

SIMATIC S7-300

Central processing units

CPU 312C to CPU 317F-2 DP

CPU 317F-2 DP



- The failsafe CPU with a large program memory and quantity framework for demanding applications
- For configuration of a failsafe automation system for plants with increased 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
- Without additional wiring of the failsafe I/O
- 1x PROFIBUS DP master/slave interface and 1 x DP master/slave/MPI interface
- Both interfaces can be used to integrate failsafe modules
- Distributed connection of failsafe ET200S PROFIsafe I/O modules possible;
Central and distributed connection of failsafe ET200M I/O modules possible
- Central and distributed use of standard modules for non-safety-relevant applications

Micro memory card required for operation of CPU.

Technical specifications

	6ES7 312-5BD01-0AB0	6ES7 313-5BE01-0AB0	6ES7 313-6BE01-0AB0	6ES7 313-6CE01-0AB0	6ES7 314-6BF01-0AB0	6ES7 314-6CF01-0AB0
Product version						
• Associated programming package	STEP 7 as of 5.2 + SP 1	STEP 7 as of 5.2 + SP 1	STEP 7 as of 5.2 + SP 1 (for STEP 7 as of 5.1 + SP 3 please use previous CPU version)	STEP 7 as of 5.2 + SP 1 (for STEP 7 as of 5.1 + SP 3 please use previous CPU version)	STEP 7 as of 5.2 + SP 1 (for STEP 7 as of 5.1 + SP 3 please use previous CPU version)	STEP 7 as of 5.2 + SP 1 (for STEP 7 as of 5.1 + SP 3 please use previous CPU version)
Supply voltages						
Rated value						
- 24 V DC	Yes	Yes	Yes	Yes	Yes	Yes
- permissible range, lower limit (DC)	20.4 V	20.4 V	20.4 V	20.4 V	20.4 V	20.4 V
- permissible range, upper limit (DC)	28.8 V	28.8 V	28.8 V	28.8 V	28.8 V	28.8 V
Current consumption						
• Inrush current, typ.	11 A	11 A	11 A	11 A	11 A	11 A
• from supply voltage L+, max.	500 mA	700 mA	700 mA	900 mA	800 mA	1,000 mA
• Power dissipation, typical	6 W	14 W	10 W	10 W	14 W	14 W
Memory/backup						
Memory						
• Working memory						
- integral	16 KByte; for program and data	32 KByte; for program and data	32 KByte; for program and data	32 KByte; for program and data	48 KByte; for program and data	48 KByte; for program and data
- expandable	No	No	No	No	No	No
• Load memory						
- pluggable (MMC)	Yes	Yes	Yes	Yes	Yes	Yes
- pluggable (MMC), max.	4 MByte	8 MByte	8 MByte	8 MByte	8 MByte	8 MByte
Backup						
- available	Yes; guaranteed by MMC (maintenance-free)	Yes; guaranteed by MMC (maintenance-free)	Yes; guaranteed by MMC (maintenance-free)	Yes; guaranteed by MMC (maintenance-free)	Yes; guaranteed by MMC (maintenance-free)	Yes; guaranteed by MMC (maintenance-free)
- without battery	Yes; Program and data	Yes; Program and data	Yes; Program and data	Yes; Program and data	Yes; Program and data	Yes; Program and data

Technical specifications (continued)

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CPU/blocks						
DB						
- Number, max.	511; DB 0 reserved	511; DB 0 reserved	511; DB 0 reserved	511; DB 0 reserved	511; DB 0 reserved	511; DB 0 reserved
- Size, max.	16 KByte	16 KByte	16 KByte	16 KByte	16 KByte	16 KByte
FB						
- Number, max.	512; from FB 0 to FB 511	512; from FB 0 to FB 511	512; from FB 0 to FB 511	512	512	512
- Size, max.	16 KByte	16 KByte	16 KByte	16 KByte	16 KByte	16 KByte
FC						
- Number, max.	512; from FC 0 to FC 511	512; from FC 0 to FC 511	512; from FC 0 to FC 511	512	512	512
- Size, max.	16 KByte	16 KByte	16 KByte	16 KByte	16 KByte	16 KByte
OB						
- Number, max.	See instruction list	See instruction list	See instruction list	See instruction list	See instruction list	See instruction list
- Size, max.	16 KByte	16 KByte	16 KByte	16 KByte	16 KByte	16 KByte
Nesting depth						
- per priority class	8	8	8	8	8	8
- additional levels within an error OB	4	4	4	4	4	4
CPU/processing times						
•for bit instruction, min.	0.2 µs	0.1 µs	0.1 µs	0.1 µs	0.1 µs	0.1 µs
•for word instruction, min.	0.4 µs	0.2 µs	0.2 µs	0.2 µs	0.2 µs	0.2 µs
•for integer math, min.	5 µs	2 µs	2 µs	2 µs	2 µs	2 µs
•for floating-point math, min.	6 µs	3 µs	3 µs	3 µs	3 µs	3 µs
Timers/counters and their retentive characteristics						
S7 counter						
- Number	128	256	256	256	256	256
•of which retentive without battery						
- adjustable	Yes	Yes	Yes	Yes	Yes	Yes
- lower limit	0	0	0	0	0	0
- upper limit	128	256	256	256	256	256
•Retentivity					Yes	
- adjustable						
•Counting range						
- lower limit	0	0	0	0	0	0
- upper limit	999	999	999	999	999	999
IEC counter						
- available	Yes	Yes	Yes	Yes	Yes	Yes
- Type	SFB	SFB	SFB	SFB	SFB	SFB
S7 times						
- Number	128	256	256	256	256	256
•Retentivity						
- adjustable	Yes	Yes	Yes	Yes	Yes	Yes
- lower limit	0	0	0	0	0	0
- upper limit	128	256	256	256	256	256
- preset	No retention	No retention	No retention	No retention	No retention	No retention
•Timing range						
- lower limit	10 ms	10 ms	10 ms	10 ms	10 ms	10 ms
- upper limit	9,990 s	9,990 s	9,990 s	9,990 s	9,990 s	9,990 s
IEC timer						
- available	Yes	Yes	Yes	Yes	Yes	Yes
- Type	SFB	SFB	SFB	SFB	SFB	SFB

