES7 398-8EA00-8AA0**
English		**6ES7 398-8EA00-8BA0**
French		**6ES7 398-8EA00-8CA0**
Spanish		**6ES7 398-8EA00-8DA0**
Italian		**6ES7 398-8EA00-8EA0**
SIMATIC Manual Collection	B3	**6ES7 998-8XC01-8YE0**
Electronic manuals on DVD, five languages: S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, engineering software, runtime software, PCS 7, SIMATIC HMI, SIMATIC NET		
SIMATIC Manual Collection update service for 1 year	B3	**6ES7 998-8XC01-8YE2**
Current "Manual Collection" DVD and the three subsequent updates		
Brochure "SIMATIC S7-400 automation system - Design and application"		
German		**6ES7 498-8AA00-8AB0**
English		**6ES7 498-8AA00-8BB0**

B3: Subject to export regulations: AL: N and ECCN: 5D992B1

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 972-0BA41-0XA0**
With PG interface	**6ES7 972-0BB41-0XA0**
RS 485 bus connector with 90° cable outlet for FastConnect system	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6ES7 972-0BA51-0XA0**
With PG interface	**6ES7 972-0BB51-0XA0**
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 order quantity 20 m	**6XV1 830-0EH10**
RS 485 repeater for PROFIBUS	**6ES7 972-0AA01-0XA0**
Data transfer rate up to 12 Mbit/s; 24 V DC; IP20 housing	

	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 Catalogs IK PI, CA 01
For establishing MPI/PROFIBUS/PROFINET communication	

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 960-1AA04-0XA0	6ES7 960-1AB04-0XA0
Current consumption		
from CPU, max.	210 mA	250 mA
Current consumption/ power loss		
Power loss, typ.	1.1 mW	1.3 mW
Dimensions		
Dimensions		
• Width	25 mm	25 mm
• Height	53 mm	53 mm
• Depth	140 mm	140 mm
Weights		
• Weight, approx.	65 g	65 g

Ordering data

		Order No.
for coupling the CPU 41xH for S7-400H/F/FH; 2 modules required per CPU;		
For 6ES7 412-3HJ14-0AB0, 6ES7 414-4HM14-0AB0 and 6ES7 417-4HT14-0AB0; for patch cable, can be used for fiber-optic cables up to 10 m in length		**6ES7 960-1AA04-0XA0**
For 6ES7 414-4HM14-0AB0 and 6ES7 417-4HT14-0AB0; for patch and installation cables, can be used for fiber-optic cables up to 10 km in length	B7	**6ES7 960-1AB04-0XA0**
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 960-1AB04-0XA0; fiber-optic monomode LC/LC duplex crossed 9/125 µ (max. 10 km)		on request

B7: Subject to export regulations: AL: N and ECCN: EAR99H

IF-964 DP PROFIBUS 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
- One or two PROFIBUS modules can be inserted per S7-400 CPU:
  - CPU 414-3/416-3: 1 module
  - CPU 417-4: 2 modules

Note:

Can only be used with CPUs 6ES7 414-3XM05-0AB0, 6ES7 414-3EM05-0AB0, 6ES7 416-3XR05-0AB0, 6ES7 416-3ER05-0AB0 and 6ES7 417-4XT05-0AB0.

1st interface	
Physics	RS 485
isolated	Yes
Functionality	
• DP master	Yes; Default setting
• DP slave	Yes
DP master	
• Services	
- PG/OP communication	Yes
- equidistance support	Yes
- SYNC/FREEZE	Yes
- direct data exchange (cross traffic)	Yes
• Transmission speeds, max.	12 MBit/s
• Transmission speeds, min.	9.6 kBit/s
• Number of DP slaves, max.	125; depending on the CPU used
• Address area	
- Inputs, max.	device-dependent
- Outputs, max.	device-dependent
• Useful data per DP slave	
- Inputs, max.	244 byte
- Outputs, max.	244 byte
Dimensions	
Dimensions	
• Width	26 mm
• Height	54 mm
• Depth	130 mm
Weights	
• Weight, approx.	65 g

Technical specifications

	6ES7 964-2AA04-0AB0
Current consumption	
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.
Current consumption/ power loss	
Power loss, typ.	1 W
Communication functions	
Number of connections	
• overall	device-dependent
PROFIBUS DP	
Cable length, max.	1 200 m; at 9.6 Kbit/s: max. 1200 m; at 12 Mbit/s: max. 100 m

Ordering data

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

SIPLUS CPU 416, CPU 417

Overview SIPLUS CPU 416-3, CPU 416-3 PN/DP

High-performance CPUs in the high-end performance range

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

	SIPLUS CPU 416-3	
Order No.	**6AG1 416-3XR05-4AB0**	**6AG1 416-3ER05-4AB0**
Order No. based on	**6ES7 416-3XR05-0AB0**	**6ES7 416-3ER05-0AB0**
Environmental conditions	Suited for exceptional medial exposure (e. g. by chlorine sulfur atmosphere).	
Technical data	The technical data are identical with those of the based-on modules.	

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

Ordering data

		Order No.
CPU 416-3	B7	**6AG1 416-3XR05-4AB0**
(medium exposure) 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		
CPU 416-3 PN/DP	B7	**6AG1 416-3ER05-4AB0**
(medium exposure) Main memory 11.2 MB, power supply 24 V DC, MPI/PROFIBUS DP master interface, PROFINET interface, PROFIBUS DP master interface, module slot for 1 IF submodule, slot for memory card, incl. slot number labels		
Accessories		see CPU 416, page 5/32

B7: Subject to export regulations: AL: N and ECCN: EAR99H

Overview SIPLUS CPU 417-4

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

	SIPLUS CPU 417-4
Order No.	**6AG1 417-4XT05-4AB0**
Order No. based on	**6ES7 417-4XT05-0AB0**
Environmental conditions	Suited for exceptional medial exposure (e. g. by chlorine sulfur atmosphere)
Technical data	The technical data are identical with those of the based-on modules.

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

Ordering data

		Order No.
SIPLUS CPU 417-4	B7	**6AG1 417-4XT05-4AB0**
(medium exposure) Main memory 30 MB, power supply 24 V DC, MPI/PROFIBUS DP master interface, PROFIBUS DP master interface, module slots for max. 2 additional IF modules, slot for memory card, incl. slot number labels		
Accessories		see CPU 417, page 5/37

B7: Subject to export regulations: AL: N and ECCN: EAR99H

Overview SIPLUS CPU 414-4H

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

- For use in S7-400H fault-tolerant systems
- Can be used with F-Runtime license as fail-safe CPU in safety-related S7-400F/FH systems
- With integral PROFIBUS DP master interface
- With 2 plug-in slots for sync modules

	SIPLUS CPU 414-4H
Order No.	**6AG1 414-4HJ04-4AB0**
Order No. based on	**6ES7 414-4HJ04-0AB0**
Environmental conditions	Suited for exceptional medial exposure (e. g. by chlorine sulfur atmosphere)
Technical data	The technical data are identical with those of the based-on modules.

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

Overview SIPLUS CPU 417-4H

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

- For use in S7-400H fault-tolerant systems
- Can be used with F-Runtime license as fail-safe CPU in safety-related S7-400F/FH systems
- With integral PROFIBUS DP master interface
- With 2 plug-in slots for sync modules

	SIPLUS CPU 417-4H
Order No.	**6AG1 417-4HL04-4AB0**
Order No. based on	**6ES7 417-4HL04-0AB0**
Environmental conditions	Suited for exceptional medial exposure (e. g. by chlorine sulfur atmosphere)
Technical data	The technical data are identical with those of the based-on modules.

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

Technical specifications

	6AG1 414-4HJ04-4AB0	6AG1 417-4HL04-4AB0
Supply voltages		
Rated value		
• DC 24 V	Yes	Yes
Feeding of external buffer voltage to CPU	5 to 15 V DC	5 to 15 V DC
Current consumption		
from backplane bus DC 5 V, max.	2 A	1.7 A
Current consumption/ power loss		
Power loss, typ.	4.5 W	6 W
Backup battery		
• Buffer current, typ.	550 µA	600 µA
• Buffer current, max.	1 530 µA	1 810 µA

	6AG1 414-4HJ04-4AB0	6AG1 417-4HL04-4AB0
Memory		
Type of storage		
RAM		
• integrated (for program)	700 Kibyte	
• integrated (for data)	700 Kibyte	
• expandable	No	No
Load memory		
• expandable FEPROM	Yes; with Memory Card (FLASH)	Yes; with Memory Card (FLASH)
• expandable FEPROM, max.	64 MByte	64 MByte
• integrated RAM, max.	256 Kibyte	256 Kibyte
• expandable RAM	Yes; With Memory Card (RAM)	Yes; With Memory Card (RAM)
• expandable RAM, max.	16 MByte	16 MByte

Technical specifications (continued)

	6AG1 414-4HJ04-4AB0	6AG1 417-4HL04-4AB0
Backup		
• present	Yes	Yes
• with battery	Yes; All data	Yes; All data
• without battery	No	No
CPU/blocks		
DB		
• Number, max.	4 095; DB 0 reserved	8 192; DB 0 reserved
• Size, max.	64 Kibyte	
FB		
• Number, max.	2 048	6 144
• Size, max.	64 Kibyte	64 Kibyte
FC		
• Number, max.	2 048	6 144
• Size, max.	64 Kibyte	64 Kibyte
OB		
• Size, max.	64 Kibyte	64 Kibyte
Nesting depth		
• per priority class	24	24
• additional within an error OB		2
CPU/processing times		
for bit operations, min.	0.06 µs	0.03 µs
for word operations, min.	0.06 µs	0.03 µs
for fixed point arithmetic, min.	0.06 µs	0.03 µs
for floating point arithmetic, min.	0.18 µs	0.09 µs
Times/counters and their remanence		
S7 counter		
• Number	2 048	2 048
• Remanence		
- adjustable	Yes	Yes
- lower limit	0	0
- upper limit	2 047	2 047
- preset	From Z 0 to Z 7	From Z 0 to Z 7
• Counting range		
- lower limit	0	1
- upper limit	999	999
IEC counter		
• present	Yes	Yes
• Type	SFB	SFB
S7 times		
• Number	2 048	2 048
• Time range		
- lower limit	10 ms	10 ms
- upper limit	9 990 s	9 990 s
IEC timer		
• present	Yes	Yes
• Type	SFB	SFB

	6AG1 414-4HJ04-4AB0	6AG1 417-4HL04-4AB0
Data areas and their remanence		
Flag		
• Number, max.	8 Kibyte	16 Kibyte
• Remanence available	Yes; MB 0 to MB 8191	Yes; MB 0 to MB 16383
Address area		
I/O address area		
• Inputs	8 Kibyte	16 Kibyte
• Outputs	8 Kibyte	16 Kibyte
• of which, distributed		
- MPI/DPinterface, inputs	2 Kibyte	2 Kibyte
- MPI/DP interface, outputs	2 Kibyte	2 Kibyte
- DP interface, inputs	6 Kibyte	8 Kibyte
- DP interface, outputs	6 Kibyte	8 Kibyte
Process image		
• Inputs, adjustable	8 Kibyte	16 Kibyte
• Outputs, adjustable	8 Kibyte	16 Kibyte
• Inputs, preset	1 024 byte	1 024 byte
• Outputs, preset	1 024 byte	1 024 byte
Subprocess images		
• Number of subprocess images, max.	8	8
Digital channels		
• Inputs	65 536	131 072
• Outputs	65 536	131 072
• Inputs, of which central	65 536	131 072
• Outputs, of which central	65 536	131 072
Analog channels		
• Inputs	4 096	8 192
• Outputs	4 096	8 192
• Inputs, of which central	4 096	8 192
• Outputs, of which central	4 096	8 192
Hardware config.		
Central devices, max.	1	1
Expansion devices, max.	21	21
Multicomputing	No	No
IM		
• Number of connectable IMs (total), max.	6	6
• Number of connectable IM 460s, max.	6	6
• Number of connectable IM 463s, max.	6; IM 463-2	6; IM 463-2

Technical specifications (continued)

	6AG1 414-4HJ04-4AB0	6AG1 417-4HL04-4AB0
Number of DP masters		
• integrated	2	2
• via IM 467	0	0
• via CP	10	10
• Mixed mode IM + CP permitted	No; IM 467 cannot be used jointly with CP 443-5 Ext.	No; IM 467 cannot be used jointly with CP 443-5 Ext.
• via interface module	0	0
Number of operable FMs and CPs (recommended)		
• FM	32; Limited due to number of slots and number of connections	64; Limited due to number of slots and number of connections
• CP, point-to-point	32; Limited due to number of slots and number of connections	64; Limited due to number of slots and number of connections
• CP, LAN	32; limited due to number of slots and number of connections	64; limited due to number of slots and number of connections
Time		
Clock		
• Hardware clock (real-time clock)	Yes	Yes
• buffered and synchronizable	Yes	Yes
Operating hours counter		
• Number	8	8
Clock synchronization		
• supports	Yes	Yes
S7 message functions		
Number of login stations for message functions, max.	8	16
Diagnostic buffer		
• present	Yes	
• Number of entries, max.	3 200	
• adjustable	Yes	
• preset	120	
Communication functions		
PG/OP communication	Yes	Yes
Global data communication		
• supported	No	No
S7 basic communication		
• supported	No	No
S7 communication		
• supported	Yes	Yes
• as server	Yes	Yes
• as client	Yes	Yes
• Useful data per job, max.	64 Kibyte	64 Kibyte

	6AG1 414-4HJ04-4AB0	6AG1 417-4HL04-4AB0
S5-compatible communication		
• supported	Yes; via CP and loadable FC	Yes; via CP and loadable FC
• Useful data per job, max.	8 Kibyte	8 Kibyte
Standard communication (FMS)		
• supported	Yes; Via CP and loadable FB	Yes; Via CP and loadable FB
• Useful data per job, max.	Dependent on CP	Dependent on CP
Number of connections		
• overall	32	64
1st interface		
Physics	RS 485 / PROFIBUS	RS 485 / PROFIBUS
isolated	Yes	Yes
Functionality		
• MPI	Yes; Default setting	Yes; Default setting
• DP master	Yes	Yes
• DP slave	No	No
MPI		
• Number of connections	32	44
• Services		
- PG/OP communication	Yes	Yes
- Global data communication	No	No
- S7 basic communication	No	No
- S7 communication	Yes	Yes
• Transmission speeds, max.	12 MBit/s	12 MBit/s
DP master		
• Number of connections, max.	32	32
• Services		
- PG/OP communication	Yes	Yes
- Global data communication	No	No
- S7 basic communication	No	No
- S7 communication	No	No
- S7 communication, as client	No	No
- S7 communication, as server	No	No
- equidistance support	No	No
- Activation/deactivation of DP slaves	Yes	No
- direct data exchange (cross traffic)	No	No
• Transmission speeds, max.	12 MBit/s	12 MBit/s
• Number of DP slaves, max.	32; Number of slots, max. 512	32; Number of slots, max. 512

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SIPLUS CPU 414-4H, CPU 417-4H

Technical specifications (continued)

	6AG1 414-4HJ04-4AB0	6AG1 417-4HL04-4AB0
DP master (continued)		
• Address area		
- Inputs, max.	2 Kibyte	2 Kibyte
- Outputs, max.	2 Kibyte	2 Kibyte
• Useful data per DP slave		
- Inputs, max.	244 byte	244 byte
- Outputs, max.	244 byte	244 byte
2nd interface		
Physics	RS 485 / PROFIBUS	RS 485 / PROFIBUS
isolated	Yes	Yes
Functionality		
• DP master	Yes; Default setting	Yes
• DP slave	No	No
• Point-to-point coupling	No	No
DP master		
• Number of connections, max.	16	32
• Number of connections (of which reserved), max.	1 for PG, 1 for OP	1 for PG, 1 for OP
• Services		
- PG/OP communication	Yes	Yes
- S7 basic communication	No	No
- S7 communication	No	No
- S7 communication, as client	No	No
- S7 communication, as server	No	No
- equidistance support	No	No
- Activation/deactivation of DP slaves	No	No
- direct data exchange (cross traffic)	No	No
• Transmission speeds, max.	12 MBit/s	12 MBit/s
• Number of DP slaves, max.	96	125; Number of slots, max. 2048
• Address area		
- Inputs, max.	8 Kibyte	8 Kibyte
- Outputs, max.	8 Kibyte	8 Kibyte
• Useful data per DP slave		
- Inputs, max.	244 byte	244 byte
- Outputs, max.	244 byte	244 byte

	6AG1 414-4HJ04-4AB0	6AG1 417-4HL04-4AB0
CPU/programming		
Programming language		
• STEP 7	Yes; V5.0 SP2	Yes; V5.0 SP2
• LAD	Yes	Yes
• FUP	Yes	Yes
• AWL	Yes	Yes
• SCL	Yes	Yes
• CFC	Yes	Yes
• GRAPH	Yes	Yes
• HiGraph	Yes	Yes
User program protection/password protection	Yes	Yes
Dimensions		
Required slots	2	2
Dimensions		
Dimensions		
• Width	50 mm	50 mm
• Height	290 mm	290 mm
• Depth	219 mm	219 mm
Weights		
• Weight, approx.	1 070 g	1 070 g

Ordering data

	Order No.
SIPLUS CPU 414-4H (medium exposure) For S7-400H and S7-400F/FH; main memory 1.4 MB, MPI/PROFIBUS DP master interface, 2 slots for synchronization modules, slot for memory card, incl. slot number plates	**6AG1 414-4HJ04-4AB0**
SIPLUS CPU 417-4H (medium exposure) For S7-400H and S7-400F/FH; main memory 20 MB, MPI/PROFIBUS DP master interface, 2 slots for synchronization modules, slot for memory card, incl. slot number plates	**6AG1 417-4HL04-4AB0**
Accessories	see CPU 41xH, page 5/46

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 voltages					
Load voltage L+					
• Rated value (DC)	24 V				
• permissible range, lower limit (DC)	20.4 V				
• permissible range, upper limit (DC)	28.8 V				
Current consumption					
from backplane bus DC 5 V, max.	130 mA	20 mA	200 mA	80 mA	150 mA
from supply voltage L+, max.	120 mA				
Current consumption/ power loss					
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 of digital inputs	16	32	32	16	16
Number of simultanneously controllable inputs					
- Number of simultaneously controllable inputs, up to 40 °C	16	32	32	16	16
- Number of simultaneously controllable inputs, up to 60 °C	16	32	32	16	16
Input voltage					
• 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