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Data areas and their retentive characteristics						
Flags						
- Number	128 Byte	256 Byte	256 Byte	256 Byte	256 Byte	256 Byte
- adjustable retentivity	Yes; MB 0 to MB 127	Yes; MB 0 to MB 255	Yes; MB 0 to MB 255	Yes; MB 0 to MB 255	Yes; MB 0 to MB 255	Yes; MB 0 to MB 255
- Number of clock memories	8; 1 memory byte	8; 1 memory byte	8; 1 memory byte	8	8	8
Data blocks						
- Number, max.	511; from DB 1 to DB 511	511; from DB 1 to DB 511	511; from DB 1 to DB 511	511	511	511
- Size, max.	16 KByte	16 KByte	16 KByte	16 KByte	16 KByte	16 KByte
Local data						
- per priority class, max.	256 Byte	510 Byte	510 Byte		510 Byte	510 Byte
Address area						
I/O address area						
- Inputs	1 KByte	1 KByte	1 KByte	1 KByte	1 KByte	1 KByte
- Outputs	1 KByte	1 KByte	1 KByte	1 KByte	1 KByte	1 KByte
Process image						
- Inputs	128 Byte	128 Byte	128 Byte	128 Byte	128 Byte	128 Byte
- Outputs	128 Byte	128 Byte	128 Byte	128 Byte	128 Byte	128 Byte
Digital channels						
- Inputs	256	992	1.008	8.192	992	992
- Outputs	256	992	1.008	8.192	992	992
- Inputs, of which central	256	992	992	992	992	992
- Outputs, of which central	256	992	992	992	992	992
Analog channels						
- Inputs	64	248	248	248	253	512
- Outputs	32	124	124	124	124	124
- Inputs, of which central		248	248	248	248	248
- Outputs, of which central		248	248	248	248	248
Configuration						
• Central units, max.	1	1	1	1	1	1
• Expansion units, max.	0	3	3	3	3	3
• Racks, max.	1	4	4	4	4	4
• Modules per rack, max.	8	8; in rack 3 max. 7	8; in rack 3 max. 7	8; in rack 3 max. 7	8; in rack 3 max. 7	8; in rack 3 max. 7
Number of DP masters						
- integral	No	No	No	1		1
- via CP	1	2	1	1	1	1
Number of FMs and CPs that can be operated (recommendation)						
- FM	8	8	8	8	8	8
- CP, point-to-point	8	8	8	8	8	8
- CP, LAN	4	6	6	6	10	10

Technical specifications (continued)

	6ES7 312-5BD01-0AB0	6ES7 313-5BE01-0AB0	6ES7 313-6BE01-0AB0	6ES7 313-6CE01-0AB0	6ES7 314-6BF01-0AB0	6ES7 314-6CF01-0AB0
Time						
Clock						
- Hardware clock (realtime clock)		Yes	Yes	Yes	Yes	Yes
- Software clock	Yes					
- buffered	No	Yes	Yes	Yes	Yes	Yes
- Deviation per day, max		10 s	10 s	10 s	10 s	10 s
Run-time meter						
- Quantity	1	1	1	1	1	1
- Number	0	0	0	0	0	0
- Range of values	2 ³¹ hours (when using SFC 101)	2 ³¹ hours (when using SFC 101)	2 ³¹ hours (when using SFC 101)	2 ³¹ hours (when using SFC 101)	2 ³¹ hours (when using SFC 101)	2 ³¹ hours (when using SFC 101)
- Granularity	1 hour	1 hour	1 hour	1 hour	1 hour	1 hour
- retentive	Yes; must be restarted on each complete restart	Yes; must be restarted on each complete restart	Yes; must be restarted on each complete restart	Yes	Yes	Yes
Time synchronization						
- supported	Yes	Yes	Yes	Yes	Yes	Yes
- on MPI, master	Yes	Yes	Yes	Yes	Yes	Yes
- on MPI, slave	Yes	Yes	Yes	Yes	Yes	Yes
- in AS, master	Yes	Yes	Yes	Yes	Yes	Yes
S7 message functions						
•Number of stations that can log on for message functions, max.	6; depending on the connections configured for PG/OP and S7 basic communication	8; depending on the connections configured for PG/OP and S7 basic communication	8; depending on the connections configured for PG/OP and S7 basic communication	8	12	12
•Process diagnostic messages	Yes	Yes	Yes	Yes	Yes	Yes
•simultaneously active Alarm-S blocks, max.	20	20	20	20	40	40
Test and startup functions						
Status/modify						
- Variable	Yes	Yes	Yes	Yes	Yes	Yes
- Variables	Inputs, outputs, flags, DB, timers, counters	Inputs, outputs, flags, DB, timers, counters	Inputs, outputs, flags, DB, timers, counters	Inputs, outputs, flags, DB, timers, counters	Inputs, outputs, flags, DB, timers, counters	Inputs, outputs, flags, DB, timers, counters
- Number of variables, max.	30	30	30	30	30	30
- of which status variables, max.	30	30	30	30	30	30
- of which modify variables, max.	14	14	14	14	14	14
Forcing						
- Forcing	Yes	Yes	Yes	Yes	Yes	Yes
- Forcing, variables	Inputs, outputs	Inputs, outputs	Inputs, outputs	Inputs, outputs	Inputs, outputs	Inputs, outputs
- Forcing, number of variables, max.	10	10	10	10	10	10
•Status block	Yes	Yes	Yes	Yes	Yes	Yes
•Single step	Yes	Yes	Yes	Yes	Yes	Yes
•Number of breakpoints	2	2	2	2	2	2

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Communication functions						
•PG/OP communication	Yes	Yes	Yes	Yes	Yes	Yes
•Routing						Yes
Global data communication						
- supported	Yes	Yes	Yes	Yes	Yes	Yes
- Size of GD packets, max.	22 Byte	22 Byte	22 Byte	22 Byte	22 Byte	22 Byte
S7 basic communication						
- supported	Yes	Yes	Yes; Server	Yes	Yes	Yes
S7 communication						
- supported	Yes	Yes	Yes	Yes	Yes	Yes
S5 compatible communication						
- supported	Yes; via CP and loadable FC	Yes; via CP and loadable FC	Yes; via CP and loadable FC	Yes	Yes	Yes
Number of connections						
- overall	6	8	8	8	12	12
- usable for PG communication	5	7	7	7	11	11
- usable for OP communication	5	7	7	7	11	11
- usable for S7 basic communication	2	4	4	4	8	8
- usable for routing	No	No	No	4		4
Connection system						
•Requisite front connector	1 x 40-pin	2 x 40 pin	1 x 40-pin	1 x 40-pin	2 x 40 pin	2 x 40 pin
MPI						
•Length of cable, max.	50 m; without repeaters	50 m; without repeaters	50 m; without repeaters	50 m; without repeaters	50 m; without repeaters	50 m; without repeaters
Point-to-point						
•Length of cable, max.			1.200 m		1.200 m	
Integral protocol driver						
- 3964 (R)			Yes		Yes	
- ASCII			Yes		Yes	
- RK512					Yes	
Transmission rate, RS 422/485						
- 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 RK 512 protocol, max.					19.2 kBit/s	
•Type of interface	integrated RS 485 interface	integrated RS 485 interface	integrated RS 485 interface	integrated RS 485 interface	Integral RS 485 interface	integrated RS 485 interface
•Physical	RS 485	RS 485	RS 485	RS 485	RS 485	RS 485
•Isolated	No	No	No	Yes	No	No
•Power supply to interface (15 to 30 V DC), max.	200 mA	200 mA	200 mA	200 mA	200 mA	200 mA