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					
- programmable	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 BEROS	Yes	Yes	Yes	Yes	Yes
- permissible quiescent current (2-wire BEROS), max.	3 mA	1.5 mA	1 mA	5 mA; AC: 5 mA	0.5 mA; 0.5 to 2 mA
Status information/alarms/ diagnostics					
Alarms					
• Diagnostic alarm	Yes; parameterizable				Yes; parameterizable
• Process alarm	Yes; parameterizable				Yes; parameterizable
Diagnoses					
• Diagnostics	Yes; internal/ external fault				Yes; internal/ external fault
Isolation					
Isolation checked with	500 V DC	500 V DC	1500 V AC	1500 V AC	1500 V AC
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
Dimensions					
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
Weights					
• Weight, approx.	600 g	500 g	600 g	650 g	600 g

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 connectors		
48-pin		
• With screw-type contacts, 1 unit	B7	**6ES7 492-1AL00-0AA0**
• With screw-type contacts, 84 units	B6	**6ES7 492-1AL00-1AB0**
• With spring-loaded contacts, 1 unit		**6ES7 492-1BL00-0AA0**
• With crimp contacts, 1 unit	B7	**6ES7 492-1CL00-0AA0**
• With crimp contacts, 84 units		**6ES7 492-1CL00-1AB0**
SIMATIC TOP connect		see page 5/131; Information about which components can be used for the respective module, see DT&IAMall or Catalog KT 10.2
Cover film for labeling strips		**6ES7 492-2XX00-0AA0**
Spare part		
S7 SmartLabel V3.0		
Software for automatic labeling of modules based on data of the STEP 7 project		
Single license	B8	**2XV9 450-1SL03-0YX0**
Upgrade single license	B8	**2XV9 450-1SL03-0YX4**

		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	B3	**6ES7 998-8XC01-8YE0**
Electronic manuals on DVD, five languages: S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, engineering software, runtime software, PCS 7, SIMATIC HMI, SIMATIC NET		
SIMATIC Manual Collection maintenance service for 1 year	B3	**6ES7 998-8XC01-8YE2**
Current "Manual Collection" DVD and the three subsequent updates		
Manual "SIMATIC S7-400 programmable controller"		
incl. instruction list		
German		**6ES7 498-8AA05-8AA0**
English		**6ES7 498-8AA05-8BA0**
French		**6ES7 498-8AA05-8CA0**
Spanish		**6ES7 498-8AA05-8DA0**
Italian		**6ES7 498-8AA05-8EA0**

B3: Subject to export regulations: AL: N and ECCN: 5D992B1
B6: Subject to export regulations: AL: N and ECCN: EAR99
B7: Subject to export regulations: AL: N and ECCN: EAR99H
B8: Subject to export regulations: AL: N and ECCN: EAR99S

SM 422 digital output modules

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 voltages					
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
Current consumption					
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 DC 5 V, max.	400 mA	1 A	160 mA	200 mA	200 mA
Current consumption/ power loss					
Power loss, max.	16 W	25 W	7 W	4 W	8 W
Digital outputs					
Number of digital outputs	16	16; Relay	16	32	32
Short-circuit protection of the output	Yes; Fuse 8 A, 250 V; per group		Yes; clocked electronically	Yes; clocked electronically	Yes; clocked electronically
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)

Technical specifications (continued)

	6ES7 422-1FH00-0AA0	6ES7 422-1HH00-0AA0	6ES7 422-1BH11-0AA0	6ES7 422-1BL00-0AA0	6ES7 422-7BL00-0AB0
Output current					
• for signal "1" rated value	2 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
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 the outputs (per group)					
• 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
• 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
Relay outputs					
Number of operating cycles		100 000; 100,000 (AC 15 / DC 13); 3,000,000 mechanical			
Switching capacity of the contacts					
• with inductive load, max.		5 A; 5 A (30 V DC); 5 A (230 V AC)			
• with resistive load, max.		5 A; 5 A (30 V DC); 5 A (230 V AC); 1.2 A (60 V DC); 0.2 A (125 V DC)			
Status information/alarms/ diagnostics					
Alarms					
• Diagnostic alarm					Yes; Parameterizable
Diagnoses					
• Diagnostics					Yes; internal/ external fault
Isolation					
Isolation checked with	1500 V AC	1500 V AC	500 V DC	500 V DC	500 V DC
Isolation					
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
Dimensions					
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
Weights					
• Weight, approx.	800 g	700 g	600 g	600 g	600 g

SM 422 digital output modules

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 connectors		
48-pin		
• with screw contacts, 1 item	B7	**6ES7 492-1AL00-0AA0**
• with screw contacts, 84 items	B6	**6ES7 492-1AL00-1AB0**
• with spring-loaded terminals, 1 item		**6ES7 492-1BL00-0AA0**
• with crimp contacts, 1 item	B7	**6ES7 492-1CL00-0AA0**
• with crimp contacts, 84 items		**6ES7 492-1CL00-1AB0**
SIMATIC TOP connect		see page 5/131; Information about which components can be used for the respective module, see DT&IAMall or Catalog KT 10.2
Cover film for labeling strips		**6ES7 492-2XX00-0AA0**
Spare part		
S7 SmartLabel V3.0		
Software for automatic labeling of modules direct from the STEP 7 project		
Single license	B8	**2XV9 450-1SL03-0YX0**
Upgrade single license	B8	**2XV9 450-1SL03-0YX4**

		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	B3	**6ES7 998-8XC01-8YE0**
Electronic manuals on DVD, five languages: S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, engineering software, runtime software, PCS 7, SIMATIC HMI, SIMATIC NET		
SIMATIC Manual Collection maintenance service for 1 year	B3	**6ES7 998-8XC01-8YE2**
Current "Manual Collection" DVD and the three subsequent updates		
Manual "SIMATIC S7-400 programmable controller"		
incl. instruction list		
German		**6ES7 498-8AA05-8AA0**
English		**6ES7 498-8AA05-8BA0**
French		**6ES7 498-8AA05-8CA0**
Spanish		**6ES7 498-8AA05-8DA0**
Italian		**6ES7 498-8AA05-8EA0**

B3: Subject to export regulations: AL: N and ECCN: 5D992B1
B6: Subject to export regulations: AL: N and ECCN: EAR99
B7: Subject to export regulations: AL: N and ECCN: EAR99H
B8: Subject to export regulations: AL: N and ECCN: EAR99S

Overview SIPLUS SM 421

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

Digital input module SIPLUS SM 421	
Order No.	**6AG1 421-1BL01-2AA0**
Order No. based on	**6ES7 421-1BL01-0AA0**
Ambient temperature range	-25 ... +60 °C
Environmental conditions	Suited for exceptional medial exposure (e. g. by chlorine sulfur atmosphere).
Technical data	The technical data are identical with those of the based-on modules.

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

Ordering data	Order No.
SIPLUS SM 421 digital input module	
(extended temperature range and medium exposure)	
32 inputs, 24 V DC	**6AG1 421-1BL01-2AA0**
Accessories	see S7-400 digital input modules SM 421, page 5/65

Overview SIPLUS SM 422

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

Digital input module SIPLUS SM 422	
Order No.	**6AG1 422-1BL00-2AA0**
Order No. based on	**6ES7 422-1BL00-0AA0**
Ambient temperature range	-25 ... +60 °C
Environmental conditions	Suited for exceptional medial exposure (e. g. by chlorine sulfur atmosphere).
Technical data	The technical data are identical with those of the based-on modules.

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

Ordering data	Order No.
SIPLUS SM 422 digital output module	
(extended temperature range and medium exposure)	
32 outputs, 24 V DC; 0.5 A	**6AG1 422-1BL00-2AA0**
Accessories	see S7-400 digital output modules SM 422, page 5/68

SM 431 analog input modules

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 voltages				
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
Current consumption				
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 DC 5 V, max.	100 mA	1 000 mA	350 mA	600 mA
Current consumption/ power loss				
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
cable length, shielded, max.	200 m	200 m	200 m	200 m; 50 m with thermocouples and input ranges <= 80 mV
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

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 Ohm				Yes
• 0 to 300 Ohm				Yes
• 0 to 48 Ohm				Yes
• 0 to 600 Ohm		Yes	Yes	Yes
• 0 to 6000 Ohm				Yes; usable up to 5000 ohms
• permissible input frequency for voltage input (destruction limit), max.	20 V; 20 V continuous, 75 V for max. 1 s (mark to space ratio 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
Characteristic curve linearization				
• programmable				Yes
- for thermoelements				Type B, E, J, K, L, N, R, S, T, U
- for thermoresistor				Pt100, Pt200, Pt500, Pt1000, Ni100, Ni1000
Temperature compensation				
• internal temperature compensation				Yes
• external temperature compensation with compensations socket				Yes
• external temperature compensation with Pt100				No
• dynamic reference temperature value				Yes

Technical specifications (continued)

	6ES7 431-0HH00-0AB0	6ES7 431-1KF20-0AB0	6ES7 431-1KF00-0AB0	6ES7 431-1KF10-0AB0
Analog value creation				
Integration and conversion time/resolution per channel				
• Resolution with overload area (bit including sign), max.	13 Bit	14 Bit; 14 / 14 / 14	13 Bit	14 Bit; with activated smoothing: 16 Bit
• Integration time, parameterizable	Yes	Yes	Yes	Yes
• Basic conversion time, ms	50 / 60 ms		16.7 / 20 ms	16.7 / 20 ms
• Integration time, ms	55 / 65 ms	52 µs	23 / 25 ms	20.1 / 23.5 ms
• additional conversion time for wire break monitoring				4.3 ms
• additional conversiontime for resistance measurement				5.5 ms
• additional conversiontime for wire break monitoring and resistance measurement				40.2 / 47 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 %; 0 to 20 mA, +/-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 %
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...20 mA	+/- 0,7 %; at +/- 20 mA, 4...20 mA	+/- 0,15 %; 0 to 20 mA, +/- 20 mA, 4 to 20 mA

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)				
• 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 %
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 D 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
Isolation				
Isolation, analog inputs				
• 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
Dimensions				
Required slots	1	1	1	1
Dimensions				
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
Weights				
• Weight, approx.	500 g	500 g	500 g	500 g

Technical specifications (continued)

	6ES7 431-7QH00-0AB0	6ES7 431-7KF00-0AB0	6ES7 431-7KF10-0AB0
Supply voltages			
Load voltage L+			
• Rated value (DC)	24 V; only required for supplying 2-wire transmitters		
• reverse polarity protection	Yes		
Current consumption			
from load voltage L+ (without load), max.	400 mA	400 mA	400 mA
from backplane bus DC 5 V, max.	700 mA	1 200 mA	650 mA
Current consumption/ power loss			
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
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
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	

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 Ohm	Yes		
• 0 to 300 Ohm	Yes		
• 0 to 48 Ohm	Yes		
• 0 to 600 Ohm	Yes		
• 0 to 6000 Ohm	Yes; usable up to 5000 ohms		
• permissible input frequency 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	
Characteristic curve linearization			
• programmable	Yes	Yes	Yes
- for thermoelements	Type B, E, J, K, L, N, R, S, T, U	Type B, E, J, K, L, N, R, S, T, U	
- for thermoresistor	Pt100, Pt200, Pt500, Pt1000, Ni100, Ni1000		Pt100, Pt200, Pt500, Pt1000, Ni100, Ni1000; different characteristics selectable (Europe/U.S.)
Temperature compensation			
• internal temperature compensation	Yes	Yes	
• external temperature compensation with compensations socket	Yes		
• external temperature compensation with Pt100		Yes	
• dynamic reference temperature value	Yes	Yes	
Analog value creation			
Integration and conversion time/resolution per channel			
• Resolution with overload area (bit including sign), max.	16 Bit; 16 / 16 / 16	16 Bit	16 Bit
• Integration time, parameterizable	Yes	Yes	Yes
• Basic conversion time, ms	2.5 / 16.7 / 20 ms	2.5 / 16.7 / 20 / 100	8 / 23 / 25 ms

Technical specifications (continued)

	6ES7 431-7QH00-0AB0	6ES7 431-7KF00-0AB0	6ES7 431-7KF10-0AB0
Analog value creation (cont.)			
• 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)
• 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 conversiontime 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
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 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); +/-0.4% at 0 to300 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	+/- 0.4 %		+/-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 %	

Technical specifications (continued)

	6ES7 431-7QH00-0AB0	6ES7 431-7KF00-0AB0	6ES7 431-7KF10-0AB0
Basic error limit (operational limit at 25 °C)			
• 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
Status information/alarms/ diagnostics			
Alarms			
• Diagnostic alarm	Yes; Parameterizable	Yes; Parameterizable	Yes; Parameterizable
• Limit value alarm	Yes; Parameterizable	Yes	Yes
Diagnoses			
• Diagnostics	Yes; Parameterizable	Yes	Yes
Isolation			
Isolation checked with	2120 V DC between bus and L+/M; 2120 V D 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
Isolation			
Isolation, analog inputs			
• 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
Dimensions			
Required slots	1	1	1
Dimensions			
Dimensions			
• Width	25 mm	25 mm	25 mm
• Height	290 mm	290 mm	290 mm
• Depth	210 mm	210 mm	210 mm
Weights			
• Weight, approx.	500 g	650 g	650 g

SM 431 analog input modules

Ordering data		Order No.
SM 431 analog output module		
16 inputs, non-floating, 13 bit		**6ES7 431-0HH00-0AB0**
8 inputs, floating, 13 bit		**6ES7 431-1KF00-0AB0**
8 inputs, floating, 14 bit, with linearization		**6ES7 431-1KF10-0AB0**
8 inputs, floating, 14 bit		**6ES7 431-1KF20-0AB0**
16 inputs, floating, 16 bit, process interrupt capability		**6ES7 431-7QH00-0AB0**
8 inputs, floating, 16 bit, process interrupt capability, for thermo-couples (I, U)		**6ES7 431-7KF00-0AB0**
8 inputs, floating, 16 bit, process interrupt capability, for temper-ature sensors		**6ES7 431-7KF10-0AB0**
Front connectors		
48-pin		
• with screw contacts, 1 item	B7	**6ES7 492-1AL00-0AA0**
• with screw contacts, 84 items	B6	**6ES7 492-1AL00-1AB0**
• with spring-loaded terminals, 1 item		**6ES7 492-1BL00-0AA0**
• with crimp contacts, 1 item	B7	**6ES7 492-1CL00-0AA0**
• with crimp contacts, 84 items		**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 5/131; Information about which compo-nents can be used for the respective module, see DT&IAMall or Catalog KT 10.2
Measuring range module for analog inputs		**6ES7 974-0AA00-0AA0**
1 module for 2 inputs (spare part)		
Cover film for labeling strips		**6ES7 492-2XX00-0AA0**
Spare part		

		Order No.
S7 SmartLabel V3.0		
Software for automatic labeling of modules direct from the STEP 7 project		
Single license	B8	**2XV9 450-1SL03-0YX0**
Upgrade single license	B8	**2XV9 450-1SL03-0YX4**
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	B3	**6ES7 998-8XC01-8YE0**
Electronic manuals on DVD, five languages: S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, engineering software, runtime software, PCS 7, SIMATIC HMI, SIMATIC NET		
SIMATIC Manual Collection maintenance service for 1 year	B3	**6ES7 998-8XC01-8YE2**
Current "Manual Collection" DVD and the three subsequent updates		
Manual "SIMATIC S7-400 programmable controller"		
incl. instruction list		
German		**6ES7 498-8AA05-8AA0**
English		**6ES7 498-8AA05-8BA0**
French		**6ES7 498-8AA05-8CA0**
Spanish		**6ES7 498-8AA05-8DA0**
Italian		**6ES7 498-8AA05-8EA0**

B3: Subject to export regulations: AL: N and ECCN: 5D992B1
B6: Subject to export regulations: AL: N and ECCN: EAR99
B7: Subject to export regulations: AL: N and ECCN: EAR99H
B8: Subject to export regulations: AL: N and ECCN: EAR99S

Overview

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

Technical specifications

	6ES7 432-1HF00-0AB0
Supply voltages	
Load voltage L+	
• Rated value (DC)	24 V
Current consumption	
from backplane bus DC 5 V, max.	150 mA
from supply voltage L+, max.	400 mA
Current consumption/ power loss	
Power loss, max.	9 W
Analog outputs	
Number of analg outputs	8
cable length, shielded, max.	200 m
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

	6ES7 432-1HF00-0AB0
Analog value creation	
Integration and conversion time/resolution per channel	
• Resolution with overload area (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
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
Status information/alarms/ diagnostics	
Substitute values connectable	No
Isolation	
Isolation checked with	2120 V DC between bus and L+/M; 2120 V D 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

SM 432 analog output modules

Technical specifications (continued)

	6ES7 432-1HF00-0AB0
Isolation	
Isolation, analog outputs	
• between the channels and the backplane bus	Yes
Dimensions	
Required slots	1
Dimensions	
Dimensions	
• Width	25 mm
• Height	290 mm
• Depth	210 mm
Weights	
• Weight, approx.	650 g

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Ordering data

		Order No.
SM 432 analog output module		**6ES7 432-1HF00-0AB0**
8 outputs, floating, 13 bit		
Front connectors		
48-pin		
• with screw contacts, 1 item	B7	**6ES7 492-1AL00-0AA0**
• with screw contacts, 84 items	B6	**6ES7 492-1AL00-1AB0**
• with spring-loaded terminals, 1 item		**6ES7 492-1BL00-0AA0**
• with crimp contacts, 1 item	B7	**6ES7 492-1CL00-0AA0**
• with crimp contacts, 84 items		**6ES7 492-1CL00-1AB0**
SIMATIC TOP connect		see page 5/131; Information about which components can be used for the respective module, see A&D Mall or Catalog KT 10.2
Cover film for labeling strips		**6ES7 492-2XX00-0AA0**
Spare part		
S7 SmartLabel V3.0		
Software for automatic labeling of modules direct from the STEP 7 project		
Single license	B8	**2XV9 450-1SL03-0YX0**
Upgrade single license	B8	**2XV9 450-1SL03-0YX4**
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	B3	**6ES7 998-8XC01-8YE0**
Electronic manuals on DVD, five languages: S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, engineering software, runtime software, PCS 7, SIMATIC HMI, SIMATIC NET		
SIMATIC Manual Collection maintenance service for 1 year	B3	**6ES7 998-8XC01-8YE2**
Current "Manual Collection" DVD and the three subsequent updates		
Manual "SIMATIC S7-400 programmable controller"		
incl. instruction list		
German		**6ES7 498-8AA05-8AA0**
English		**6ES7 498-8AA05-8BA0**
French		**6ES7 498-8AA05-8CA0**
Spanish		**6ES7 498-8AA05-8DA0**
Italian		**6ES7 498-8AA05-8EA0**

B3: Subject to export regulations: AL: N and ECCN: 5D992B1
B6: Subject to export regulations: AL: N and ECCN: EAR99
B7: Subject to export regulations: AL: N and ECCN: EAR99H
B8: Subject to export regulations: AL: N and ECCN: EAR99S

Overview SIPLUS SM 431

- Analog inputs for SIMATIC S7-400
- Connecting voltage sensors and current sensors, thermo elements, resistors and resistance thermometers
- Resolution 13 to 16 bit

Analog input module SIPLUS SM 431	
Order No.	**6AG1 431-0HH00-4AB0**
Order No. based on	**6ES7 431-0HH00-0AB0**
Ambient conditions	Suited for exceptional medial exposure (e. g. by chlorine sulfur atmosphere).
Technical data	The technical data are identical with those of the based-on modules.

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

Ordering data	Order No.
SIPLUS SM 431 analog input module (medial exposure) 16 inputs, non-floating, 13 bit	**6AG1 431-0HH00-4AB0**
Accessories	see S7-400 analog input modules SM 431, page 5/78

Overview SIPLUS SM 432

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

Analog output module SIPLUS SM 432	
Order No.	**6AG1 432-1HF00-4AB0**
Order No. based on	**6ES7 432-0HF00-0AB0**
Ambient conditions	Suited for exceptional medial exposure (e. g. by chlorine sulfur atmosphere).
Technical data	The technical data are identical with those of the based-on modules.

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

Ordering data	Order No.
SIPLUS SM 432 analog output module (medium exposure) 8 outputs, floating, 13 bit	**6AG1 432-1HF00-4AB0**
Accessories	see S7-400 analog output modules SM 432, page 5/80

FM 450-1 counter module

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.

http://www.siemens.com/simatic-technology

Technical specifications

	6ES7 450-1AP00-0AE0
Supply voltages	
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
Load voltage 1L+	
• Reverse polarity protection	Yes
Load voltage 2L+	
• Reverse polarity protection	Yes
Current consumption	
from load voltage 1L+ (without load), max.	40 mA
from backplane bus DC 5 V, max.	450 mA
Current consumption/ power loss	
Power loss, typ.	9 W
Connection point	
required front connectors	1x 48-polig
Digital inputs	
Number of digital 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

	6ES7 450-1AP00-0AE0
Input delay (for rated value of input voltage)	
• Input frequency (with 0.1 ms delay), max.	200 kHz
• for standard inputs	
- programmable	Yes
- at "0" to "1", max.	2.5 µs; >= 2.5 µs (200 kHz); <= 25 µs (20 kHz)
Digital outputs	
Number of digital outputs	6
Short-circuit protection of the output	Yes; clocked electronically
Limitation of inductive shutdown voltage to	2L+ (-39 V)
Output voltage	
• for signal "0" (DC), 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
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

Technical specifications (continued)

	6ES7 450-1AP00-0AE0
Encoder	
Connectable encoders	
• Incremental encoder (symmetrical)	Yes; with 2 pulse strings offset by 90°
• Incremental encoder (asymmetrical)	Yes
• 24 V initiator	Yes
• 24 V directional element	Yes; 1 pulse train, 1 direction level
Counters	
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
• Counter 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
• Counter 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
Isolation	
Isolation checked with	500 V
Isolation	
Galvanic isolation, digital inputs	
• between the channels and the backplane bus	Yes; Optocoupler
Isolation, digital outputs	
• between the channels and the backplane bus	Yes; Optocoupler
Isolation counter	
• between the channels and the backplane bus	Yes; Optocoupler
Permissible potential difference	
between different circuits	75 V DC / 60 V AC
Dimensions	
Dimensions	
• Width	25 mm
• Height	290 mm
• Depth	210 mm
Weights	
• 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	B7	**6ES7 492-1AL00-0AA0**
• with screw contacts, 84 items	B6	**6ES7 492-1AL00-1AB0**
• with spring-loaded terminals, 1 item		**6ES7 492-1BL00-0AA0**
• with crimp contacts, 1 item	B7	**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		

B6: Subject to export regulations: AL: N and ECCN: EAR99
B7: Subject to export regulations: AL: N and ECCN: EAR99H

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SIPLUS FM 450-1 counter module

Overview

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

SIPLUS FM 450-1 counter module	
Order No.	**6AG1 450-1AP00-4AE0**
Order No. based on	**6ES7 450-1AP00-0AE0**
Ambient conditions	Suited for exceptional medial exposure (e. g. by chlorine sulfur atmosphere)
Technical data	The technical data are identical to that of the based-on modules.

For further technical documentation on SIPLUS, see:

http://www.siemens.com/siplus-techdoku

Note:

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

http://www.siemens.com/simatic-technology

Ordering data

	Order No.
FM 450-1 counter module (medium exposure) with 2 channels, max. 500 kHz; for incremental encoder	**6AG1 450-1AP00-4AE0**
Accessories	see FM 450-1, page 5/83

Overview

- Three-channel positioning module for rapid traverse/creep speed drives
- 4 digital outputs per channel for motor control
- Incremental or synchro-serial position decoding

Note

SIMODRIVE Sensor/Motion Connect 500 feature position-measuring systems and preassembled connecting cables for counting and positioning functions.

http://www.siemens.com/simatic-technology

Technical specifications

	6ES7 451-3AL00-0AE0
Supply voltages	
Rated value	
• DC 24 V	Yes
Current consumption	
Current consumption, max.	550 mA
Connection point	
required front connectors	1x 48-pin
Digital inputs	
Number of digital 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 BERO	
- for signal "1", typ.	30 mA
Digital outputs	
Number of digital outputs	12; 4 per axis
Functions	Rapid traverse, creep, run right, run left
Short-circuit protection of the output	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

	6ES7 451-3AL00-0AE0
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
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

FM 451 positioning module

Technical specifications (continued)

	6ES7 451-3AL00-0AE0
Encoder signals, absolute encoder (SSI)	
• Input signal	5 V difference signal (phys. RS 422)
• Data signal	DATA. notDATA
• Clock signal	CL. notCL
• Telegram length	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
Isolation	
Galvanic isolation, digital inputs	
• galvanic isolation, digital inputs	Yes
Isolation, digital outputs	
• Galvanic isolation, digital outputs	Yes
Environmental requirements	
Operating termperature	
• min.	0 °C
• max.	55 °C
Storage/transport temperature	
• min.	-40 °C
• max.	70 °C
Relative humidity	
• Humidity class F	Yes
Degree of protection	
IP 20	Yes
Dimensions	
Dimensions	
• Width	50 mm
• Height	290 mm
• Depth	210 mm
Weights	
• Weight, approx.	1 300 g

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	B7	**6ES7 492-1AL00-0AA0**
• with screw contacts, 84 items	B6	**6ES7 492-1AL00-1AB0**
• with spring-loaded terminals, 1 item		**6ES7 492-1BL00-0AA0**
• with crimp contacts, 1 item	B7	**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 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**

B6: Subject to export regulations: AL: N and ECCN: EAR99
B7: Subject to export regulations: AL: N and ECCN: EAR99H

Overview

- Extremely 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 synchro-serial position decoding

Note:

SIMODRIVE Sensor/Motion Connect 500 feature position-measuring systems and preassembled connecting cables for counting and positioning functions.

http://www.siemens.com/simatic-technology

Technical specifications

	6ES7 452-1AH00-0AE0
Supply voltages	
Rated value	
• DC 24 V	Yes
Current consumption	
Current consumption, max.	500 mA
Connection point	
required front connectors	1x 48-pin
Digital inputs	
Number of digital 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 BERO - for signal "1", typ.	9 mA
Digital outputs	
Number of digital outputs	16
Functions	Cam tracks
Short-circuit protection of the output	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 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
Encoder	
Connectable encoders	
• Incremental encoder (symmetrical)	Yes
• Incremental encoder (asymmetrical)	Yes
• Absolute encoder (SSI)	Yes
• 2-wire BEROS	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

FM 452 cam controller

Technical specifications (continued)

	6ES7 452-1AH00-0AE0
Encoder signals, absolute encoder (SSI)	
• Input signal	5 V difference signal (phys. RS 422)
• Data signal	DATA. notDATA
• Clock signal	CL. notCL
• Telegram length	13 or 25 bit serial
• Clock frequency, max.	1 MHz
• Gray code	1
• cable length, shielded, max.	300 m; at max. 125 kHz
Isolation	
Galvanic isolation, digital inputs	
• galvanic isolation, digital inputs	No
Isolation, digital outputs	
• Galvanic isolation, digital outputs	No
Environmental requirements	
Operating termperature	
• min.	0 °C
• max.	55 °C
Storage/transport temperature	
• min.	-40 °C
• max.	70 °C
Relative humidity	
• Humidity class F	Yes
Degree of protection	
IP 20	Yes
Dimensions	
Dimensions	
• Width	25 mm
• Height	290 mm
• Depth	210 mm
Weights	
• 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	B7	**6ES7 492-1AL00-0AA0**
• with screw contacts, 84 items	B6	**6ES7 492-1AL00-1AB0**
• with spring-loaded terminals, 1 item		**6ES7 492-1BL00-0AA0**
• with crimp contacts, 1 item	B7	**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 5/86

B6: Subject to export regulations: AL: N and ECCN: EAR99
B7: Subject to export regulations: AL: N and ECCN: EAR99H

Overview

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

Note:

SIMODRIVE Sensor/Motion Connect 500 feature position-measuring systems and preassembled connecting cables for counting and positioning functions.

http://www.siemens.com/simatic-technology

Technical specifications

	6ES7 453-3AH00-0AE0
Supply voltages	
Aux. voltage 1L+ to 4L+	
• Rated value (DC)	24 V
• dynamic range	18.5 to 30.2 V
• static area	20.4 to 28.8 V
Current consumption	
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 DC 5 V, max.	1.6 A; Rated current
Current consumption/ power loss	
Power loss, max.	8 W
Connection point	
required front connectors	1x 48-pin
Digital inputs	
Number of digital 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 DC 24 V
- at "1" to "0", max.	45 µs; via input voltage range
Digital outputs	
Number of digital outputs	4; for each channel/axis
Functions	configurable
Short-circuit protection of the output	Yes

	6ES7 453-3AH00-0AE0
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 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
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

FM 453 positioning module

Technical specifications (continued)

	6ES7 453-3AH00-0AE0
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
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

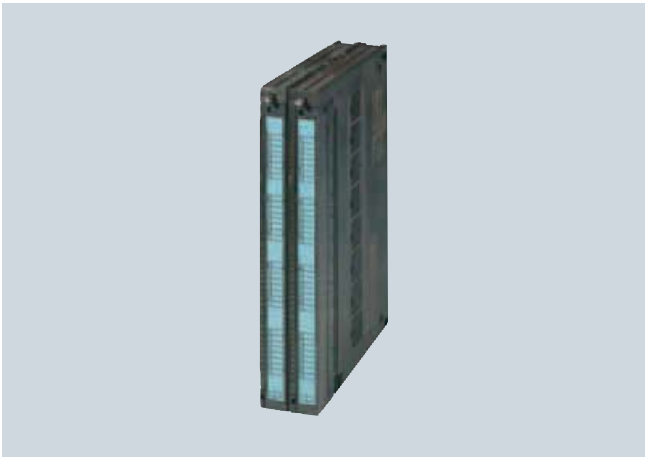
	6ES7 453-3AH00-0AE0
Isolation	
Galvanic isolation, digital inputs	
• galvanic isolation, digital inputs	Yes; Optocoupler
Isolation, digital outputs	
• Galvanic isolation, digital outputs	Yes; Optocoupler
Environmental requirements	
Operating termperature	
• min.	0 °C
• max.	55 °C
Storage/transport temperature	
• min.	-40 °C
• max.	70 °C
Relative humidity	
• Humidity class F	No
Degree of protection	
IP 20	Yes
Dimensions	
Dimensions	
• Width	50 mm
• Height	290 mm
• Depth	210 mm
Weights	
• 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		**6FX2 002-3AB04-■■■■**
for 2 servo motors / 1 stepper motor		**6FX2 002-3AB02-■■■■**
for 1 servo motor / 2 stepper motors		**6FX2 002-3AB03-■■■■**
Length code		see FM 451. page 5/86
Front covers for CPU and function modules		**6ES7 492-1XL00-0AA0**
Spare part		
Front connector		
48-pin		
• with screw contacts, 1 item	B7	**6ES7 492-1AL00-0AA0**
• with screw contacts, 84 items	B6	**6ES7 492-1AL00-1AB0**
• with spring-loaded terminals, 1 item		**6ES7 492-1BL00-0AA0**
• with crimp contacts, 1 item	B7	**6ES7 492-1CL00-0AA0**
• with crimp contacts, 84 items		**6ES7 492-1CL00-1AB0**
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 FM 451, page 5/86

B6: Subject to export regulations: AL: N and ECCN: EAR99
B7: Subject to export regulations: AL: N and ECCN: EAR99H

Overview



- 16-channel closed-loop control module for universal closed-loop control tasks
- Suitable for temperature, pressure, and flow control systems
- User-friendly online self-optimization for temperature controls
- Preprogrammed controller structures
- 2 control algorithms
- 2 versions:
  - FM 455 C as continuous-action controller
  - FM 455 S as step controller 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 voltages		
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
Current consumption		
from load voltage L+ (without load), max.	440 mA; typ. 370 mA	400 mA; typ. 330 mA
Current consumption/ power loss		
Power loss, max.	17.3 W	16.2 W
Power loss, typ.	12 W	10.7 W
Connection point		
required front connectors	2x 48-pin	2x 48-pin
Digital inputs		
Number of digital inputs	16	16
Input characteristic curve to IEC 1131, 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
Digital outputs		
Number of digital outputs		32
Short-circuit protection of the output		Yes; Electronic
Limitation of inductive shutdown voltage to		L+ (-1.5 V)
Lamp load, max.		5 W
Controlling a digital input		Yes
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
Load impedance range		
• lower limit		240 Ω
• upper limit		4 kΩ
• cable length, shielded, max.		1 000 m
• Cable length unshielded, max.		600 m
Analog inputs		
Number of analog inputs	16; with thermo-couples or 2-wire connection; 8 with Pt 100 or 4-wire connection	16; with thermo-couples or 2-wire connection; 8 with Pt 100 or 4-wire connection

Technical specifications (continued)

	6ES7 455-0VS00-0AE0	6ES7 455-1VS00-0AE0
cable length, shielded, max.	200 m; 50 m at 80 mV and thermocouples	200 m; 50 m at 80 mV and thermocouples
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
Input ranges (rated values), resistance thermometers		
• Pt 100	Yes	Yes
• permissible input frequency for voltage input (destruction limit), max.	20 V	20 V
• permissible input current for current input (destruction limit), max.	40 mA	40 mA
Characteristic curve linearization		
• programmable	Yes	Yes
- for thermoelements	Typ B. J. K. R. S	Typ B. J. K. R. S
- for thermoresistor	Pt100 (Standard)	Pt100 (Standard)
Temperature compensation		
• internal temperature compensation	Yes; parametrizable	Yes; parametrizable
• external temperature compensation with Pt100	Yes; parametrizable	Yes; parametrizable
Analog outputs		
Number of analg outputs	16	
cable length, shielded, max.	200 m; 50m at 80 mV and thermocouples	
Voltage output, Short-circuit protection	Yes	
Voltage output, short-circuit current, max..	25 mA	
Current output, no-load voltage, max.	18 V	

	6ES7 455-0VS00-0AE0	6ES7 455-1VS00-0AE0
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	
Analog value creation		
Measurement principle	integrating	integrating
Integration and conversion time/resolution per channel		
• Resolution with overload area (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; at 12 bits: 16 2/3 ms at 60 Hz, 20 ms at 50 Hz; at 14 bits: 100 ms at 50 and 60 Hz	16.67 ms; at 12 bits: 16 2/3 ms at 60 Hz, 20 ms at 50 Hz; at 14 bits: 100 ms at 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
Encoder		
Connection of signal encoders		
• for voltage measurement	Yes	Yes
• for current measurement as 4-wire transducer	Yes	Yes
Connectable encoders		
• 2-wire BEROS	Yes	Yes
- permissible quiescent current (2-wire BEROS), max.	1.5 mA	1.5 mA
Errors/accuracies		
Linearity error (relative to input area)	+/- 0.05 %	+/- 0.05 %

Technical specifications (continued)

	6ES7 455-0VS00-0AE0	6ES7 455-1VS00-0AE0
Temperature error (relative to input areas)	+/- 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 %	

	6ES7 455-0VS00-0AE0	6ES7 455-1VS00-0AE0
Interference voltage suppression for f = n x (fl +/- 1 %), fl = 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
Control technology		
Number of closed loop controllers	16; with thermo-couples or 2-wire connection; 8 with Pt 100 or 4-wire connection	16; with thermo-couples or 2-wire connection; 8 with Pt 100 or 4-wire connection
Status information/alarms/ diagnostics		
Substitute values connectable	Yes; Parameterizable	Yes; Parameterizable
Isolation		
Isolation checked with	500 V DC	500 V DC
Isolation		
Isolation, controller		
• between the channels	No	No
• between the channels and the backplane bus	Yes; Optocoupler	Yes; Optocoupler
Permissible potential difference		
between inputs and MANA (UCM)	2.5 V DC	2.5 V DC
between M internally and the inputs	75 V DC / 60 V AC	75 V DC / 60 V AC
Dimensions		
Dimensions		
• Width	50 mm	50 mm
• Height	290 mm	290 mm
• Depth	210 mm	210 mm
Weights		
• 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	B7	**6ES7 492-1AL00-0AA0**
• with screw contacts, 84 items	B6	**6ES7 492-1AL00-1AB0**
• with spring-loaded terminals, 1 item		**6ES7 492-1BL00-0AA0**
• with crimp contacts, 1 item	B7	**6ES7 492-1CL00-0AA0**
• with crimp contacts, 84 items		**6ES7 492-1CL00-1AB0**

B6: Subject to export regulations: AL: N and ECCN: EAR99
B7: Subject to export regulations: AL: N and ECCN: EAR99H

FM 458-1 DP application module

Overview

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

- Designed for high-performance and freely-configurable control tasks in the SIMATIC S7-400
- Can be adapted as required to individual requirements, e.g.: open-loop control, closed-loop control, computing and motion control. Therefore highly flexible for many different applications.
- Extensive library with approx. 300 function blocks: These include simple functions such as AND, ADD and OR up to complex GMC (General Motion Control) blocks such as virtual master or gearbox functions.
- User-friendly graphic configuring with the SIMATIC engineering tool CFC (Continuous Function Chart): Optimum code generation by 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 global leader in automation systems for decades already. In contrast to other function modules with static structures/functions, the FM 458-1 DP application module can be flexibly configured according to individual requirements.