Technical specifications (continued)

	6ES7 312-5BD01-0AB0	6ES7 313-5BE01-0AB0	6ES7 313-6BE01-0AB0	6ES7 313-6CE01-0AB0	6ES7 314-6BF01-0AB0	6ES7 314-6CF01-0AB0
1st interface						
Functionality						
- MPI	Yes	Yes	Yes	Yes	Yes	Yes
- DP master	No	No	No	No	No	No
- DP slave	No	No	No	No	No	No
- Point-to-point connection	No	No	No	No	No	No
MPI						
- Number of connections	6	8	8	8	12	12
•Services						
- PG/OP communication	Yes	Yes	Yes	Yes	Yes	Yes
- Routing	No	No	No	Yes	No	Yes
- Global data communication	Yes	Yes	Yes	Yes	Yes	Yes
- S7 basic communication	Yes	Yes	Yes	Yes	Yes	Yes
- S7 communication	Yes	Yes	Yes	Yes	Yes	Yes
- S7 communication, as client	No	No; via CP and loadable FB	No; via CP and loadable FB	No	No	No
- S7 communication, as server	Yes	Yes	Yes	Yes	Yes	Yes
- Transmission rates, max.	187.5 kBit/s	187.5 kBit/s	187.5 kBit/s	187.5 kBit/s	187. kBit/s	187.5 kBit/s
2nd interface						
•Type of interface			integrated RS 422/ 485 interface	integrated RS 485 interface	integrated RS 422/ 485 interface	integrated RS 485 interface
•Physical			RS 422/ RS 485 (X.27)	RS 485	RS 422/ RS 485 (X.27)	RS 485
•Isolated			Yes	Yes	Yes	Yes
•Power supply to interface (15 to 30 V DC), max.			No	200 mA		200 mA
Functionality						
- MPI			No	No	No	No
- DP master			No	Yes	No	Yes
- DP slave			No	Yes	No	Yes
- Point-to-point connection			Yes	No	Yes	No
DP master						
- Number of connections, max.				8; for PG/OP communication		12; for PG/OP communication
- 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
- Routing				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				Yes		Yes
- SYNC/FREEZE				Yes		Yes
- Activate/deactivate DP slaves				Yes		Yes
- Direct data exchange (lateral communication)				Yes		Yes
- DPV1				Yes		Yes
- Transmission rates, max.			-	12 Mbit/s		12 Mbit/s
- Number of DP slaves, max.			-	32		32

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2nd interface (continued)						
- Address area - Inputs, max. - Outputs, max. - User data per DP Slave - Inputs, max. - Outputs, max.				1 KByte 1 KByte 244 Byte 244 Byte		1 KByte 1 KByte 244 Byte 244 Byte
DP slave Number of connections			-	8		12
- Services - PG/OP communication - Routing - Global data communication - S7 basic communication - Direct data exchange (lateral communication) - DPV1 - GSD file				Yes Yes No No Yes No Current GSD - The file is available at http://www.ad.siemens.com/support under Product Support	-	Yes Yes No No Yes No Current GSD - The file is available at http://www.ad.siemens.com/support under Product Support
- Transmission rates, max. - Automatic baud rates search			-	12 kBit/s Yes		12 kBit/s Yes
- Intermediate memory - Inputs - Outputs - Address areas, max. - User data per address area, max.				244 Byte 244 Byte 32 32 Byte		244 Byte 244 Byte 32 32 Byte
Point-to-point coupling Transmission rates, max.			38.4 kBaud half duplex 19.2 kBaud full duplex		38.4 kBit/s	
Length of cable, max.			1,200 m		1,200 m	
Controllable interface from the user program			Yes		Yes	
Interface can activate alarm/interrupt in the user program			Yes; Message for Break ID		Yes	
Protocol driver			3964 (R); ASCII		3964 (R); ASCII and RK 512	

Technical specifications (continued)

	6ES7 312-5BD01-0AB0	6ES7 313-5BE01-0AB0	6ES7 313-6BE01-0AB0	6ES7 313-6CE01-0AB0	6ES7 314-6BF01-0AB0	6ES7 314-6CF01-0AB0
CPU/ programming						
Programming language						
- STEP 7	Yes; V5.1 SP2	Yes; V5.1 SP2	Yes; V5.1 SP2	Yes; V5.1 SP2	Yes; V5.1 SP2	Yes; V5.1 SP2
- LAD	Yes	Yes	Yes	Yes	Yes	Yes
- FBD	Yes	Yes	Yes	Yes	Yes	Yes
- STL	Yes	Yes	Yes	Yes	Yes	Yes
- SCL	Yes	Yes	Yes	Yes	Yes	Yes
- CFC					Yes	Yes
- GRAPH	Yes	Yes	Yes	Yes	Yes	Yes
- HiGraph®	Yes	Yes	Yes	Yes	Yes	Yes
Software library						
• Instruction set	See instruction list	See instruction list	See instruction list	See instruction list	See instruction list	See instruction list
• Bracket levels	8	8	8	8	8	8
• User program protection/ password protection	Yes	Yes	Yes	Yes	Yes	Yes
• System functions (SFC)	See instruction list	See instruction list	See instruction list	See instruction list	See instruction list	See instruction list
• System function blocks (SFB)	See instruction list	See instruction list	See instruction list	See instruction list	See instruction list	See instruction list
Digital inputs						
• Number of digital inputs	10	24	16	16	24	24
Length of cable						
- Length of cable shielded, max.	1,000 m; 100 m for technological functions	1,000 m; 100 m for technological functions	1,000 m; 100 m for technological functions	1,000 m; 100 m for technological functions	1,000 m; 100 m for technological functions	1,000 m; 100 m for technological functions
- Length of cable unshielded, max.	600 m	600 m	600 m	600 m	600 m	600 m
Input voltage						
- Rated value, DC	24 V	24 V	24 V	24 V	24 V	24 V
- for signal "0"	-3 to 5 V	-3 to 5 V	-3 to 5 V	-3 to 5 V	-3 to 5 V	-3 to 5 V
- for signal "1"	15 to 30 V	15 to 30 V	15 to 30 V	15 to 30 V	15 to 30 V	15 to 30 V
Input current						
- for 1 signal, typical	8 mA	8 mA	8 mA	8 mA	8 mA	8 mA
Input delay (at rated value of the input voltage)						
• For standard inputs						
- Parameterizable	Yes; 0, 1 / 0, 3 / 3 / 15 ms	Yes; 0, 1 / 0, 3 / 3 / 15 ms	Yes; 0, 1 / 0, 3 / 3 / 15 ms	Yes; 0, 1 / 0, 3 / 3 / 15 ms	Yes; 0, 1 / 0, 3 / 3 / 15 ms	Yes; 0, 1 / 0, 3 / 3 / 15 ms
• for counters/technological functions						
- at 0 to 1, max.	50 µs	16 µs	8 µs	8 µs	8 µs	8 µs