Overview

- Basic module for handling computing, open-loop control and closed-loop control tasks
- PROFIBUS DP interface for linking of distributed I/O and drive engineering
- Modular configuration with expansion modules for I/O and communication

Technical specifications

	6DD1 607-0AA2
Supply voltages	
Rated value	
• DC 5 V	Yes
• DC 24 V	Yes
• Permissible range (ripple included), lower limit (DC)	4.8 V
• permissible range (ripple included), upper limit (DC)	5.25 V
Current consumption	
Current consumption, typ.	3 A
Current consumption, max.	1.5 A
Backup battery	
Battery op.	Yes
• Buffer current, max.	15 µA
Memory	
Backup	
• present	Yes; SRAM
Time	
Clock	
• Hardware clock (real-time clock)	Yes
• Resolution	500 ms
PROFIBUS DP	
equidistance	Yes; with connection to interrupt tasks
direct data exchange (cross traffic)	Yes

	6DD1 607-0AA2
Digital inputs	
Number of digital inputs	8; Connectors 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
Status information/alarms/ diagnostics	
Alarms	
• Alarms	Yes
Isolation	
Galvanic isolation, digital inputs	
• galvanic isolation, digital inputs	No; only via optional interface modules
Dimensions	
Required slots	1
Dimensions	
Weights	1 000 g

FM 458-1 DP basic module

Ordering data	Order No.
FM 458-1 DP application module Basic module for computing, closed-loop control and open-loop control tasks; with PROFIBUS DP interface	**6DD1 607-0AA2**
Micro Memory Card for FM 458-1 DP basic module	
2 MB	**6ES7 953-8LL20-0AA0**
4 MB	**6ES7 953-8LM20-0AA0**
FM 458-1 DP Know-How-Protect for protection of technological application modules against unauthorized copying	**6DD1 607-0GA0**
SC 64 interface cable To connect FM 458-1 to the serial interface of a programming device/ PC	**6DD1 684-0GE0**
SB10 interface module To connect 8 binary I/Os to FM 458-1 DP	**6DD1 681-0AE2**
SB61 interface module To connect 8 binary I/Os to FM 458-1 DP, input voltage: 24/48 V DC	**6DD1 681-0EB3**
SU12 interface module To connect 10 signals to FM 458-1 DP	**6DD1 681-0AJ1**

	Order No.
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 972-0BA41-0XA0**
With PG interface	**6ES7 972-0BB41-0XA0**
RS 485 bus connector with 90° cable outlet for FastConnect system	
Max. transfer rate 12 Mbit/s	
Without PG interface	**6ES7 972-0BA51-0XA0**
With PG interface	**6ES7 972-0BB51-0XA0**
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 order quantity 20 m	**6XV1 830-0EH10**
Preferred lengths:	
20 m	**6XV1 830-0EN20**
50 m	**6XV1 830-0EN50**
100 m	**6XV1 830-0ET10**

EXM 438-1 input/output expansion module

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 voltages	
Rated value	
• DC 5 V	Yes
• DC 24 V	Yes; to be set up externally
Current consumption	
Current consumption, typ.	1.5 A
Digital inputs	
Number of digital 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 of digital outputs	8
Short-circuit protection of the output	Yes; electronic/thermal
• Response threshold, typ.	250 mA
Limitation of inductive shutdown voltage to	Supply voltage +1 V
Output voltage	
• for signal "0" (DC), max.	3 V
• for signal "1" (DC), 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
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 analg outputs	8; 4 outputs 16 bit; 4 outputs12 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	
Integration and conversion time/resolution per channel	
• Resolution with overload area (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 supply	
Output voltage	about 14 V (non-isolated)
Output current, rated value	100 mA
Short-circuit protection	Yes; electronic
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+

EXM 438-1 input/output expansion module

Technical specifications

	6DD1 607-0CA1
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!)
• Input frequency, max.	2.5 MHz
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
• Input frequency, max.	1 MHz; Track frequency
Encoder signals, absolute encoder (SSI)	
• Input signal	5 V 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)
Isolation	
Galvanic isolation, digital inputs	
• galvanic isolation, digital inputs	No
Isolation, digital outputs	
• Galvanic isolation, digital outputs	No
Isolation, analog inputs	
• Isolation, analog inputs	No
Isolation, analog outputs	
• Galvanic isolation, analog outputs	No
Dimensions	
Required slots	1
Dimensions	
Weights	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**

EXM 448
universal communication 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 voltages	
Rated value	
• DC 5 V	Yes
Current consumption	
Current consumption, typ.	0.8 A
Dimensions	
Required slots	1
Dimensions	
Weights	0.8 kg

Ordering data

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

EXM 448-2
universal communication 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 voltages	
Rated value	
• DC 5 V	Yes
Current consumption	
Current consumption, typ.	0.6 A
Dimensions	
Required slots	1
Dimensions	
Weights	0.9 kg

Ordering data

		Order No.
EXM 448-2 universal communications expansion module		**6DD1 607-0EA2**
For fast communication with drives; for constructing two SIMOLINK fiber-optic connections		
FM 458-1 DP User Manual	B7	**6DD1 904-0AE1**
English/German		

B7: Subject to export regulations: AL: N and ECCN: EAR99H

Overview SC64 interface cable

- For connecting the FM 458-1 DP to an SBxx or SU12 interface module
- To use the digital inputs of the FM 458-1 DP with interrupt capability

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

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

Accessories for FM 458-1 DP

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.

Technical specifications

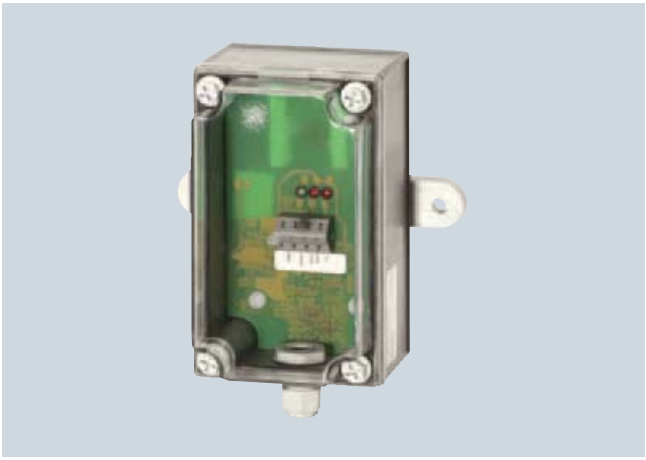
Technical specifications SB10 interface module	
Number of digital inputs or outputs	8
Electrical isolation	No
Max. cable cross-section	1.5 mm²
Dimensions (W x H x D) in mm	45 x 130 x 156
Weight	0.3 kg
Technical specifications SB61 interface module	
Number of digital inputs for	8
• Input voltage	DC 24/48 V
Electrical isolation	Yes, via optocoupler
Max. cable cross-section	1.5 mm²
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	8
• Output voltage, max	24/48 V DC
Output current, max.	40 mA, short-circuit proof
Electrical isolation	Yes, via optocoupler
Max. cable cross-section	1.5 mm²
Dimensions (W x H x D) in mm	45 x 130 x 156
Weight	0.32 kg
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 mm²
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 mm²
Dimensions (W x H x D) in mm	45 x 130 x 156
Weight	0.3 kg

Ordering data

	Order No.
SC 64 interface cable for connection of FM 458-1 to the serial port of a PG/PC	**6DD1 684-0GE0**
SC62 interface cable between the SM500 or EXM 438-1 module and a max. of 5 interface moduls SB10, SB60, SB70, SB61, SB71 and/or SU12, 2 m long	**6DD1 684-0GC0**
SC63 interface cable between an 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 terminal, 10-pin	**6DD1 681-0AJ1**
SU13 interface module with screw-plug-in terminal	**6DD1 681-0GK0**

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.

http://www.siemens.com/siplus – Support – Tools and Downloads!

Technical specifications

	Radio clock module SIPLUS DCF 77
Radio frequency	77.5 Hz
Power supply	DC 24 V (DC 20.4 ... 28. 8)
Power consumption, typ.	50 mA
Dimensions (W x H x D)	75 x 125 [1] x 75

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	B7	**6AG1 057-1AA03-0AA0**
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		

B7: Subject to export regulations: AL: N and ECCN: EAR99H

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 voltages	
Rated value	
• DC 5 V	Yes
• DC 24 V	Yes
Current consumption	
from backplane bus DC 5 V, max.	360 mA
Current consumption/ power loss	
Power loss, typ.	1.7 W
Memory	
Type of storage	
Memory requirements per interface in CompactFlash 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
CPU/programming	
Configuration software	
• STEP 7	Yes; own parameter assignment forms
Dimensions	
Dimensions	
• Width	25 mm
• Height	290 mm
• Depth	210 mm
Weights	
• Weight, approx.	600 g

Ordering data

	Order No.
CP 440 communications processor	**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**

CP 441-1, CP 441-2

Overview

- For powerful, high-speed serial communication via point-to-point connections
- 2 versions:
  - CP 441-1 with 1 variable interface for simple point-to-point connection
  - CP 441-2 with 2 variable interfaces for powerful point-to-point connection
- Plug-in interface modules for different transmission interfaces: RS 232C (V.24) , 20 mA (TTY) or RS 422/RS 485 (X.27)
- Implemented protocols: ASCII, 3964 (R), printer drivers; CP 441-2 additionally has RK 512 and customized protocols (retrofittable)
- Simple parameterization via a parameterization tool integrated into STEP 7

Technical specifications

	6ES7 441-1AA04-0AE0	6ES7 441-2AA04-0AE0
Supply voltages		
Rated value		
• DC 5 V	Yes	Yes
• DC 24 V	Yes	Yes
Current consumption		
from backplane bus DC 5 V, max.	600 mA; without interface module	600 mA; without interface module
Current consumption/ power loss		
Power loss, typ.	0.3 W	0.3 W
Memory		
Type of storage		
Memory requirements per interface in CompactFlash 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
Physical interface, 20mA (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	1 000 m
RS 232, cable length, shielded, max.	10 m	10 m
RS 422/485, cable length, shielded, max.	1 200 m	1 200 m
interface module		
• 20 mA (TTY), power consumption from 5 V/24 V, max.	100 mA; 100 mA from 5 V; 45 mA from 24 V	300 mA at 5 V; 45 mA at 24 V
• RS 422/485 (X.27), power consumption from 5 V, max.	250 mA; from 5 V	300 mA
• RS 232C (V.24), power consumption from 5 V, max.	100 mA; from 5V	300 mA

	6ES7 441-1AA04-0AE0	6ES7 441-2AA04-0AE0
Point-to-point		
supported printers	HP-Deskjet, HP-Laserjet, IBM-Proprinter, user-defined	HP-Deskjet, HP-Laserjet, IBM-Proprinter, user-defined
Transmission speed, max.	38.4 kBit/s	115.2 kBit/s; distributed on both interfaces
Integrated protocol driver		
• 3964 (R)	Yes	Yes
• ASCII	Yes	Yes
• Printer	Yes	Yes
• customer-specific drivers reloadable	No	Yes
• RK512	No	Yes
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
Transmission speed, RS 422/485		
• with 3964 (R) protocol, max.	38.4 kBit/s	115.2 kBit/s
• with ASCII protocol, max.	38.4 kBit/s	115.2 kBit/s
• with printer driver, max.	38.4 kBit/s	115.2 kBit/s
• with RK 512 protocol, max.		115.2 kBit/s
Transmission speed, RS232		
• with 3964 (R) protocol, max.	38.4 kBit/s	115.2 kBit/s
• with ASCII protocol, max.	38.4 kBit/s	115.2 kBit/s
• with printer driver, max.,	38.4 kBit/s	115.2 kBit/s
• with RK 512 protocol, max.		115.2 kBit/s

Technical specifications (continued)

	6ES7 441-1AA04-0AE0	6ES7 441-2AA04-0AE0
CPU/programming		
Configuration software		
• STEP 7	Yes; own parameter assignment forms	Yes; own parameter assignment forms

	6ES7 441-1AA04-0AE0	6ES7 441-2AA04-0AE0
Dimensions		
Dimensions		
• Width	25 mm	25 mm
• Height	290 mm	290 mm
• Depth	210 mm	210 mm
Weights		
• Weight, approx.	800 g; Interface module: 100 g	720 g; Interface module: 100 g

Ordering data

	Order No.
CP 441-1 communications processor	**6ES7 441-1AA04-0AE0**
With 1 variable interface for interface submodules; including configuration package on CD	
CP 441-2 communications processor	**6ES7 441-2AA04-0AE0**
With 2 variable interfaces for interface submodules; including configuration package on CD	
Interface submodules	
RS 232C (V.24)	**6ES7 963-1AA00-0AA0**
20 mA (TTY)	**6ES7 963-2AA00-0AA0**
RS 422/485 (X.27)	**6ES7 963-3AA00-0AA0**
RS 232 connecting cable	
5 m	**6ES7 902-1AB00-0AA0**
10 m	**6ES7 902-1AC00-0AA0**
TTY connecting cable	
5 m	**6ES7 902-2AB00-0AA0**
10 m	**6ES7 902-2AC00-0AA0**
50 m	**6ES7 902-2AG00-0AA0**

	Order No.
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**
Data highway (DF1 protocol)	
• Single license	**6ES7 870-1AE00-0YA0**
• Single license, without software or documentation	**6ES7 870-1AE00-0YA1**

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 description	**CP 443-5 BASIC**
Transfer rate	
Transmission rate at Interface 1	
• Minimum	9.6 kbit/s
• Maximum	12 Mbit/s
Interfaces	
Version of electrical connection of the PROFIBUS interface	9-pin Sub-D socket (RS 485)
Supply voltage	
Type of supply voltage	DC
Supply voltage	5 V
Relative symmetrical tolerance at 5 V DC	5%
Current consumption	
Current consumed from backplane bus at 5 V DC, typical	1.2 A
Effective power loss	
Effective power loss	6.5 W
Permitted ambient conditions	
Ambient temperature	
• during operation	0 … +60 °C
• during storage	-40 … +70 °C
• during transport	-40 … +70 °C
Maximum relative humidity at 25 °C during operation	95%

Order No.	6GK7 443-5FX02-0XE0
Product type description	**CP 443-5 BASIC**
Design, dimensions and weight	
Module format	S7-400 compact module, single width
• Width	25 mm
• Height	290 mm
• Depth	210 mm
Net weight	700 g
Performance data	
FMS function	
Number of possible connections in the case of FMS connection, max.	48
Data volume of the variables	
• for READ job, max.	237 byte
• for WRITE job, max.	233 byte
Number of variables	
• Configurable from server to FMS partner	512
• Loadable from server to FMS partner	2640
S7 communication	
Number of possible connections for S7 communication, max. [1]	48

[1] depending on the CPU type

Technical specifications (continued)

Order No.	6GK7 443-5FX02-0XE0
Product type description	**CP 443-5 BASIC**
Open communication	
Number of possible connections for open communication by means of SEND/RECEIVE blocks, max. [2]	32
Data volume as useful data for open communication (SEND/RECEIVE) per connection, max.	240 bytes

Order No.	6GK7 443-5FX02-0XE0
Product type description	**CP 443-5 BASIC**
Multi-protocol operation	
Number of possible connections, of which 2 reserved for PG/OP communication in the case of multi-protocol operation, max.	59

[2] also S5-compatible communication

Ordering data

	Order No.
CP 443-5 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	
STEP 7 Version 5.4	
Target system: SIMATIC S7-300/-400, SIMATIC C7, SIMATIC WinAC *Requirement:* Windows 2000 Prof./XP Prof. *Delivery package:* German, English, French, Spanish, Italian; incl. 3.5" authorization diskette, without documentation	
• Floating license on CD	**6ES7 810-4CC08-0YA5**
• Rental license for 50 hours	**6ES7 810-4CC08-0YA6**
• Software Update Service on CD (requires current software version)	**6ES7 810-4BC01-0YX2**
• Upgrade Floating License 3.x/4.x/5.x to V5.4; on CD	**6ES7 810-4CC08-0YE5**
• Trial License STEP 7 V5.4; on CD, runs for 14 days	**6ES7 810-4CC08-0YA7**

	Order No.
PROFIBUS FastConnect bus connector RS485	
With 90° cable outlet; insulation displacement technology, max. transmission rate 12 Mbit/s	
• without PG interface	**6ES7 972-0BA51-0XA0**
• with PG interface	**6ES7 972-0BB51-0XA0**
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 stations up to 12 Mbit/s with plug-in cable	

5

CP 443-5 Extended

Overview

DP-M	DP-S	FMS	PG/OP	S7/S5	
●			●	●	

- DP-V1 master connection of the S7-400 to PROFIBUS
- 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

Technical specifications

Order No.	6GK7 443-5DX04-0XE0
Product type description	**CP 443-5 Extended**
Transfer rate	
Transmission rate at Interface 1	
• Minimum	9.6 kbit/s
• Maximum	12 Mbit/s
Interfaces	
Version of electrical connection of the PROFIBUS interface	9-pin Sub-D socket (RS 485)
Supply voltage	
Type of supply voltage	DC
Supply voltage	5 V
Relative symmetrical tolerance at 5 V DC	5%
Current consumption	
Current consumed from backplane bus at 5 V DC, typical	1.3 A
Effective power loss	
Effective power loss	6.5 W
Permitted ambient conditions	
Ambient temperature	
• during operation	0 … +60 °C
• during storage	-40 … +70 °C
• during transport	-40 … +70 °C
Maximum relative humidity at 25 °C during operation	95%

Order No.	6GK7 443-5DX04-0XE0
Product type description	**CP 443-5 Extended**
Design, dimensions and weight	
Module format	S7-400 compact module, single width
• Width	25 mm
• Height	290 mm
• Depth	210 mm
Net weight	700 g
Max. number of modules per CPU	14
Number of external DP lines per central rack, max.	10
Performance data	
PROFIBUS DP	
Service as DP-Master DPV1	Yes
Number of DP-Slaves operable on DP-Master	125
Data volume	
• of the address area of the inputs as DP-Master overall	4 Kibyte
• of the address area of the outputs as DP-Master overall	4 Kibyte
• of the address area of the inputs per DP-Slave	244 bytes
• of the address area of the outputs per DP-Slave	244 bytes

Technical specifications (continued)

Order No.	6GK7 443-5DX04-0XE0
Product type description	**CP 443-5 Extended**
S7 communication	
Number of possible connections for S7 communication, max.	48 [1]
Open communication	
Number of possible connections for open communication by means of SEND/RECEIVE blocks, max. [2]	32
Data volume as useful data for open communication (SEND/RECEIVE) per connection, max.	240 bytes
Multi-protocol operation	
Number of active connections in multi-protocol operation	
• without DP, max.	59
• with DP, max.	55

[1] depending on the CPU type

[2] also S5-compatible communication

Ordering data

	Order No.
CP 443-5 Extended communications processor	**6GK7 443-5DX04-0XE0**
for connection of the SIMATIC S7-400 to PROFIBUS, Extended version for PROFIBUS DP; with electronic manual on CD-ROM	
STEP 7 Version 5.4	
Target system: SIMATIC S7-300/-400, SIMATIC C7, SIMATIC WinAC *Requirement:* Windows 2000 Prof./XP Prof. *Delivery package:* German, English, French, Spanish, Italian; incl. 3.5" authorization diskette, without documentation	
• Floating license on CD	**6ES7 810-4CC08-0YA5**
• Rental license for 50 hours	**6ES7 810-4CC08-0YA6**
• Software Update Service on CD (requires current software version)	**6ES7 810-4BC01-0YX2**
• Upgrade Floating License 3.x/4.x/5.x to V5.4; on CD	**6ES7 810-4CC08-0YE5**
• Trial License STEP 7 V5.4; on CD, runs for 14 days	**6ES7 810-4CC08-0YA7**

	Order No.
PROFIBUS FastConnect bus connector RS485	
With 90° cable outlet; insulation displacement technology, max. transmission rate 12 Mbit/s	
• without PG interface	**6ES7 972-0BA51-0XA0**
• with PG interface	**6ES7 972-0BB51-0XA0**
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	

CP 443-1

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 autosensing/autonegotiation and autocrossover 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: Across networks by means of S7 routing
  - S7 communication
- Multicast for UDP
- Access protection by means of configurable access list
- Support for fail-safe programmable controllers in combination with SIMATIC S7-400 CPU 416F-3 PN/DP
- Module replacement without PG
- SIMATIC H system operation for redundant S7 communication
- Configuration with STEP 7
- Diagnostic possibilities in STEP 7 and with web browser
- Automatic setting of the CPU clock by means of Industrial Ethernet with NTP or SIMATIC procedure
- Integration of network management systems via SNMP (MIB II diagnostic information)

Technical specifications

Order No.	6GK7 443-1EX20-0XE0
Product type description	**CP 443-1**
Transfer rate	
Transmission rate at Interface 1	
• Minimum	10 Mbit/s
• Maximum	100 Mbit/s
Interfaces	
Version of electrical connection to the Industrial Ethernet interface 1	2 x RJ45 (TP)
Supply voltage	
Type of supply voltage	DC
Supply voltage	5 V
Relative symmetrical tolerance at 5 V DC	5%
Current consumption	
Current consumed from backplane bus at 5 V DC, typical	1.4 A
Effective power loss	
Effective power loss	8.6 W
Permitted ambient conditions	
Ambient temperature	
• during operation	0 … +60 °C
• during storage	-40 … +70 °C
• during transport	-40 … +70 °C
Maximum relative humidity at 25 °C during operation	95%
Design, dimensions and weight	
Module format	S7-400 compact module, single width
• Width	25 mm
• Height	290 mm
• Depth	210 mm
Net weight	700 g

Order No.	6GK7 443-1EX20-0XE0
Product type description	**CP 443-1**
Performance data	
Open communication	
Number of possible connections for open communication by means of SEND/RECEIVE blocks, max. [3]	64 [2]
Data volume as useful data for open communication by means of SEND/RECEIVE blocks	
• per ISO connection, max.	8 KB
• per ISO on TCP connection, max.	8 KB
• per TCP connection, max.	8 KB
• per UDP connection, max.	2 KB
Number of possible connections for open communication by means T blocks, max.	64
Data volume as useful data for open communication by means T-blocks	
• per ISO on TCP connection, max.	1 452 bytes
S7 communication	
Number of possible connections for S7 communication	
• Maximum	128 [1]
• for PG connections, maximum	2
• for OP connections, maximum	30
Multi-protocol operation	
Number of active connections in multi-protocol operation	128
Performance data, PROFINET communication as PN IO controller	
Number of PN IO devices operable on PROFINET IO controller	128
Number of external PN IO lines with PROFINET per subrack	4
of which, PN IO IRT devices	32
Data volume	
• as useful data for input variables as PROFINET IO controller	4 KB
• as useful data for output variables as PROFINET IO controller	4 KB
• as useful data for input variables per PN IO device as PROFINET IO controller	240 bytes
• as useful data for output variables per PN IO device as PROFINET IO controller	240 bytes
Configuration	
Configuration software for full functional scope STEP 7 V5.4 SP4 or higher	Yes

[1] when using several CPUs
[2] depending on the CPU type
[3] also S5-compatible communication

5

Ordering data

		Order No.
CP 443-1 communications processor For connecting SIMATIC S7-400 to Industrial Ethernet through TCP/IP, ISO and UDP; PROFINET IO Controller, 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	A8	**6GK7 443-1EX20-0XE0**
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, online 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 Plug 180 RJ45 plug connector for Industrial Ethernet with a rugged metal housing 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**
SOFTNET Edition 2007 for Industrial Ethernet Software for S7 and open communication, incl. OPC server, PG/OP communication and NCM PC, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2, Windows 2003 Server SP1, R2, SP2, Windows Vista Business/Ultimate; German/English		
SOFTNET-S7 Edition 2007 for Industrial Ethernet up to 64 connections		
• Single license for 1 installation	B3	**6GK1 704-1CW70-3AA0**
• Software Update Service for 1 year, with automatic extension; requirement: Current software version		**6GK1 704-1CW00-3AL0**
• Upgrade from V6.4 to 2007 edition	B3	**6GK1 704-1CW00-3AE0**
• Upgrade from V6.0, V6.1, V6.2 or V6.3 to 2007 Edition	B3	**6GK1 704-1CW00-3AE1**
SOFTNET-S7 Lean Edition 2007 for Industrial Ethernet up to 8 connections		
• Single license for 1 installation	B3	**6GK1 704-1LW70-3AA0**
• Software Update Service for 1 year, with automatic extension; requirement: Current software version		**6GK1 704-1LW00-3AL0**
• Upgrade from V6.4 to 2007 Edition	B3	**6GK1 704-1LW00-3AE0**
• Upgrade from V6.0, V6.1, V6.2 or V6.3 to 2007 Edition	B3	**6GK1 704-1LW00-3AE1**
S7-1613 Edition 2007 Software for S7 and open communication, incl. PG/OP communication, OPC server and NCM PC; up to 120 connections, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2; Windows 2003 Server SP1, R2, SP2, Windows Vista Business/Ultimate; for CP 1613/CP 1613 A2/CP 1623; German/English		
• Single license for 1 installation	B3	**6GK1 716-1CB70-3AA0**
• Software Update Service for 1 year, with automatic extension; requirement: Current software version		**6GK1 716-1CB00-3AL0**
• Upgrade S7-1613 from V6.4 to 2007 Edition	B3	**6GK1 716-1CB00-3AE0**
• Upgrade S7-1613 from V6.0, V6.1, V6.2 or V6.3 to S7-1613 Edition 2007	B3	**6GK1 716-1CB00-3AE1**
STEP 7 Version 5.4 *Target system*: SIMATIC S7-300/-400, SIMATIC C7, SIMATIC WinAC *Requirement*: Windows 2000 Prof./XP Prof. *Delivery package:* German, English, French, Spanish, Italian; incl. 3.5" authorization diskette, without documentation		
• Floating license on CD		**6ES7 810-4CC08-0YA5**
• Rental license for 50 hours		**6ES7 810-4CC08-0YA6**
• Software Update Service on CD (requires current software version)		**6ES7 810-4BC01-0YX2**
• Upgrade Floating License 3.x/4.x/5.x to V5.4; on CD		**6ES7 810-4CC08-0YE5**
• Trial License STEP 7 V5.4; on CD, runs for 14 days		**6ES7 810-4CC08-0YA7**

A8: Subject to export regulations: AL: N and ECCN: 5A991X
B3: Subject to export regulations: AL: N and ECCN: 5D992B1

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 an RJ45 connection with 10/100/1000 Mbit/s full/half duplex with auto-sensing functionality
  - PROFINET interface with four RJ45 connections with 10/100 Mbit/s full/half duplex with auto-sensing and auto-crossover functionality via integrated 4-port switch
- Communication services via both interfaces
  - Open communication (ISO, TCP/IP and UDP), Multicast with UDP, incl. routing between two interfaces
  - PG/OP communication:
    Cross-network by means of S7 routing
  - S7 communication (client, server, multiplexing) incl. routing between both interfaces
  - IT communication:
    HTTP communication allows access to process data via own web sites;
    e-mail client function, sending of e-mails with authentication directly from the user program;
    FTP communication allows program-controlled FTP client communication;
    access to data blocks via FTP servers
- 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 prioritized start-ups of PROFINET IO Devices
- Configuration with STEP 7
- Access protection by means of a configurable IP access list
- Module replacement without PG;
  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 SIMATIC H system for redundant S7 communication
- Operation in fail-safe applications (PROFIsafe) together with SIMATIC S7-400 CPU 416F

CP 443-1 Advanced

Technical specifications

Order No.	6GK7 443-1GX20-0XE0
Product type description	**CP 443-1 Advanced**
Transfer rate	
Transmission rate at Interface 1	
• Minimum	10 Mbit/s
• Maximum	1000 Mbit/s
Transmission rate at Interface 2	
• Minimum	10 Mbit/s
• Maximum	100 Mbit/s
Interfaces	
Electrical connection version	
• at Industrial Ethernet interface 1	1 x RJ45 (TP)
• at Industrial Ethernet interface 2	4 x RJ45 (TP)
Slot version of the swap medium	C-PLUG
Supply voltage	
Type of supply voltage	DC
Supply voltage	5 V
Relative symmetrical tolerance at 5 V DC	5%
Current consumption	
Current consumed from backplane bus at 5 V DC, typical	1.34 A
Effective power loss	
Effective power loss	7.25 W
Permitted ambient conditions	
Ambient temperature	
• during operation	0 … +60 °C
• during storage	-40 … +70 °C
• during transport	-40 … +70 °C
Maximum relative humidity at 25 °C during operation	95%
Design, dimensions and weight	
Module format	S7-400 compact module, single width
• Width	25 mm
• Height	290 mm
• Depth	217 mm
Net weight	750 g
Performance data	
Open communication	
Number of possible connections for open communication by means of SEND/RECEIVE blocks, max. [1]	64 [2]
Data volume as useful data for open communication by means of SEND/RECEIVE blocks	
• per ISO connection, max.	8 KB
• per ISO on TCP connection, max.	8 KB
• per TCP connection, max.	8 KB
• per UDP connection, max.	2 KB
• for each e-mail connection, max.	2 KB
Number of possible connections for open communication by means of T blocks, max.	64 [2]
Data volume as useful data for open comm. by means of T-blocks	
• per ISO on TCP connection, max.	1 452 bytes
S7 communication	
Number of possible connections for S7 communication	
• Maximum	128
• for PG connections, maximum	2
• for OP connections, maximum	30
Multi-protocol operation	
Number of active connections in multi-protocol operation	128
IT functions	
Number of possible connections	
• as client by means of FTP, max.	20
• as server	
- by means of FTP, max.	10
- by means of HTTP, max.	4
Memory capacity of the user memory	
• as Flash memory file system	30 MB
• as RAM	16 MB
• additionally buffered as RAM via central backup battery	512 KB
Performance data, PROFINET communication as PN IO controller	
Number of PN IO devices operable on PROFINET IO controller	128
• of which, PN IO IRT devices	32
Number of external PN IO lines with PROFINET per subrack	4
Data volume	
• as useful data for input variables as PROFINET IO controller	4 KB
• as useful data for output variables as PROFINET IO controller	4 KB

[1] also S5-compatible communication
[2] depending on the CPU type

Technical specifications (continued)

Order No.	6GK7 443-1GX20-0XE0
Product type description	**CP 443-1 Advanced**
Data volume (continued)	
• as useful data for input variables per PN IO device as PROFINET IO controller	240 bytes
• as useful data for output variables per PN IO device as PROFINET IO controller	240 bytes
Performance data PROFINET CBA	
Number of remote interconnection partners in the case of PROFINET CBA	64
Total number of interconnections in the case of PROFINET CBA	600
Data volume	
• as useful data for digital inputs in the case of PROFINET CBA, max.	8 192 bytes
• as useful data for digital outputs in the case of PROFINET CBA, max.	8 192 bytes
• as useful data for arrays and data types	
- in case of acyclic transmission with PROFINET CBA, max.	8 192 bytes
- in case of cyclic transmission with PROFINET CBA, max.	250 bytes
- in case of local interconnection with PROFINET CBA, max.	2 400 bytes
Performance data PROFINET CBA, remote interconnections with acyclic transmission	
Send cycle of the remote interconnections in the case of acyclic transmission with PROFINET CBA	100 ms
Number of remote interconnections	
• with input variables in case of acyclic transmission with PROFINET CBA, max.	150
• with output variables in case of acyclic transmission with PROFINET CBA, max.	150
Data volume	
• as useful data for remote interconnections with input variables in the case of acyclic transmission with PROFINET CBA	81 92 bytes
• as useful data for remote interconnections with output variables in the case of acyclic transmission with PROFINET CBA	8 192 bytes
Performance data PROFINET CBA, remote interconnections with cyclic transmission	
Send cycle of the remote interconnections in the case of cyclic transmission with PROFINET CBA	10 ms

Order No.	6GK7 443-1GX20-0XE0
Product type description	**CP 443-1 Advanced**
Number of remote interconnections	
• with input variables in case of cyclic transmission with PROFINET CBA, max.	250
• with output variables in case of cyclic transmission with PROFINET CBA, max.	250
Data volume	
• as useful data for remote interconnections with input variables in the case of cyclic transmission with PROFINET CBA, max.	2 000 bytes
• as useful data for remote interconnections with output variables in the case of cyclic transmission with PROFINET CBA, max.	2 000 bytes
Performance data PROFINET CBA, HMI variables via PROFINET (acyclic)	
Number of HMI stations with login capability for HMI variables in the case of acyclic transmission with PROFINET CBA	3
Send cycle of the HMI variables in the case of acyclic transmission with PROFINET CBA	500 ms
Send cycle of the HMI variables in the case of acyclic transmission with PROFINET CBA max.	200
Data volume as useful data for HMI variables in the case of acyclic transmission with PROFINET CBA max.	8 192 bytes
Performance data PROFINET CBA, device-internal interconnections	
Number of interconnections in the case of PROFINET CBA, max	300
Data volume of internal interconnections in the case of PROFINET CBA, max	2 400 bytes
Performance data PROFINET CBA, interconnections with constants	
Number of interconnections with constants in the case of PROFINET CBA, max	500
Data volume as useful data for interconnections with constants in the case of PROFINET CBA, max	4 000 bytes
Performance data PROFINET CBA, PROFIBUS proxy functionality	
Product function in the case of PROFINET CBA, PROFIBUS proxy functionality	No
Number of accesses to S7-extended variables in case of PROFINET CBA max.	32
Configuration	
Configuration software for full functional scope STEP 7 V5.4 SP4 or higher	Yes

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Ordering data		Order No.
CP 443-1 Advanced communications processor		
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 by means of SIMATIC procedure or NTP, access protection by means of IP access list, FTP client/server, HTTP server, HTML diagnostics, SNMP, DHCP, e-mail, data storage on C-PLUG; PROFINET connection: 4 x RJ45 (10/100 Mbit/s) via switch; Gigabit connection: 1 x RJ45 (10/100/1000 Mbit/s); with electronic manual on DVD		
• For use with SIMATIC S7-400 CPU, V5.2 or higher;	A8	**6GK7 443-1GX20-0XE0**
C-PLUG		**6GK1 900-0AB00**
Swap medium for simple replacement of devices in the event of a fault; for storing configuration or engineering and application data; can be used for SIMATIC NET products with C-PLUG slot		
SOFTNET Edition 2007 for Industrial Ethernet		
Software for S7 and open communication, incl. OPC server, PG/OP communication and NCM PC, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2, Windows 2003 Server SP1, R2, SP2; Windows Vista Business/Ultimate; German/English		
SOFTNET-S7 Edition 2007 for Industrial Ethernet		
up to 64 connections		
• Single License for 1 installation	B3	**6GK1 704-1CW70-3AA0**
• Software Update Service for 1 year, with automatic extension; requirement: Current software version		**6GK1 704-1CW00-3AL0**
• Upgrade from V6.4 to 2007 edition		**6GK1 704-1CW00-3AE0**
• Upgrade from V6.0, V6.1, V6.2 or V6.3 to 2007 Edition	B3	**6GK1 704-1CW00-3AE1**
SOFTNET-S7 Lean Edition 2007 for Industrial Ethernet		
up to 8 connections		
• Single License for 1 installation	B3	**6GK1 704-1LW70-3AA0**
• Software Update Service for 1 year, with automatic extension; requirement: Current software version		**6GK1 704-1LW00-3AL0**
• Upgrade from V6.4 to 2007 edition		**6GK1 704-1LW00-3AE0**
• Upgrade from V6.0, V6.1, V6.2 or V6.3 to 2007 Edition	B3	**6GK1 704-1LW00-3AE1**
S7-1613 2007 Edition		
Software for S7 and open communication, incl. PG/OP communication, OPC server and NCM PC; up to 120 connections, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2; Windows 2003 Server SP1, R2, SP2, Windows Vista Business/Ultimate; for CP 1613/CP 1613 A2/CP 1623; German/English		
• Single License for 1 installation	B3	**6GK1 716-1CB70-3AA0**
• Software Update Service for 1 year, with automatic extension; requirement: Current software version		**6GK1 716-1CB00-3AL0**
• Upgrade S7-1613 from V6.4 to S7-1613 2007 Edition	B3	**6GK1 716-1CB00-3AE0**
• Upgrade S7-1613 from V6.0, V6.1, V6.2 or V6.3 to S7-1613 2007 Edition	B3	**6GK1 716-1CB00-3AE1**
IE FC RJ45 Plug 180		
RJ45 plug connector for Industrial Ethernet with a rugged metal housing 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**