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Digital outputs						
• Number of digital outputs	6	16	16	16	16	16
• Length of cable shielded, max.	1,000 m	1,000 m	1,000 m	1,000 m	1,000 m	1,000 m
• Length of cable unshielded, max.	600 m	600 m	600 m	600 m	600 m	600 m
• Short-circuit protection of the output	Yes; clocking electronically	Yes; clocking electronically	Yes; clocking electronically	Yes; clocking electronically	Yes; clocking electronically	Yes; clocking electronically
• Limitation of voltage induced on circuit interruption to	L+ (-48 V)	L+ (-48 V)	L+ (-48 V)	L+ (-48 V)	L+ (-48 V)	L+ (-48 V)
Output voltage - for 1 signal	L+ (-0.8 V)	L+ (-0.8 V)	L+ (-0.8 V)	L+ (-0.8 V)	L+ (-0.8 V)	L+ (-0.8 V)
Output current						
- for 1 signal permissible range for 0 to 40 °C, max.	500 mA	500 mA	500 mA	500 mA	500 mA	500 mA
- for 1 signal permissible range for 0 to 60 °C, max.	500 mA	500 mA	500 mA	500 mA	500 mA	500 mA
- for 1 signal minimum load current	5 mA	5 mA	5 mA	5 mA	5 mA	5 mA
- for 0 signal residual current, max.	0.5 mA	0.5 mA	0.5 mA	0.5 mA	0.5 mA	0.5 mA
Switching frequency						
- at resistive load, max.	100 Hz	100 Hz	100 Hz	100 Hz	100 Hz	100 Hz
- at inductive load, max.	0.5 Hz	0.5 Hz	0.5 Hz	0.5 Hz	0.5 Hz	0.5 Hz
Summation current of the outputs (per group)						
• horizontal mounting positions						
- up to 40 °C, max.	3 A	8 A	8 A	8 A	8 A	8 A
- up to 60 °C, max.	1.5 A	4 A	4 A	4 A	4 A	4 A
Analog inputs						
• Number of analog inputs for voltage/current measurement		4			4	4
• Number of analog inputs for resistance/temperature measurement		1			1	1
• Technical unit for temperature measurement, adjustable		Yes			Yes	Yes
Input ranges (rated values), voltages						
- 0 to +10 V		Yes			Yes	Yes
- -10 V to +10 V		Yes			Yes	Yes
Input ranges (rated values), currents						
- 0 to 20 mA		Yes			Yes	Yes
- -20 to +20 mA		Yes			Yes	Yes
- 4 to 20 mA		Yes			Yes	Yes
Input ranges (rated values), resistances						
- 0 to 600 ohms		Yes			Yes	Yes
Input ranges (rated values), resistance thermometer						
- Pt 100		Yes			Yes	Yes

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Analog outputs						
•Number of analog outputs		2			2	2
Output ranges, voltage						
- 0 to 10 V		Yes			Yes	Yes
- -10 to +10 V		Yes			Yes	Yes
Output ranges, current						
- 0 to 20 mA		Yes			Yes	Yes
- -20 to +20 mA		Yes			Yes	Yes
- 4 to 20 mA		Yes			Yes	Yes
Analog value formation						
Integration and conversion time/triggering per channel						
- with over-range (bits incl. sign), max.		12 Bit			12 Bit	12 Bit
- Integration time parameterizable		Yes; 2.5 / 16.6 / 20 ms			Yes; 2.5 / 16.6 / 20 ms	Yes; 2.5 / 16.6 / 20 ms
- Conversion time (per channel)		1 ms			1 ms	1 ms
Sensor						
Connectable encoders						
- 2-wire BEROs	Yes	Yes	Yes	Yes	Yes	Yes
- permissible closed-circuit current (2-wire BEROs), max.	1.5 mA	1.5 mA	1.5 mA	1.5 mA	1.5 mA	1.5 mA
Error/accuracies						
Basic error limit (operational limit at 25 °C)						
- relative to the output range, voltage		+/- 0.7 %			+/- 0.7 %	+/- 0.7 %
- relative to the output range, current		+/- 0.7 %			+/- 0.7 %	+/- 0.7 %
- relative to the input range, voltage		+/- 0.7 %			+/- 0.7 %	+/- 0.7 %
- relative to the input range, current		+/- 0.7 %			+/- 0.7 %	+/- 0.7 %
- relative to the input range, resistance		+/- 3 %			+/- 3 %	+/- 3 %
- relative to the input range, resistance thermometer		+/- 3 %			+/- 3 %	+/- 3 %
Integral functions						
•Number of counters	2; 2 channels (see "Technological Functions" manual)	3; 3 channels (see "Technological Functions" manual)	3; 3 channels (see "Technological Functions" manual)	3	4	4
•Count frequency (counters) max.	10 kHz	30 kHz	30 kHz	30 kHz	60 kHz	60 kHz
•Frequency measurement	Yes	Yes	Yes	Yes	Yes	Yes
•Controlled positioning	No	No	No	No	Yes	Yes
•PID controller	No	Yes	Yes	Yes	Yes	Yes
•Number of pulse outputs	2; 2 channels pulse width modulation up to max. 2.5 kHz (see "Technological Functions" manual)	3; 3 channels pulse width modulation up to max. 2.5 kHz (see "Technological Functions" manual)	3; 3 channels pulse width modulation up to max. 2.5 kHz (see "Technological Functions" manual)	3	4	4
•Cut-off frequency (pulse)	2.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz

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Central processing units

CPU 312C to CPU 317F-2 DP

Technical specifications (continued)

	6ES7 312-5BD01-0AB0	6ES7 313-5BE01-0AB0	6ES7 313-6BE01-0AB0	6ES7 313-6CE01-0AB0	6ES7 314-6BF01-0AB0	6ES7 314-6CF01-0AB0
Potentials/ electrical isolation						
Analog output functions						
- Electrical isolation, analog output functions		Yes; common for analog I/O			Yes; common for analog I/O	Yes; common for analog I/O
- between the channels and the backplane bus		Yes			Yes	Yes
Analog input functions						
- Electrical isolation, analog inputs		Yes; common for analog I/O			Yes; common for analog I/O	Yes; common for analog I/O
- between the channels and the backplane bus		Yes			Yes	Yes
Digital output functions						
- Electrical isolation, digital output functions	Yes	Yes	Yes	Yes	Yes	Yes
- between the channels, in groups of	6	8	8	8	8	8
- between the channels and the backplane bus	Yes	Yes	Yes	Yes	Yes	Yes
Digital input functions						
- Electrical isolation, digital input functions	Yes	Yes	Yes	Yes	Yes	Yes
- between the channels, in groups of	10	16; and 8	16	16	16	16
- between the channels and the backplane bus	Yes	Yes	Yes	Yes	Yes	Yes
Dimensions and weight						
•Weight, approx.	409 g	660 g	566 g	566 g	676 g	676 g
•Width	80 mm	120 mm	120 mm	120 mm	120 mm	120 mm
•Height	125 mm	125 mm	125 mm	125 mm	125 mm	125 mm
•Depth	130 mm	130 mm	130 mm	130 mm	130 mm	130 mm

Technical specifications (continued)

	6ES7 312-1AD10-0AB0	6ES7 314-1AF10-0AB0	6ES7 315-2AG10-0AB0	6ES7 317-2AJ10-0AB0	6ES7 318-2AJ00-0AB0
Product version					
•Associated programming package	STEP 7 as of 5.1 + SP 4	STEP 7 as of 5.1 + SP 4	STEP 7 as of 5.1 + SP 4	STEP 7 as of 5.2 + SP 1	STEP 7 V 5.1 + Service Pack 02
Supply voltages					
Rated value					
- 24 V DC	Yes	Yes	Yes	Yes	Yes
- permissible range, lower limit (DC)	20.4 V	20.4 V	20.4 V	20.4 V	20.4 V
- permissible range, upper limit (DC)	28.8 V	28.8 V	28.8 V	28.8 V	28.8 V
Voltages and currents					
•External fusing for supply lines (recommendation)	Min. 2 A	Min. 2 A	Min. 2 A	Min. 2 A	LS switch; 2 A, Type B or C
Current consumption					
•Inrush current, max.					12 A
•Inrush current, typ.	2.5 A	2.5 A	2.5 A	2.5 A	8 A
•I _q	0.5 A²s	0.5 A²s	0.5 A²s	1 A²s	
•from supply voltage L+, max.	600 mA	600 mA	800 mA		
•Power dissipation, typical	2.5 W	2.5 W	2.5 W	4 W	12 W
Memory/backup					
Memory					
•Working memory					
- integral	16 KByte	48 KByte	128 KByte	512 KByte	512 KByte
- expandable	No	No	No	No	
•Load memory					
- pluggable (MMC)	Yes	Yes	Yes	Yes	
- pluggable (MMC), max.	4 MByte	8 MByte	8 MByte	8 MByte	
- expandable FEPR0M					Yes
- expandable FEPR0M, max.					4 MByte
- integral RAM, max.					64 KByte
- expandable RAM					Yes
- expandable RAM, max					2 MByte
Backup					
- available	Yes; guaranteed by MMC (maintenance-free)	Yes; guaranteed by MMC (maintenance-free)	Yes; guaranteed by MMC (maintenance-free)	Yes; guaranteed by MMC (maintenance-free)	Yes
- with battery					Yes; all blocks
- without battery					Yes; 11 KByte

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Central processing units

CPU 312C to CPU 317F-2 DP

Technical specifications (continued)

	6ES7 312-1AD10-0AB0	6ES7 314-1AF10-0AB0	6ES7 315-2AG10-0AB0	6ES7 317-2AJ10-0AB0	6ES7 318-2AJ00-0AB0
CPU/blocks					
DB					
- Number, max.	511; DB 0 reserved	511; DB 0 reserved	1.024; DB 0 reserved	2.047; DB 0 reserved	2.047; DB0 reserved
- Size, max.	16 KByte	16 KByte	16 KByte	64 KByte	64 KByte
FB					
- Number, max.	512; see instruction list	512; see instruction list	2.048; see instruction list	2.048; see instruction list	1.024; see instruction list
- Size, max.	16 KByte	16 KByte	16 KByte	64 KByte	64 KByte
FC					
- Number, max.	512; see instruction list	512; see instruction list	2.048; see instruction list	2.048; see instruction list	1.024; see instruction list
- Size, max.	16 KByte	16 KByte	16 KByte	64 KByte	64 KByte
OB					
- Number, max.	see instruction list	see instruction list	see instruction list		see instruction list
- Size, max.	16 KByte	16 KByte	16 KByte	64 KByte	64 KByte
Nesting depth					
- per priority class	8	8	8	16	16
- additional levels within an error OB	4	4	4	4	3
CPU/processing times					
•for bit instruction, min.	0.2 µs	0.1 µs	0.1 µs	0.05 µs	0.1 µs
•for word instruction, min.	0.4 µs	0.2 µs	0.2 µs	0.2 µs	0.1 µs
•for integer math, min.	5 µs	2 µs	2 µs	0.2 µs	0.1 µs
•for floating-point math, min.	6 µs	3 µs	3 µs	1 µs	0.6 µs
•for timing/counting instructions, min.					0.1 µs
Timers/counters and their retentive characteristics					
S7 counter					
- Number	128	256	256	512	512
•of which retentive without battery					
- adjustable	Yes	Yes	Yes	Yes	Yes
•Retentivity					
- adjustable		Yes	Yes	Yes	
•Counting range					
- adjustable	Yes	Yes	Yes	Yes	
- lower limit	0	0	0	0	0
- upper limit	999	999	999	999	999
IEC counter					
- available	Yes	Yes	Yes	Yes	Yes
- Type	SFB, unlimited quantity (only lim- ited by working memory)	SFB, unlimited quantity (only lim- ited by working memory)	SFB, unlimited quantity (only lim- ited by working memory)	SFB, unlimited quantity (only lim- ited by working memory)	SFB, unlimited quantity (only lim- ited by working memory)
S7 times					
- Number	128	256	256	512	512
•Retentivity					
- adjustable	Yes	Yes	Yes	Yes	Yes
- preset	No retention	No retention	No retention	No retention	No timers retentive
•Timing range					
- lower limit	10 ms	10 ms	10 ms	10 ms	10 ms
- upper limit	9,990 s	9,990 s	9,990 s	9,990 s	9,990 s
IEC timer					
- available	Yes	Yes	Yes	Yes	Yes
- Type	SFB, unlimited quantity (only lim- ited by working memory)	SFB, unlimited quantity (only lim- ited by working memory)	SFB, unlimited quantity (only lim- ited by working memory)	SFB, unlimited quantity (only lim- ited by working memory)	SFB, unlimited quantity (only lim- ited by working memory)