A8: Subject to export regulations: AL: N and ECCN: 5A991X
B3: Subject to export regulations: AL: N and ECCN: 5D992B1

Ordering data (continued)

	Order No.
IE FC RJ45 Plug 4 x 2 RJ45 plug connector for Industrial Ethernet (10/100/1000 Mbit/s) with a rugged metal housing 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**
SCALANCE X204-2 Industrial Ethernet switch with four 10/100 Mbit/s RJ45 ports and two fiber-optic ports	**6GK5 204-2BB10-2AA3**
Industrial Ethernet Switch SCALANCE X308-2 2 x 1000 Mbit/s multimode fiber-optic ports (SC sockets), 1 x 10/100/1000 Mbit/s RJ45 port, 7 x 10/100 Mbit/s RJ45 ports; for glass fiber-optic cables (multimode) up to a max. 750 m.	**6GK5 308-2FL00-2AA3**

		Order No.
STEP 7 Version 5.4 *Target system*: SIMATIC S7-300/-400, SIMATIC C7, SIMATIC WinAC *Requirement*: Windows 2000 Prof./XP Prof. *Delivery package:* German, English, French, Spanish, Italian; incl. 3.5" authorization diskette, without documentation		
• Floating license on CD		**6ES7 810-4CC08-0YA5**
• Rental license for 50 hours		**6ES7 810-4CC08-0YA6**
• Software Update Service on CD (requires current software version)		**6ES7 810-4BC01-0YX2**
• Upgrade Floating License 3.x/4.x/5.x to V5.4; on CD		**6ES7 810-4CC08-0YE5**
• Trial License STEP 7 V5.4; on CD, runs for 14 days		**6ES7 810-4CC08-0YA7**
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 *Type of supply:* German, English, with electronic documentation		
• Single License	B3	**6ES7 820-0CC04-0YA5**
• Software Update Service	B3	**6ES7 820-0CC01-0YX2**
• Upgrade to V3.0, Single License	B3	**6ES7 820-0CC04-0YE5**

B3: Subject to export regulations: AL: N and ECCN: 5D992B1

5

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
Supply voltages	
Rated value	
• Permissible range (ripple included), lower limit (DC)	20.4 V
• permissible range (ripple included), upper limit (DC)	28.8 V
Power supply and voltage jumpering	
• Mains/voltage failure jumpering	20 ms
Voltages and currents	
external protection for supply cables (recommendation)	2.5 A
Current consumption	
Inrush current, typ.	3 A
I^2t	0.1 A^2s
Current consumption, max.	600 mA
Power loss, typ.	5.5 W
Address area	
Adressing volume	
• Outputs	244 byte
• Inputs	244 byte
Hardware config.	
Number of modules per DP slave interface, max.	12
interfaces	
PROFIBUS DP, Output current, max.	70 mA
interface physics, RS 485	Yes
PROFIBUS DP	
Transmission procedure	RS 485
Transmission speed, max.	12 MBit/s
Node addresses	1...125
SYNC capability	Yes
FREECE capability	Yes
direct data exchange (cross traffic)	Yes; Sender

	6ES7 153-2BA02-0XB0
1st interface	
DP slave	
• GSD file	SI04801.GSG
CPU/programming	
Configuration software	
• STEP 7	Yes; STEP 7 / COM PROFIBUS / non-Siemens tools via GSD file
Time stamping	
Accuracy	1 ms; 1ms at up to 8 modules; 10ms at up to 12 modules
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 stamp on signal change	Yes
Environmental requirements	
Operating termperature	
• min.	0 °C
• max.	60 °C
Air pressure	
• Operating height above sea level, max.	3.000 m
Degree and class of protection	
• IP 20	Yes
General information	
Vendor identification (VendorID)	801E
Dimensions	
Dimensions	
Width	40 mm
Height	125 mm
Depth	117 mm
Weights	
Weight, approx.	360 g

Technical specifications (continued)

	6ES7 197-1LB00-0XA0
System	
Demands on DP master system	
• Length of parameter assignment message	244 byte
Supply voltages	
Description	via bus module
Protocols	
PROFIBUS DP protocol	Yes
PROFIBUS DP	
Properties of the lower level DP master systems	
• Transmission speed, 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
Status information/alarms/ diagnostics	
Status indicator	No
Alarms	
• Alarms	No
Diagnoses	
• Diagnostic functions	Yes
Isolation	
to lower-level DP master system	Yes
Dimensions	
Dimensions	
• Width	40 mm
• Height	125 mm
• Depth	130 mm
Weights	
• Weight, approx.	200 g

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 Two IM 153 interface modules (6ES7 153-2BA02-0XB0), One Y coupler (6ES7 197-1LB00-0XA0), One BM IM/IM bus module (6ES7 195-7HD80-0XA0), One BM Y coupler bus module (6ES7 654-7HY00-0XA0)	B7	**6ES7 197-1LA04-0XA0**
For use with PCS 7 V6.1 SP1		
Y link For connecting single-channel DP slaves to SIMATIC S7-400H; consisting of Two IM 153 interface modules (6ES7 153-2BA82-0XB0), One Y coupler (6ES7 197-1LB00-0XA0), One BM IM/IM bus module (6ES7 195-7HD80-0XA0), One BM Y coupler bus module (6ES7 654-7HY00-0XA0)	B7	**6ES7 197-1LA11-0XA0**
Accessories		
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**

B7: Subject to export regulations: AL: N and ECCN: EAR99H

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IM 153-1/153-2

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 version that is best suited for most applications in the manufacturing environment. It permits the use of up to eight 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 1 ms.

IM 153-2 High Feature FO

The High Feature version (with reduced scope of services) is also available as an FO version. This permits fiber optic cables to be connected in the POF or the PCF, and is therefore particularly well suited for use in the heavily EMC-charged areas.

Technical specifications

	6ES7 153-1AA03-0XB0	6ES7 153-2BA02-0XB0	6ES7 153-2BA82-0XB0	6ES7 153-2BB00-0XB0
Power supply				
Input current				
• Rated value at DC 24 V	625 mA			
Output voltage				
• Rated value, DC 5 V	Yes	Yes		Yes
Output current				
• for backplane bus (DC 5 V), max.	1 A	1.5 A		1 A
Supply voltages				
Rated value				
• DC 24 V		Yes	Yes	Yes
• Permissible range (ripple included), lower limit (DC)	20.4 V	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	28.8 V
external protection for supply cables (recommendation)	not necessary	2.5A	2.5A	not necessary
Power supply and voltage jumpering				
• Mains/voltage failure jumpering	5 ms	20 ms	20 ms	
Current consumption				
Current consumption, max.	350 mA; At 24 V DC	600 mA	600 mA	500 mA; At 24 V DC
Inrush current, typ.	2.5 A	3 A	3 A	3.5 A
I^2t	0.1 A^2s	0.1 A^2s	0.1 A^2s	0.1 A^2s
Current consumption/ power loss				
Power loss, typ.	3 W	5.5 W	5.5 W	4.5 W

Technical specifications (continued)

	6ES7 153-1AA03-0XB0	6ES7 153-2BA02-0XB0	6ES7 153-2BA82-0XB0	6ES7 153-2BB00-0XB0
Address area				
Adressing volume				
• Outputs	128 byte	244 byte	244 byte	128 byte
• Inputs	128 byte	244 byte	244 byte	128 byte
Hardware config.				
Number of modules per DP slave interface, max.	8	12	12	8
Communication functions				
Bus protocol/ transmission protocol	PROFIBUS DP to EN 50170	PROFIBUS DP to EN 50170	PROFIBUS DP	PROFIBUS DP to EN 50170
interfaces				
PROFIBUS DP, Output current, max.	90 mA	70 mA	70 mA	Not applicable
interface physics, RS 485	Yes	Yes	Yes	No
interface physics, LWL	No	No	No	Yes
Connection point				
PROFIBUS DP	9-pin sub D socket	9-pin SUB-D	9-pin SUB-D	optical, 2 x duplex sockets
PROFIBUS DP				
Transmission procedure	RS 485	RS 485	RS 485	LWL, wavelength 660 nm
Transmission speed, max.	12 MBit/s	12 MBit/s	12 MBit/s	12 MBit/s; 9.6 / 19.2 / 45.45 / 93.75 / 187.5 / 500 Kbit/s; 1.5 / 12 Mbit/s
Node addresses	1 to 125 permitted	1 to 125 permitted	1.125	1 to 125 permitted
automatic detection of transmission speed	Yes	Yes	Yes	1 to 125 permitted
SYNC capability	Yes	Yes	Yes	Yes
FREECE capability	Yes	Yes	Yes	Yes
direct data exchange (cross traffic)	Yes; Sender	Yes; Sender	Yes	Yes; Sender
1st interface				
DP slave				
• GSD file	(for DPV1) SIEM801D.GSD; SI01801D.GSG	SI04801.GSG	SI0480E.GSG	(for DPV1) SIEM8071.GSD; SI018071.GSG (for IM 153-2AB0x); SI028071.GSG (for IM 153-2BB0x)
• automatic baud rate search	Yes	Yes	Yes	Yes
CPU/programming				
Configuration software				
• STEP 7	STEP 7 / COM PROFIBUS / non-Siemens tools via GSD file	Yes; STEP 7 / COM PROFIBUS / non-Siemens tools via GSD file	Yes	Yes; STEP 7 / COM PROFIBUS / non-Siemens tools via GSD file
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	10 ms; 10 ms / 3 ms
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	128; 128 signals / station; max. 32 signals / slot	128
Time format		RFC 1119		RFC 1119 Internet (ISP)

Technical specifications (continued)

	6ES7 153-1AA03-0XB0	6ES7 153-2BA02-0XB0	6ES7 153-2BA82-0XB0	6ES7 153-2BB00-0XB0
Time resolution		0.466 ns	0.466 ns	1 ms
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	Yes	rising / falling edge as signal entering or exiting
Isolation				
Isolation checked with	Isolation voltage 500 V	Isolation voltage 500 V	500 V DC	Isolation voltage 500 V
Environmental requirements				
Operating termperature				
• min.	0 °C	0 °C	-25 °C	0 °C
• max.	60 °C	60 °C	60 °C	60 °C
Air pressure				
• Operating height above sea level, max.	3 000 m	3 000 m	3 000 m	3 000 m
Degree of protection				
IP 20	Yes	Yes	Yes	Yes
General information				
Vendor identification (VendorID)	801Dh	801E	801E	8071h
Dimensions				
Dimensions				
• Width	40 mm	40 mm	40 mm	40 mm
• Height	125 mm	125 mm	125 mm	125 mm
• Depth	117 mm	117 mm	117 mm	117 mm
Weights				
• Weight, approx.	360 g	360 g	360 g	360 g

	6ES7 195-7HD10-0XA0	6ES7 195-7HA00-0XA0	6ES7 195-7HB00-0XA0	6ES7 195-7HC00-0XA0
Accessories				
belongs to product	ET 200M			
Dimensions				
Weights				
• Weight, approx.	133 g	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**
• Fiber optic	**6ES7 153-2BB00-0XB0**
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 time including 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, without PG connection socket, up to 12 Mbit/s, FastConnect		**6ES7 972-0BA51-0XA0**
• 90° outgoing cable, terminating resistor with disconnecting function, with PG connection socket, up to 12 Mbit/s, FastConnect		**6ES7 972-0BB51-0XA0**
SIMATIC DP DIN rail for ET 200M		
For insertion of up to 5 bus modules for		
• Length: 483 mm (19“)		**6ES7 195-1GA00-0XA0**
• Length: 530 mm		**6ES7 195-1GF30-0XA0**
SIMATIC S7-300 DIN 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: 2,000 mm		**6ES7 390-1BC00-0AA0**
S7 Manual Collection	B3	**6ES7 998-8XC01-8YE0**
Electronic manuals on DVD, multi-language: S7-200, TD 200, S7-300, C7, S7-400, 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	B3	**6ES7 998-8XC01-8YE2**
Scope of delivery: Current DVD "S7 Manual Collection" and the three subsequent updates		

B3: Subject to export regulations: AL: N and ECCN: 5D992B1

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SIPLUS IM 153-1/153-2

Overview

- For connecting ET 200M as a slave to PROFIBUS DP (via copper conductors)
- IM 153-2 also for use in redundant PROFIBUS DP systems with S7-400H, software redundancy and S5-155H
- With time stamp functionality and time synchronization
- Suitable for isochronous mode

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	SIPLUS IM 153-1	SIPLUS IM 153-2
Order No.	**6AG1 153-1AA03-2XB0**	**6AG1 153-2BA02-7XB0**
Order No. based on	**6ES7 153-1AA03-0XB0**	**6ES7 153-2BA02-0XB0**
Ambient temperature range	-25 ... +60 °C Condensation permissible	-25 ... +70 °C -25 ... +60 °C (for applications with cUL approval), condensation permissible
Environmental conditions	Suited for exceptional medial exposure (e.g. by chlorine sulfur atmosphere)	
Approvals	CE. UL haz. Loc.	CE
Conforms with standard for electronic equipment used on rolling stock (EN 50155, temperature T1, category 1).	Yes	No
Technical data	The technical data are identical with those of the based-on modules.	

SIPLUS bus module	for accommodating an 80 mm module	for accommodating two IM 153-2	for accommodating a PS and an IM 153	For accommodating two 40 mm wide I/O modules
Order No.	**6AG1 195-7HC00-2XA0**	**6AG1 195-7HD10-2XA0**	**6AG1 195-7HA00-2XA0**	**6AG1 195-7HB00-7XA0**
Order No. based on	**6ES7 195-7HC00-0XA0**	**6ES7 195-7HD10-0XA0**	**6ES7 195-7HA00-0XA0**	**6ES7 195-7HB00-0XA0**
Ambient temperature range	-25 ... +60 °C Condensation permissible			
Environmental conditions	Suited for exceptional medial exposure (e.g. by chlorine sulfur atmosphere)			
Approvals	CE, cUL (available soon)		CE, UL haz. Loc.	CE. UL haz. Loc.
Conforms with standard for electronic equipment used on rolling stock (EN 50155, temperature T1, category 1).	No	No	No	No
Technical data	The technical data are identical with those of the based-on modules.			

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

Ordering data

		Order No.
IM 153-1 interface module		
Slave interface for connecting an ET 200M to PROFIBUS DP		
• Standard temperature range		**6AG1 153-1AA03-2XB0**
IM 153-2 interface module		
Slave interface for connecting an ET 200M to PROFIBUS DP; also for use in redundant systems		
• High Feature	B7	**6AG1 153-2BA02-7XB0**
Active IM 153/IM 153 bus module		**6AG1 195-7HD10-2XA0**
For two IM 153-2 High Feature modules for designing redundant systems		

	Order No.
Bus module for ET 200M	
• 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 IM 153-1/IM 153-2, page 5/125

B7: Subject to export regulations: AL: N and ECCN: EAR99H

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Isolation module

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
Dimensions	
Weights	
• 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**

SIPLUS isolating module

Overview

- Permits combined operation of fail-safe signal modules in safety mode and standard S7-300 modules in the same ET 200M system.
- Design of PROFIBUS DP lines using copper bus cables. It is not necessary to use fiber-optic cables.
- Every IM 153-x can be used

The isolation module is not required if safety class SIL 2 is to be achieved.

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, condensation permitted
Environmental conditions	Suited for exceptional medial exposure (e.g. by chlorine sulfur atmosphere).
Conforms with standard for electronic equipment used on rolling stock (EN 50155, temperature T1, category 1).	Yes
Technical data	The technical data are identical with those of the based-on modules.

Information about safety class and safety category see isolating module, page 5/128.

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Ordering data

Ordering data	Order No.
Isolating module (medial exposure) for simultaneous operation of fail-safe and standard modules in an ET 200M	**6AG1 195-7KF00-2XA0**
Accessories	see Isolation module, page 5/128

Failsafe input/output modules

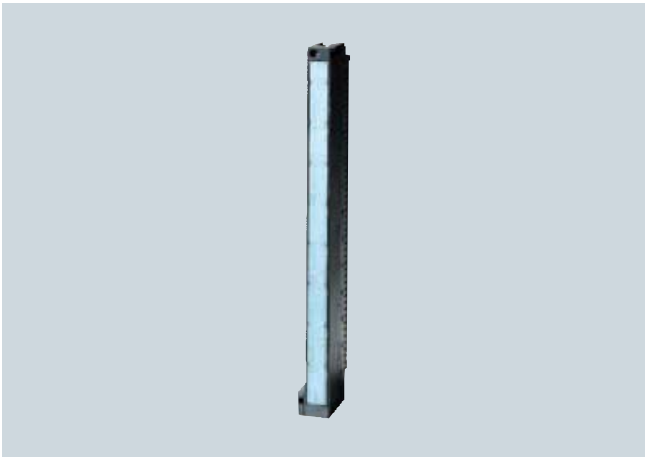
Overview

- 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 further information see section 4, page 111.

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	B7	**6ES7 492-1AL00-0AA0**
• With spring-loaded terminals		**6ES7 492-1BL00-0AA0**
• With crimp contacts	B7	**6ES7 492-1CL00-0AA0**
48-pin for signal modules, function modules; 84 units per pack		
• With screw contacts	B6	**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	B7	**6ES7 492-2XL00-0AA0**
6 units		
Connection terminal for modules		**6ES7 490-1BA00-0AA0**
6 units		
Manual "SIMATIC S7-400 automation system"		
incl. instruction list		
German		**6ES7 498-8AA05-8AA0**
English		**6ES7 498-8AA05-8BA0**
French		**6ES7 498-8AA05-8CA0**
Spanish		**6ES7 498-8AA05-8DA0**
Italian		**6ES7 498-8AA05-8EA0**
SIMATIC Manual Collection	B3	**6ES7 998-8XC01-8YE0**
Electronic manuals on DVD, five languages: S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, engineering software, runtime software, PCS 7, SIMATIC HMI, SIMATIC NET		
SIMATIC Manual Collection update service for 1 year	B3	**6ES7 998-8XC01-8YE2**
Current "Manual Collection" DVD and the three subsequent updates		

B3: Subject to export regulations: AL: N and ECCN: 5D992B1
B6: Subject to export regulations: AL: N and ECCN: EAR99
B7: Subject to export regulations: AL: N and ECCN: EAR99H

Overview

The fully modular connection is the standard connection for the SIMATIC S7-300/400. The fully modular connection facilitates convenient, fast, and correct connection of the I/O to the SIMATIC S7-300/400.