Technical specifications (continued)

	6ES7 312-1AD10-0AB0	6ES7 314-1AF10-0AB0	6ES7 315-2AG10-0AB0	6ES7 317-2AJ10-0AB0	6ES7 318-2AJ00-0AB0
Data areas and their retentive characteristics					
Flags					
- Number	128 Byte	256 Byte	2,048 Byte	4,096 Byte	8 MByte
- adjustable retentivity	Yes; MB 0 to MB 127	Yes; MB 0 to MB 255	Yes; MB 0 to MB 2047	Yes; MB 0 to MB 4095	Yes; MB 0 to MB 1023
- Number of clock memories	8; 1 memory byte	8; 1 memory byte	8; 1 memory byte	8; 1 memory byte	8; 1 memory byte
Data blocks					
- Number, max.	511; from DB 1 to DB 511	511; from DB 1 to DB 511	1,023; from DB 1 to DB 1023	2,047; from DB 1 to DB 2047	2,047
- Size, max.	16 KByte	16 KByte	16 KByte; Local data size: max. 1024 bytes per sequence level/ 510 bytes per block	64 KByte	64 KByte
- adjustable retentivity				Non-Retain support (adjustable retentivity)	
Local data					
- adjustable, max.					8.192 Byte
- preset					3.584 Byte
- per priority class, max.	256 Byte	510 Byte	128 Byte	1.024 Byte	8.192 Byte
Address area					
I/O address area					
- Inputs	1 KByte	1 KByte	2 KByte	8 KByte	8 KByte
- Outputs	1 KByte	1 KByte	2 KByte	8 KByte	8 KByte
• of which distributed					
- Inputs			2 KByte	8.192 Byte	8 KByte
- Outputs			2 KByte	8.192 Byte	8 KByte
Process image					
- Inputs	128 Byte	128 Byte	128 Byte	256 Byte	2.048 Byte
- Outputs	128 Byte	128 Byte	128 Byte	256 Byte	2.048 Byte
- Inputs, preset					256 Byte
- Outputs, preset					256 Byte
Digital channels					
- Inputs	256	1,024	16,384	65,536	65,536
- Outputs	256	1,024	16,384	65,536	65,536
- Inputs, of which central	256	1,024	1,024	1,024	1,024
- Outputs, of which central	256	1,024	1,024	1,024	1,024
Analog channels					
- Inputs	64	256	1,024	4,096	4,096
- Outputs	64	256	1,024	4,096	4,096
- Inputs, of which central	64	256	256	256	256
- Outputs, of which central	64	256	256	256	128
Configuration					
• Central units, max.					1
• Expansion units, max.					3
• Racks, max.	1	4	4	4	4
• Modules per rack, max.	8	8	8	8	8
Number of DP masters					
- integral	0	0	1	2	2
- via CP	1	1	1	2	2; CP 342-5
Number of FMs and CPs that can be operated (recommendation)					
- FM	8	8	8	8	16
- CP, point-to-point	8	8	8	8	8
- CP, LAN	4	10	10	10	16

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Central processing units

CPU 312C to CPU 317F-2 DP

Technical specifications (continued)

	6ES7 312-1AD10-0AB0	6ES7 314-1AF10-0AB0	6ES7 315-2AG10-0AB0	6ES7 317-2AJ10-0AB0	6ES7 318-2AJ00-0AB0
Time					
Clock					
- Hardware clock (realtime clock)		Yes	Yes	Yes	Yes
- Software clock	Yes				
- buffered	No	Yes	Yes	Yes	Yes
- Deviation per day, max	15 s	10 s	10 s	10 s	10 s
Run-time meter					
- Quantity	1	1	1	4	8
- Number	0	0	0	0 to 3	0 to 7
- Range of values	0 to 2 ³¹ hours (when using SFC 101)	0 to 2 ³¹ hours (when using SFC 101)	0 to 2 ³¹ hours (when using SFC 101)	0 to 2 ³¹ hours (when using SFC 101)	0 to 32767 hours
- Granularity	1 hour	1 hour	1 hour	1 hour	1 hour
- retentive	Yes; must be restarted on each complete restart	Yes; must be restarted on each complete restart	Yes; must be restarted on each complete restart	Yes; must be restarted on each complete restart	Yes
Time synchronization					
- supported	Yes	Yes	Yes	Yes	Yes
- on MPI, master	Yes	Yes	Yes	Yes	Yes
- on MPI, slave	Yes	Yes	Yes	Yes	Yes
- in AS, master	Yes	Yes	Yes	Yes	Yes
- in AS, slave				Yes	Yes
S7 message functions					
•Number of stations that can log on for message functions, max.	6; depending on the connections configured for PG/OP and S7 basic communication	12; depending on the connections configured for PG/OP and S7 basic communication	16; depending on the connections configured for PG/OP and S7 basic communication	32; depending on the connections configured for PG/OP and S7 basic communication	
•Process diagnostic messages	Yes	Yes	Yes	Yes	Yes
•simultaneously active Alarm-S blocks, max.	20	40	40	60	100
Test and startup functions					
Status/modify					
- Variable	Yes	Yes	Yes	Yes	Yes
- Variables	Inputs, outputs, flags, DB, timers, counters	Inputs, outputs, flags, DB, timers, counters	Inputs, outputs, flags, DB, timers, counters	Inputs, outputs, flags, DB, timers, counters	Inputs, outputs, flags, DB, timers, counters
- Number of variables, max.	30	30	30	30	70
- of which status variables, max.	30	30	30	30	
- of which modify variables, max.	14	14	40	14	
Forcing					
- Forcing	Yes	Yes	Yes	Yes	Yes
- Forcing, variables	Inputs, outputs	Inputs, outputs	Inputs, outputs	Inputs, outputs	Inputs, outputs, memory markers, distributed inputs, distributed outputs
- Forcing, number of variables, max.	10	10	10	10	256
•Status block	Yes	Yes	Yes	Yes	Yes
•Single step	Yes	Yes	Yes	Yes	Yes
•Number of breakpoints	2	2	2	2	4
Diagnostic buffer					
- available	Yes	Yes	Yes	Yes	Yes
- Number of inputs, max.	100	100	200	100	100
- adjustable	No	No	No	No	No