- Easy plugging in of front connector module, connecting cable and connection module
- Fast and low-cost wiring
- Supply voltage connectable to front connector module or connection module for digital and analog signals
- Reduction in wiring errors, clear control cabinet wiring
- Distribution of digital signals by byte or by double-byte
- Each component can be replaced individually.
- Every cable length can be configured without cutting, or pre-assembled cables can be used

Connecting cables

The connection cable is the linking element between the front connector module and the connection module. It transmits 8 signals and the supply voltage. The maximum bridgeable distance is 30 m. The connecting cable is available in two different versions:

- The pre-assembled round cable
- The round-sheath ribbon cable assembled by the user

Basic modules

In the case of the basic module, the connection modules are used with basic functionality. Here, the I/O signal is connected quickly and simply from the field to the module or from the module to the field.

The connection terminals for the I/O signals are designed as screw terminals or spring terminals. The connection modules are available for digital and analog signals.

Signal modules

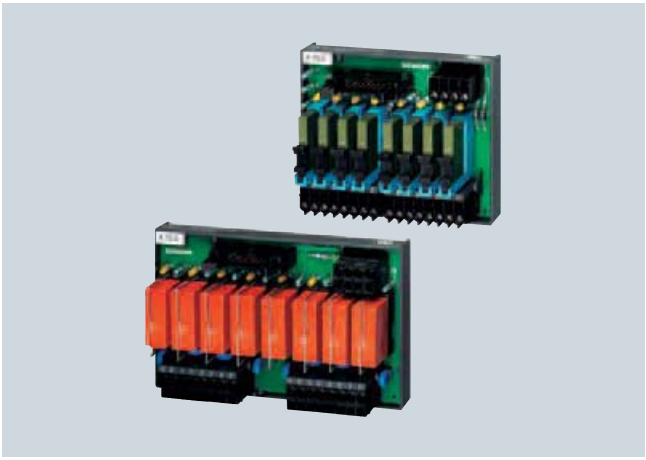
In the case of the signal module, the digital connection modules with LED are used. The yellow LEDs indicate the "active high" signal of the individual channels. This makes commissioning easier for you, and you always have an overview of the signal states of your I/O. At the same time, a green LED indicates when the 24 V DC is applied.

The connection terminals for the I/O signals are designed as screw terminals or spring terminals. The connection modules are available for digital signals.

Fully modular connection

Overview (continued)

Function modules



Function modules are implemented with digital connection modules fitted with relays or optocouplers.

If other voltage or power levels are required in the field, the connection module for output signals TPRo is used. This converts the 24 V DC output signal simply and reliably to another voltage or power level. If 230 V AC input signals have to be transmitted to the controller in the field, a connection module with relay TPRi is available that converts the 230 V AC signal simply to 24 V DC. This means you always have the same voltage level on the module side.

Technical specifications front connector modules

Technical data of front connector module	
Rated operating voltage	24 V DC
Max. permissible operating voltage	60 V DC
Max. permissible continuous current • per connector pin	1 A
Max. permissible summation current	4 A/byte (power supply)
Permissible ambient temperature	0 to + 60 °C
Test voltage	0.5 kV, 50 Hz, 60 s
Air gaps and creepage distances	IEC 664 (1980), IEC 664 A (1981), in accordance with DIN VDE 0110 (01.89), overvoltage class II, pollution degree 2

Wiring rules for the front connector modules

	Front connector module SIMATIC TOP connect, connection for potential supply
	Screw connection
	Modules up to 4 connections
Connectable cable cross-sections	
• solid cables	No
• flexible cables with/without wire end ferrule	0.25 to 1.5 mm^2
Number of cables per connection	1 or a combination of 2 conductors up to 1.5 mm^2 (total) in a common wire end ferrule
Max. diameter of the cable insulation	3.1 mm
Stripping length of the cables	
• without insulating collar	6 mm
• with insulating collar	-
Wire-end ferrules to DIN 46228	
• without insulating collar	Form A; 5 to 7 mm long
• with insulating collar 0.25 to 1.0 mm^2	-
• with insulating collar 1.5 mm^2	-
Blade width of the screwdriver	3.5 mm (cylindrical shape)
Tightening torque for connecting the cables	0.4 to 0.7 Nm

	Front connector module SIMATIC TOP connect, connection for potential supply
	Screw connection
	Modules up to 6 connections
Connectable cable cross-sections	
• solid cables	No
• flexible cables with/without wire end ferrule	0.25 bis 0.75 mm^2
Number of cables per connection	1 or a combination of 2 conductors up to 1.5 mm^2 (total) in a common wire end ferrule
Max. diameter of the cable insulation	2.0 mm
Stripping length of the wires	
• without insulating collar	6 mm
• with insulating collar	-
Wire-end ferrules to DIN 46228	
• without insulating collar	Form A; 5 to 7 mm long
• with insulating collar 0.25 to 1.0 mm^2	-
• with insulating collar 1.5 mm^2	-
Blade width of the screwdriver	3.5 mm (cylindrical shape)
Tightening torque for connecting the cables	0.4 to 0.7 Nm

Technical specifications connecting cables

Technical data of connecting cable from SIMATIC S7 to connection module	
Operating voltage	**60 V DC**
Continuous current per signal conductor	1 A
Max. summation current	4 A/byte
Operating temperature	0 to +60°C
Outer diameter of pre-assembled round cable in mm, unshielded/shielded	Approx. 6.5/7.0
Outer diameter of round-sheath ribbon cable in mm , 16-pole/2 x 16-pole	Approx. 9.5/11.5

Technical specifications basic modules

Connection module TP1, TP3 and TPK	
Max. operating voltage	**60 V DC**
Continuous current per signal	1 A
Max. summation current (voltage infeed)	4 A/byte
Operating temperature	0 to + 60°C
Mounting position	Any
Air gaps and creepage distances	IEC Report 664, IEC 664 A, IEC 1131 T2, CSA C22.2 No 142 UL 508, VDE 0160 (12.90), overvoltage category II, pollution degree 3
Dimensions (W x H x D) in mm	
• 1-wire connection 6ES7 924-0AA10-0A_0	Approx. 55 x 43.2 x 63
• for 3-wire initiators 6ES7 924-0CA10-0A_0	Approx. 68 x 43.2 x 80
• for 2 x 8 signals 6ES7 924-1AA10-0A_0	Approx. 100 x 43.2 x 80

Connection module TP2	
Max. operating voltage	**60 V DC**
Continuous current signal conductor	2 A
Operating temperature	0 to + 60°C
Mounting position	Any
Air gaps and creepage distances	IEC Report 664, IEC 664 A, IEC 1131 T2, CSA C22.2 No 142 UL 508, VDE 0160 (12.90), overvoltage category II, pollution degree 3
Dimensions (W x H x D) in mm	
• for 2 ampere modules 6ES7 924-0BB10-0A_0	Approx. 68 x 43.2 x 80

Connection module TPA	
Max. operating voltage	**60 V DC**
Continuous current signal conductor	1 A
Operating temperature	0 to + 60°C
Mounting position	Any
Air gaps and creepage distances	IEC Report 664, IEC 664 A, IEC 1131 T2, CSA C22.2 No 142 UL 508, VDE 0160 (12.90), overvoltage category II, pollution degree 3
Dimensions (W x H x D) in mm	
• for 2 analog modules 6ES7 924-0CC10-0A_0	Approx. 68 x 43.2 x 80

Wiring rules for connection modules

	Connection module TPA, TP1, TP2, TP3, TPK	
	Spring connection	Screw connection
Connectable cable cross-sections		
• solid cables	No	
• flexible cables without wire end ferrule	0.5 to 2.5 mm^2	
• flexible cables with wire end ferrule in accordance with DIN 46228/1	0.5 to 1.5 mm^2	0.5 to 2.5 mm^2 (2.5 mm^2 with a crimp in accordance with EN 60947-1
• flexible cables with wire end ferrule and plastic collar in accordance with DIN 46228/4	0.5 to 1.5 mm^2	
Number of cables per connection	1 or a combination of 2 cables up to the cross-sections specified above(total) in a shared wire end ferrule	
Blade width of the screwdriver	3.5 mm (cylindrical shape)	
Tightening torque for connecting the cables	-	0.4 to 0.7 Nm

Fully modular connection

Technical specifications signal modules

Connection module TP1, TP3 and TPK with LED	
Max. operating voltage	24 V DC
Continuous current per signal	1 A
Max. summation current (voltage infeed)	4 A/byte
Operating temperature	0 to + 60 °C
Mounting position	Any
Air gaps and creepage distances	IEC Report 664, IEC 664 A, IEC 1131 T2, CSA C22.2 No 142 UL 508, VDE 0160 (12.90), overvoltage category II, pollution degree 3
Dimensions (W x H x D) in mm	
• 1-wire connection with LED 6ES7 924-0AA10-0B_0	Approx. 55 x 43.2 x 63
• for 3-wire initiators with LED 6ES7 924-0CA10-0B_0	Approx. 68 x 43.2 x 80
• for 2 x 8 signals with LED 6ES7 924-1AA10-0B_0	Approx. 100 x 43.2 x 80

Connection module TP2 with LED	
Max. operating voltage	24 V DC
Continuous current per signal conductor	2 A
Operating temperature	0 to + 60 °C
Mounting position	Any
Air gaps and creepage distances	EC Report 664, IEC 664 A, IEC 1131 T2, CSA C22.2 No 142 UL 508, VDE 0160 (12.90), overvoltage category II, pollution degree 3
Dimensions (W x H x D) in mm	
• for 2-ampere modules with LED 6ES7 924-0BB10-0B_0	Approx. 68 x 43.2 x 80

Wiring rules for connection modules

Connection module TP1 LED, TPK LED, TP2 LED, TP3 LED		
	Spring connection	Screw connection
Connectable cable cross-sections		
• solid cables	No	
• flexible cables without wire end ferrule	0.5 to 2.5 mm^2	
• flexible cables with wire end ferrule in accordance with DIN 46228/1	0.5 to 1.5 mm^2	0.5 to 2.5 mm^2 (2.5 mm^2 with a crimp in accordance with EN 60947-1)
• flexible cables with wire end ferrule and plastic collar in accordance with DIN 46228/4	0.5 to 1.5 mm^2	
Number of wires per connection	1 or a combination of 2 conductors up to the cross-sections specified above (total) in a shared wire end ferrule	
Blade width of the screwdriver	3.5 mm (cylindrical shape)	
Tightening torque for connecting the cables	-	0.4 to 0.7 Nm

Technical specifications function modules

Connection module with relay for outputs (TPRo)	
Energizing side	
Operating voltage for coil	24 V DC
Input circuit	Reverse polarity protection and freewheeling diodes
Contact side	
Number of relay outputs	8 (NO contacts)
Contact design	Single contact, 1 NO contact
Switching capacity (resistive load)	max. 4 A/250 V AC, max. 3 A/30 V DC max. 0.6 A/48 V DC max. 0.4 A/60 V DC recommended minimum load ≥10 mA
Switching frequency	20 cycles/minute
Service life	
• mechanical	5 x 10^6 operating cycles
• electrical	3 x 10^4 operating cycles at 230 V AC/2 A/ cos φ = 1
Operating temperature	0 to +60 °C
Mounting position	Any
Air gaps and creepage distances	Basic standard IEC 60664-1; UL 508; CuI (Reference CSA C22.2 No. 142) overvoltage category III pollution degree 2
Dimensions (W x H x D) in mm	
6ES7 924-0BD10-0B_0	Approx. 100 x 45 x 80

Connection module with relay for inputs (TPRi)	
Energizing side	
Operating voltage for coil	230 VAC
	from 207 – 280 V AC
Input circuit	Varistors
Contact side	
Number of relay outputs	8 (NO contacts)
Contact design	Single contact, 1 NO contact
Switching capacity (resistive load)	max. 50 mA/24 V AC, max. 50 mA/48 V DC max. 50 mA/60 V DC recommended minimum load ≥5 mA
Switching frequency	200 cycles/minute
Service life	
• mechanical	10 x 10^6 operating cycles
• electrical	3 x 10^6 operating cycles at 230 V AC/50 mA/ cos φ = 1
Operating temperature	0 to +60 °C
Mounting position	Any
Air gaps and creepage distances	Basic standard IEC 60664-1; UL 508; CuI (Reference CSA C22.2 No. 142) overvoltage category III pollution degree 2
Dimensions (W x H x D) in mm	
6ES7 924-0BE10-0B_0	Approx. 120 x 45 x 80

Technical specifications function modules (continued)

Wiring rules for the connection modules

	Connection modules TPRo and TPRi	
	Spring connection	Screw connection
Connectable cable cross-sections		
• Solid cables	No	
• flexible cables without wire end ferrule	0.5 to 2.5 mm^2	
• flexible cables with wire end ferrule in accordance with DIN 46228/1	0.5 to 1.5 mm^2	0.5 to 2.5 mm^2 (2.5 mm^2 with a crimp in accordance with EN 60947-1)
• flexible cables with wire end ferrule and plastic collar in accordance with DIN 46228/4	0.5 to 1.5 mm^2	
Number of wires per connection	1 or a combination of 2 conductors up to the cross-sections specified above (total) in a shared wire end ferrule	
Blade width of the screwdriver	3.5 mm (cylindrical shape)	
Tightening torque for connecting the cables	-	0.4 to 0.7 Nm

Ordering data front connector modules

		Order No.
Front connector module (digital 4 x 8 I/O)		
Voltage infeed via		
• Screw terminals		**6ES7 921-4AB00-0AA0**
Front connector module (2 x 8 outputs) for 2 ampere digital outputs		
Voltage infeed via		
• Screw terminals		**6ES7 921-4AD00-0AA0**
Front connector module (analog)		
Voltage infeed via		
• Screw terminals		**6ES7 921-4AG00-0AA0**

Ordering data connect. cables

		Order No.
Pre-assembled round cable		
16-pole, 0.14 mm^2		
unshielded		
0.5 m		**6ES7 923-0BA50-0CB0**
1.0 m		**6ES7 923-0BB00-0CB0**
1.5 m		**6ES7 923-0BB50-0CB0**
2.0 m		**6ES7 923-0BC00-0CB0**
2.5 m		**6ES7 923-0BC50-0CB0**
3.0 m		**6ES7 923-0BD00-0CB0**
4.0		**6ES7 923-0BE00-0CB0**
5.0 m		**6ES7 923-0BF00-0CB0**
shielded		
1.0 m		**6ES7 923-0BB00-0DB0**
2.0 m		**6ES7 923-0BC00-0DB0**
2.5 m		**6ES7 923-0BC50-0DB0**
3.0 m		**6ES7 923-0BD00-0DB0**
4.0 m		**6ES7 923-0BE00-0DB0**
5.0 m		**6ES7 923-0BF00-0DB0**
Round-sheath ribbon cable		
16-pole, 0.14 mm^2		
unshielded		
30 m		**6ES7 923-0CD00-0AA0**
60 m	B7	**6ES7 923-0CG00-0AA0**
shielded		
30 m		**6ES7 923-0CD00-0BA0**
60 m		**6ES7 923-0CG00-0BA0**
Round-sheath ribbon cable		
2 x 16-pole, 0.14 mm^2		
unshielded		
30 m		**6ES7 923-2CD00-0AA0**
60 m		**6ES7 923-2CG00-0AA0**
8 connectors (16-pole) Insulation displacement system with 8 cable grips		**6ES7 921-3BE10-0AA0**
Accessories		
Crimping tool For processing the connectors (female ribbon cable connector)		**6ES7 928-0AA00-0AA0**

B7: Subject to export regulations: AL: N and ECCN: EAR99H

Fully modular connection

Ordering data basic modules	Order No.
Connection module TP1	
for 1-wire initiators	
Packaging unit (1 unit)	
• Spring terminals	**6ES7 924-0AA10-0AB0**
• Screw terminals	**6ES7 924-0AA10-0AA0**
Connection module TP3	
for 3-wire initiators	
Packaging unit (1 unit)	
• Spring terminals	**6ES7 924-0CA10-0AB0**
• Screw terminals	**6ES7 924-0CA10-0AA0**
Connection module TPK	
for 2 x 8 signals	
Packaging unit (1 unit)	
• Spring terminals	**6ES7 924-1AA10-0AB0**
• Screw terminals	**6ES7 924-1AA10-0AA0**
Connection module TP2	
for 2 A modules	
for 2-wire initiators	
Packaging unit (1 unit)	
• Spring terminals	**6ES7 924-0BB10-0AB0**
• Screw terminals	**6ES7 924-0BB10-0AA0**
Connection module TPA	
for analog signals	
Packaging unit (1 unit)	
• Spring terminals	**6ES7 924-0CC10-0AB0**
• Screw terminals	**6ES7 924-0CC10-0AA0**
Accessories	
Labeling plates for connection modules	
Insertable labeling plate PU = 200 units	**6ES7 928-2AB00-0AA0**
Self-adhesive labeling plate PU = 200 units	**6ES7 928-2BB00-0AA0**
Shield plate	**6ES7 928-1BA00-0AA0**
for analog connection module (4 units)	
Shield connection terminal	
for shield plate, 2 units, with cable diameter	
• 2 to 6 mm (2 cables)	**6ES7 390-5AB00-0AA0**
• 3 to 8 mm	**6ES7 390-5BA00-0AA0**
• 4 to 13 mm	**6ES7 390-5CA00-0AA0**

Ordering data signal modules	Order No.
Connection module TP1 with LED	
for 1-wire initiators	
Packaging unit (1 unit)	
• Spring terminals	**6ES7 924-0AA10-0BB0**
• Screw terminals	**6ES7 924-0AA10-0BA0**
Connection module TP3 with LED	
for 3-wire initiators	
Packaging unit (1 unit)	
• Spring terminals	**6ES7 924-0CA10-0BB0**
• Screw terminals	**6ES7 924-0CA10-0BA0**
Connection module TPK with LED	
for 2 x 8 signals	
Packaging unit (1 unit)	
• Spring terminals	**6ES7 924-1AA10-0BB0**
• Screw terminals	**6ES7 924-1AA10-0BA0**
Connection module TP2 with LED	
for 2 A modules	
for 2-wire initiators	
Packaging unit (1 unit)	
• Spring terminals	**6ES7 924-0BB10-0BB0**
• Screw terminals	**6ES7 924-0BB10-0BA0**
Accessories	
Labeling plates for connection modules	
Insertable labeling plate PU = 200 units	**6ES7 928-2AB00-0AA0**
Self-adhesive labeling plate PU = 200 units	**6ES7 928-2BB00-0AA0**

Ordering data function modules

	Order No.
Connection module TPRo for output signals	
for 2-wire connection	
Packaging unit (1 unit)	
• Spring terminals	**6ES7 924-0BD10-0BB0**
• Screw terminals	**6ES7 924-0BD10-0BA0**
Connection module TPRi for input signals	
for 2-wire connection	
Packaging unit (1 unit)	
• Spring terminals	**6ES7 924-0BE10-0BB0**
• Screw terminals	**6ES7 924-0BE10-0BA0**

	Order No.
Accessories	
Labeling plates for connection modules	
Insertable labeling plate PU = 200 units	**6ES7 928-2AB00-0AA0**
Self-adhesive labeling plate PU = 200 units	**6ES7 928-2BB00-0AA0**
Replacement relay for relay connection module PU = 4 units	
Replacement relay for TPRi	**6ES7 928-3BA00-4AA0**
Replacement relay for TPRo	**6ES7 928-3AA00-4AA0**
Optocoupler DC alternative for relay in the case of TPRo PU = 4 units	**6ES7 928-3DA00-4AA0**
Optocoupler AC alternative for relay in the case of TPRo PU = 4 units	**6ES7 928-3CA00-4AA0**

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
Color of core	Blue, RAL 5010
Designation of cores	Numbered from 3 to 48 (adapter contact = core number)
Fabrication	Screw or crimp contacts

Ordering data

	Order No.
Front connector with single cores for 32-channel digital modules SIMATIC S7-400, 46 x 0.5 mm^2	
Core type H05V-K	
Screw version	
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**
• Special 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 version	
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**
• Special lengths	on request
Packaging unit (5 units)	
• 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 version	
Packaging unit (1 unit) Length:	
• 3.2 m	**6ES7 922-4BD20-0UD0**
• 5 m	**6ES7 922-4BF00-0UD0**
• Special lengths	on request

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 config.						
Number of single-width slots, max.	18	18	9	9	18; 2 segments with 8 or 10 slots	4
Rack						
• K bus	Yes	Yes	Yes	Yes	Yes	Yes
• P bus	Yes	Yes	Yes	Yes	Yes	Yes
Dimensions						
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
Weights						
• Weight, approx.	4 200 g	3 000 g	2 200 g	1 500 g	4 200 g	750 g

Racks

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 config.						
Number of single-width slots, max.	18	18	18	18	9	9
Rack						
• K bus	Yes	Yes				
• P bus	Yes	Yes	Yes	Yes	Yes	Yes
Dimensions						
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
Weights						
• Weight, approx.	4 200 g	3 000 g	4 200 g	2 500 g	2 200 g	1 250 g

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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**

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 voltages		
Rated value		
• DC 24 V	Yes	
• permissible range, lower limit (DC)	19.2 V	
• permissible range, upper limit (DC)	30 V	
• AC 120 V		Yes
• AC 230 V		Yes
• permissible range, lower limit (AC)		85/170 V AC
• permissible range, upper limit (AC)		132 V AC or 264 V AC
• permissible frequency range, lower limit		47 Hz
• permissible frequency range, upper limit		63 Hz
Current consumption		
Inrush current, typ.	0.9 A; at 24 V	0.6 A at rated voltage 230 V AC: 1.15 A: at rated voltage 120 V AC
Current consumption/ power loss		
Power loss, max.	11 W	20 W
Relay outputs		
Rated input voltage of relay L+ (DC)	24 V	24 V
Switching capacity of the contacts		
• with resistive load, max.	200 mA	200 mA
Dimensions		
Dimensions		
• Width	482.5 mm	482.5 mm
• Height	109.5 mm	109.5 mm
• Depth	235 mm	235 mm
Weights		
• 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	
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	

Expansion racks

Overview

- SIMATIC S5 expansion racks for distributed expansion of the SIMATIC S7-400
- For connection to existing SIMATIC S5 systems

The following components can be connected to the SIMATIC S7-400:

- Expansion racks ER 701-2 and ER 701-3 from the SIMATIC S5-115U series
- Expansion racks EG 183U and EG 185U from the SIMATIC S5-135U/-155U series

The following requirements must be met for expansion:

- IM 463-2 interface module plugged into the SIMATIC S7-400 central controller
- IM 314 interface module plugged into SIMATIC S5 expansion racks
- Maximum configuration:
- Up to 32 SIMATIC S5 expansion racks can be connected to one S7-400 central controller
- Transmission distance:
  The maximum permissible distance between the central controller and the last expansion rack on a line is 600 m

Suitable SIMATIC S5 modules

Expansion rack	ER 701-2, ER 701-3	EG 183U, EG 185 U
Digital input modules	6ES5 420-7LA11	6ES5 420-4UA14
	6ES5 430-7LA12	6ES5 430-4UA14
	6ES5 431-7LA11	6ES5 431-4UA12
	6ES5 432-7LA11	6ES5 432-4UA12
	6ES5 434-4UA12	6ES5 434-4UA12
	6ES5 434-7LA12	6ES5 436-4UA12
	6ES5 435-7LA11	
	6ES5 435-7LB11	
	6ES5 435-7LC11	
	6ES5 436-7LA11	
	6ES5 436-7LB11	
	6ES5 436-7LC11	
Digital output modules	6ES5 441-7LA13	6ES5 441-4UA14
	6ES5 451-7LA21	6ES5 451-4UA14
	6ES5 453-7LA11	6ES5 453-4UA12
	6ES5 454-7LA12	6ES5 454-4UA14
	6ES5 454-7LB11	6ES5 455-4UA12
	6ES5 455-7LA11	6ES5 456-4UA12
	6ES5 456-7LA11	6ES5 457-4UA12
	6ES5 456-7LB11	6ES5 458-4UA13
	6ES5 457-7LA11	6ES5 458-4UC11
	6ES5 458-7LA11	
	6ES5 458-7LB11	
	6ES5 458-7LC11	
Digital input/output modules	6ES5 482-7LA11	6ES5 482-4UA20
	6ES5 482-7LF11	
	6ES5 482-7LF21	
	6ES5 482-7LF31	

Expansion rack	ER 701-2, ER 701-3	EG 183U, EG 185 U
Analog input modules	6ES5 460-7LA13	6ES5 460-4UA13
	6ES5 463-4UA12	6ES5 463-4UA13
	6ES5 463-4UB12	6ES5 465-4UA13
	6ES5 465-7LA13	6ES5 466-4UA11
	6ES5 466-4UA11	
Analog output modules	6ES5 470-7LA13	6ES5 470-4UA13
	6ES5 470-7LB13	6ES5 470-4UB13
	6ES5 470-7LC13	6ES5 470-4UC13
Interface modules	6ES5 306-7LA11	6ES5 300-3AB11
	6ES5 314-3UA11	6ES5 300-5CA11

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
Current consumption	
from backplane bus DC 5 V, max.	140 mA
Current consumption/ power loss	
Power loss, max.	700 mW
Hardware config.	
Cable length between first and last interface module, max.	5 m
Dimensions	
Dimensions	
• Width	25 mm
• Height	290 mm
• Depth	217 mm
Weights	
• 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**

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
Current consumption	
from backplane bus DC 5 V, max.	290 mA
Current consumption/ power loss	
Power loss, max.	1 450 mW
Hardware config.	
Cable length between first and last interface module, max.	5 m
Dimensions	
Dimensions	
• Width	25 mm
• Height	290 mm
• Depth	217 mm
Weights	
• 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	

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
Current consumption	
from backplane bus DC 5 V, max.	85 mA
Current consumption/ power loss	
Power loss, max.	425 mW
Hardware config.	
Cable length between first and last interface module, max.	1.5 m
Dimensions	
Dimensions	
• Width	25 mm
• Height	290 mm
• Depth	217 mm
Weights	
• 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**

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
Current consumption	
from backplane bus DC 5 V, max.	120 mA
Current consumption/ power loss	
Power loss, max.	600 mW
Hardware config.	
Cable length between first and last interface module, max.	1.5 m
Dimensions	
Dimensions	
• Width	25 mm
• Height	290 mm
• Depth	217 mm
Weights	
• 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**

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
Current consumption	
from backplane bus DC 5 V, max.	1 550 mA
Current consumption/ powerloss	
Power loss, max.	7 750 mW
Hardware config.	
Cable length between first and last interface module, max.	102 m
Dimensions	
Dimensions	
• Width	25 mm
• Height	290 mm
• Depth	217 mm
Weights	
• 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**

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
Current consumption	
from backplane bus DC 5 V, max.	620 mA
Current consumption/ power loss	
Power loss, max.	3 100 mW
Hardware config.	
Cable length between first and last interface module, max.	102 m
Dimensions	
Dimensions	
• Width	25 mm
• Height	290 mm
• Depth	217 mm
Weights	
• Weight, approx.	620 g

Ordering data

	Order No.
IM 461-3 interface module	**6ES7 461-3AA01-0AA0**
Receive 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	

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
Current consumption	
from backplane bus DC 5 V, max.	1 320 mA
Current consumption/ power loss	
Power loss, max.	6 600 mW
Hardware config.	
Cable length between first and last interface module, max.	600 m
Dimensions	
Dimensions	
• Width	25 mm
• Height	290 mm
• Depth	217 mm
Weights	
• 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	

5

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	6ES7 405-0KA02-0AA0	6ES7 405-0KR02-0AA0	6ES7 405-0RA02-0AA0
Power supply				
Input voltage				
• Rated value, DC 24 V	Yes	Yes	Yes	Yes
• Rated value, DC 48 V	Yes	Yes	Yes	Yes
• Rated value, DC 60 V	Yes	Yes	Yes	Yes
• permissible range, lower limit (DC)	19.2 V; dynamic 18.5 V	Static 19.2 V, dynamic 18.5 V	19.2 V; dynamic 18.5 V	static 19.2 V, dynamic 18.5 V
• permissible range, upper limit (DC)	72 V; dynamic 75.5 V	static 72 V, dynamic 75.5 V	72 V; dynamic 75.5 V	static: 72 V dynamic 75.5 V
Input current				
• Rated value at DC 24 V	2 A	4 A	4 A	7 A
• Rated value at DC 48 V	1 000 mA	2 A	2 A	3.2 A
• Rated value at DC 60 V	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, DC 5 V	Yes	Yes	Yes	Yes
• Rated value, DC 24 V	Yes	Yes	Yes	Yes
Output current				
• for backplane bus (DC 5 V), max.	4 A	10 A; no base load required	10 A; no base load required	20 A; no base load required
• for backplane bus (DC 24 V), max.	0.5 A	1 A; idling-proof	1 A; idling-proof	1 A; idling-proof
• Short-circuit protection	Yes	Yes	Yes	Yes
Supply voltages				
Power supply and voltage jumpering				
• Mains/voltage failure jumpering	20 ms	20 ms	20 ms	20 ms
• Mains/power failure jumper to NAMUR recommendation	Yes	Yes	Yes	Yes
Current consumption/ power loss				
Power consumption				
• Power consumption, typ.	48 W	95 W	95 W	168 W

Technical specifications (continued)

	6ES7 405-0DA02-0AA0	6ES7 405-0KA02-0AA0	6ES7 405-0KR02-0AA0	6ES7 405-0RA02-0AA0
Current consumption/ power loss				
Power loss, typ.	16 W	20 W	20 W	44 W
Backup battery				
• Backup battery (optional)	Yes; 1 x lithium AA; 3.6 V/2.3 Ah	Yes; 2 x lithium AA; 3.6 V/1.9 Ah	Yes; 2 x lithium AA; 3.6 V/2.3 Ah	Yes; 2 x lithium AA; 3.6 V/2.3 Ah
Connection point				
Connecting cables/ cross sections	3x 1.5 mm^2, solid or stranded wire with end sleeve, external diameter 3 to 9 mm	3x 1.5 mm^2, solid or stranded wire with end sleeve, external diameter 3 to 9 mm	3x 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
Isolation				
primary/secondary	Yes	Yes	Yes	Yes
EMC				
• Observance of line harmonic distortion to IEC 61000-3-2, IEC 61000-3-3			Yes	Yes
Degree of protection				
Class of protection	1; with protective conductor	1; with protective conductor	1; with protective conductor	1; with protective conductor
Standards, approvals, certificates				
FM approval	Yes; Ta: 0 to 60 °C T4	Yes; Up to 60 °C: T4	Yes; Ta: 0 to 60 °C T4	Yes; Up to 60°C: T4
Dimensions				
Required slots	1	2	2	2
Dimensions				
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
Weights				
• 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
Power supply				
Input voltage				
• Rated value, DC 24 V	Yes			
• Rated value, DC 110 V	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, DC 230 V	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, AC 120 V	Yes	Yes	Yes	Yes
• Rated value, AC 230 V	Yes	Yes	Yes	Yes
• permissible range, lower limit (AC)	85 V	85 V	85 V	85 V
• permissible range, upper limit (AC)	264 V	264 V	264 V	264 V

Technical specifications (continued)

	6ES7 407-0DA02-0AA0	6ES7 407-0KA02-0AA0	6ES7 407-0KR02-0AA0	6ES7 407-0RA02-0AA0
Power supply				
Input voltage				
• Mains frequency				
- Rated value 50 Hz	Yes	Yes	Yes	Yes
- Rated value 60 Hz	Yes	Yes	Yes	Yes
- permissible range, lower limit	47 Hz	47 Hz	47 Hz	47 Hz
- permissible range, upper limit	63 Hz	63 Hz	63 Hz	63 Hz
Input current				
• Rated value at DC 110 V	350 mA; at 120 V DC	1 A; at 120 V DC	1 A; at 120 V DC	1.4 A
• Rated value at DC 230 V	190 mA	0.5 A	0.5 A	0.7 A
• Rated value at AC 120 V	0.42 A	0.9 A	0.9 A	1.4 A
• Rated value at AC 230 V	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, DC 5 V	Yes	Yes		
• Rated value, DC 24 V	Yes	Yes		
Output current				
• for backplane bus (DC 5 V), 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 (DC 24 V), max.	0.5 A	1 A; idling-proof	1 A; idling-proof	1 A; idling-proof
• Short-circuit protection	Yes	Yes	Yes	Yes
Supply voltages				
Power supply and voltage jumpering				
• Mains/voltage failure jumpering	20 ms	20 ms	20 ms	20 ms
• Mains/power failure jumper to NAMUR recommendation	Yes	Yes	Yes	Yes
Current consumption/ power loss				
Power consumption				
• Power consumption, typ.	52 W	95 W	95 W	
Power loss, typ.	20 W	20 W	20 W	35 W
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
Connection point				
Connecting cables/cross sections	3x 1.5 mm^2, solid or stranded wire with end sleeve, external diameter 3 to 9 mm	3x 1.5 mm^2, solid or stranded wire with end sleeve, external diameter 3 to 9 mm	3x 1.5 mm^2, solid or stranded wire with end sleeve, external diameter 3 to 9 mm	3x 1.5 mm^2, solid or stranded wire with end sleeve, external diameter 3 to 9 mm
Isolation				
primary/secondary	Yes	Yes	Yes	Yes
EMC				
• Observance of line harmonic distortion to IEC 61000-3-2, IEC 61000-3-3	Yes	Yes	Yes	Yes

Technical specifications (continued)

	6ES7 407-0DA02-0AA0	6ES7 407-0KA02-0AA0	6ES7 407-0KR02-0AA0	6ES7 407-0RA02-0AA0
Degree of protection				
Class of protection	1; with protective conductor	1; with protective conductor	1; with protective conductor	1; with protective conductor
Standards, approvals, certificates				
FM approval	Yes; Ta: 0 to 60 °C T4	Yes; Ta: 0 to 60 °C T4	Yes; Ta: 0 to 60 °C T4	Yes; Ta: 0 to 60 °C T4
Dimensions				
Required slots	1	2	2	2
Dimensions				
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
Weights				
• Weight, approx.	760 g	1 200 g	1 200 g	1 300 g

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**
SIPLUS PS 405 power supply modules		
(extended temperature range and medium load)		
24 V DC; 5 V DC, 24 V DC		
10 A, wide range		**6AG1 405-0KA02-2AA0**
Power plug for PS 405		**6ES7 490-0AA00-0AA0**
Spare part		
Backup battery		**6ES7 971-0BA00**
Type AA, 1.9 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**
SIPLUS PS 407 power supply modules		
(extended temperature range and medium load)		
120/230 V AC; 5 V DC, 24 V DC		
10 A		**6AG1 407-0KA02-4AA0**
10 A, redundant	B7	**6AG1 407-0KR02-4AA0**
Power plug for PS 407		**6ES7 490-0AB00-0AA0**
Spare part		
Backup battery		**6ES7 971-0BA00**
Type AA, 1.9 Ah		

B7: Subject to export regulations: AL: N and ECCN: EAR99H

Labeling sheets

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

Technical specifications

	6ES7 492-2AX00-0AA0	6ES7 492-2BX00-0AA0	6ES7 492-2CX00-0AA0	6ES7 492-2DX00-0AA0	6ES7 492-2XX00-0AA0
Dimensions					
Weights					
• Weight, approx.	2 g	2 g	2 g	2 g	72 g

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**

	Order No.
Cover film for labeling strips	**6ES7 492-2XX00-0AA0**
10 pieces (spare part)	

Overview

Cover film for labeling strips

- Teal-colored film for covering and fixing user-created labeling strips
- On standard paper
- Spare part

Measuring range module for analog input modules

- Plug-in module for selecting the input ranges for analog modules
- 1 module for 2 inputs
- Spare part

Module slot cover

- Cover plates for unassigned slots in module mounting racks
- Spare part, 10 items

Power plug

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

Exchangeable fan

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

Exchangeable monitoring unit

- Electronic monitoring unit for the fan subassembly
- Spare part

Exchangeable power supply unit

- Power supply unit for installation in 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**