Technical specifications (continued)

	6ES7 312-1AD10-0AB0	6ES7 314-1AF10-0AB0	6ES7 315-2AG10-0AB0	6ES7 317-2AJ10-0AB0	6ES7 318-2AJ00-0AB0
Communication functions					
•PG/OP communication	Yes	Yes	Yes	Yes	Yes
•Routing	No	No	Yes	Yes	Yes
Global data communication					
- supported	Yes	Yes	Yes	Yes	Yes
- Size of GD packets, max.	22 Byte	22 Byte	22 Byte	22 Byte	54 Byte
S7 basic communication					
- supported	Yes	Yes	Yes	Yes	Yes
S7 communication					
- supported	Yes	Yes	Yes	Yes	Yes
S5 compatible communication					
- supported	Yes; via CP and loadable FC	Yes; via CP and loadable FC	Yes; via CP and loadable FC	Yes; via CP and loadable FC	Yes; via CP and loadable FC
Standard communication					
- Supported					Yes; via CP and loadable FC
Number of connections					
- overall	6	12	16	32	32
- usable for PG communication	5	11	15	31	31
- usable for OP communication	5	11	15	31	31
- usable for S7 basic communication	2	8	12	30	30
- usable for S7 communication					30
- usable for routing			4	8	
1st interface					
•Type of interface	integrated RS 485 interface	integrated RS 485 interface	integrated RS 485 interface	integrated RS 485 interface	integrated RS 485 interface
•Physical	RS 485	RS 485	RS 485	RS 485	RS 485
•Isolated	No	No	No	Yes	Yes
•Power supply to interface (15 to 30 V DC), max.	200 mA	200 mA	200 mA	200 mA	200 mA
Functionality					
- MPI	Yes	Yes	Yes	Yes	Yes
- DP master	No	No	No	Yes	Yes
- DP slave	No	No	No	Yes	Yes
- Point-to-point connection	No	No	No	No	No
MPI					
- Number of connections	6	12	16	32	32
•Services					
- PG/OP communication	Yes	Yes	Yes	Yes	Yes
- Routing	No	No	Yes	Yes	
- Global data communication	Yes	Yes	Yes	Yes	Yes
- S7 basic communication	Yes	Yes	Yes	Yes	Yes
- S7 communication	Yes	Yes	Yes	Yes	Yes
- S7 communication, as client	No	No; via CP and loadable FB	No; via CP and loadable FB	No; via CP and loadable FB	
- S7 communication, as server	Yes	Yes	Yes	Yes	Yes
- Number of stations, max.					32
- Transmission rates, max.	187.5 kBit/s	187.5 kBit/s	187.5 kBit/s	12 Mbit/s	12 Mbit/s

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Central processing units

CPU 312C to CPU 317F-2 DP

Technical specifications (continued)

	6ES7 312-1AD10-0AB0	6ES7 314-1AF10-0AB0	6ES7 315-2AG10-0AB0	6ES7 317-2AJ10-0AB0	6ES7 318-2AJ00-0AB0
1st interface (continued)					
DP-Master					
•Services					
- PG/OP communication				Yes	Yes
- Routing				Yes	
- Global data communication				No	No
- S7 basic communication				No	No
- S7 communication				No	
- S7 communication, as server					Yes
- Equidistance support				Yes	Yes
- SYNC/FREEZE				Yes	Yes
- Activate/deactivate DP slaves					Yes
- Direct data exchange (lateral communication)					Yes; Sender and receiver
- DPV1				Yes	
- Transmission rates, max.				12 kBit/s	12 Mbit/s
- Number of DP slaves, max.				124	125
•Address area					
- Inputs, max.				244 Byte	2 KByte
- Outputs, max.				244 Byte	2 KByte
•User data per DP Slave					
- Inputs, max.					244 Byte
- Outputs, max.					244 Byte
DP slave					
•Services					
- Routing				Yes; only with active interface	Yes
- Global data communication				No	
- S7 Basic communication				No	
- S7 communication				No	
- Direct data exchange (lateral communication)				Yes	
- DPV1				No	
- Programming					Yes
- Transmission rates, max.				12 kBit/s	12 Mbit/s
•Intermediate memory					
- Inputs				244 Byte	244 Byte
- Outputs				244 Byte	244 Byte
- Address areas, max.				32	
- User data per address area, max.				32 Byte	

Technical specifications (continued)

	6ES7 312-1AD10-0AB0	6ES7 314-1AF10-0AB0	6ES7 315-2AG10-0AB0	6ES7 317-2AJ10-0AB0	6ES7 318-2AJ00-0AB0
2nd interface					
•Type of interface			integrated RS 485 interface	integrated RS 485 interface	integrated RS 485 interface
•Physical			RS 485	RS 485	RS 485
•Isolated			Yes	Yes	Yes
•Power supply to interface (15 to 30 V DC), max.			200 mA	200 mA	200 mA
Functionality					
- MPI			No	No	No
- DP master			Yes	Yes	Yes
- DP slave			Yes	Yes	Yes
- Point-to-point connection			No	No	No
DP master					
- Number of connections, max.			16	32	16
•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			No	No	Yes
- S7 communication, as client			No	No	No
- S7 communication, as server			No	No	Yes
- Equidistance support			Yes	Yes	Yes
- SYNC/FREEZE			Yes	Yes	Yes
- Activate/deactivate DP slaves					Yes
- DPV1			Yes	Yes	
- Transmission rates, max.			12 Mbit/s	12 Mbit/s	12 Mbit/s
- Number of DP slaves, max.			124; per station	124	125
•Address area					
- Inputs, max.			244 KByte	244 KByte	244 KByte
- Outputs, max.			244 KByte	244 KByte	244 KByte
•User data per DP Slave					
- Inputs, max.					244 Byte
- Outputs, max.					244 Byte
DP slave					
- Number of connections			16	32	
•Services					
- PG/OP communication			Yes	Yes	
- Routing			Yes; with active interface	Yes; with active interface	Yes
- Global data communication			No	No	
- S7 basic communication			No	No	
- S7 communication, as client			No	No	
- S7 communication, as server			No	No	
- Direct data exchange (lateral communication)			Yes	Yes	
- DPV1			No	No	
- GSD-Datei			http://www.ad.siemens.com/sup-port under Product Support	http://www.ad.siemens.com/sup-port under Product Support	siem807f.gse
- Transmission rates, max.			12 Mbit/s	12 Mbit/s	12 Mbit/s
- Automatic baud rates search			Yes; only when interface passive	Yes; only when interface passive	
•Intermediate memory					
- Inputs			244 Byte	244 Byte	244 Byte
- Outputs			244 Byte	244 Byte	244 Byte
- Address areas, max.			32	32	
- User data per address area, max.			32 Byte	32 Byte	

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Central processing units

CPU 312C to CPU 317F-2 DP

Technical specifications (continued)

	6ES7 312-1AD10-0AB0	6ES7 314-1AF10-0AB0	6ES7 315-2AG10-0AB0	6ES7 317-2AJ10-0AB0	6ES7 318-2AJ00-0AB0
CPU/ programming					
Programming language					
- STEP 7	Yes; as of V 5.1 SP4	Yes; as of V 5.1 SP 4	Yes; as of V 5.1 SP4	Yes; as of V 5.2 SP1	Yes; V5.0
- LAD	Yes	Yes	Yes	Yes	Yes
- FBD	Yes	Yes	Yes	Yes	Yes
- STL	Yes	Yes	Yes	Yes	Yes
- SCL		Yes	Yes	Yes	Yes
- CFC					Yes
- GRAPH		Yes	Yes	Yes	
- HiGraph®			Yes	Yes	Yes
Software library					
- Process diagnostics					Yes
- Software controller					Yes
• Instruction set	see instruction list	see instruction list	see instruction list	see instruction list	see instruction list
• Bracket levels	8	8	8	8	8
• User program protection/pass-word protection	Yes	Yes	Yes	Yes	Yes
• System functions (SFC)	see instruction list	see instruction list	see instruction list	see instruction list	see instruction list
• System function blocks (SFB)	see instruction list	see instruction list	see instruction list	see instruction list	see instruction list
Dimensions and weight					
• Weight, approx.	270 g	280 g	290 g	460 g	930 g
• Width	40 mm	40 mm	40 mm	80 mm	160 mm
• Height	125 mm	125 mm	125 mm	125 mm	125 mm
• Depth	130 mm	130 mm	130 mm	130 mm	130 mm

Technical specifications (continued)

	6ES7 317-2EJ10-0AB0	6ES7 317-6TJ10-0AB0
Product version		
•Associated programming package	STEP 7 as of 5.3	STEP 7 as of V 5.2 + SP1; S7 Distributed Safety as of V5.2 + SP1
Supply voltages		
Rated value		
- 24 V DC	Yes	Yes
- permissible range, lower limit (DC)	20.4 V	20.4 V
- permissible range, upper limit (DC)	28.8 V	28.8 V
Voltages and currents		
•External fusing for supply lines (recommendation)	Min. 2 A	Min. 2 A
Current consumption		
•Inrush current, max.		2.5 A
•Inrush current, typ.	2.5 A	
•I ² t	1 A ² s	1 A ² s
•from load voltage L+ (no load), max.		100 mA
•Power dissipation, typical	3.5 W	6 W
Memory/backup		
Memory		
•Working memory		
- integral	512 KByte	512 KByte
- expandable	No	No
•Load memory		
- pluggable (MMC)	Yes	Yes
- pluggable (MMC), max.	8 MByte	8 MByte
Backup		
- available	Yes; guaranteed by MMC (maintenance-free)	Yes; guaranteed by MMC (maintenance-free)
CPU/blocks		
DB		
- Number, max.	2,047; DB 0 reserved	2,047; DB 0 reserved
- Size, max.	64 KByte	64 KByte
FB		
- Number, max.	2,048; see instruction list	2,048; see instruction list
- Size, max.	64 KByte	64 KByte
FC		
- Number, max.	2,048; See instruction list	2,048; See instruction list
- Size, max.	64 KByte	64 KByte
OB		
- Number, max.	see instruction list	see instruction list
- Size, max.	64 KByte	64 KByte
Nesting depth		
- per priority class	16	16
- additional levels within an error OB	4	4

	6ES7 317-2EJ10-0AB0	6ES7 317-6TJ10-0AB0
CPU/processing times		
•for bit instruction, min.	0.05 µs	0.05 µs
•for word instruction, min.	0.2µs	0.2 µs
•for integer math, min.	0.2 µs	0.2 µs
•for floating-point math, min.	1 µs	1 µs
Timers/counters and their retentive characteristics		
S7 counter		
- Number	512	512
•of which retentive without battery		
- adjustable	Yes	Yes
•Counting range		
- adjustable	Yes	Yes
- lower limit	0	0
- upper limit	999	999
IEC counter		
- available	Yes	Yes
- Type	SFB	SFB
S7 times		
- Number	512	512
•Retentivity		
- adjustable	Yes	Yes
- preset	No retention	No retention
•Timing range		
- lower limit	10 ms	10 ms
- upper limit	9,990 s	9,990 s
IEC timer		
- available	Yes	Yes
- Type	SFB	SFB
Data areas and their retentive characteristics		
Flags		
- Number	4,096 Byte	4,096 Byte
- adjustable retentivity	Yes; MB 0 to MB 4095	Yes; MB 0 to MB 4095
- Number of clock memories	8; 1 memory byte	8; 1 memory byte
Data blocks		
- Number, max.	2,047; DB 0 reserved	2,047; DB 0 reserved
- Size, max.	64 KByte	64 KByte
- adjustable retentivity	Yes	Yes
Local data		
- per priority class, max.	1,024 Byte	1,024 Byte
Address area		
I/O address area		
- Inputs	8 KByte	8 KByte
- Outputs	8 KByte	8 KByte
•of which distributed		
- Inputs	8 KByte	8 KByte
- Outputs	8 KByte	8 KByte

SIMATIC S7-300

Central processing units

CPU 312C to CPU 317F-2 DP

Technical specifications (continued)

	6ES7 317-2EJ10-0AB0	6ES7 317-6TJ10-0AB0
Process image		
- Inputs	256 Byte	256 Byte
- Outputs	256 Byte	256 Byte
- Inputs, adjustable	2,048 KByte	
- Outputs, adjustable	2,048 KByte	
- Inputs, preset	256 Byte	
- Outputs, preset	256 Byte	
Digital channels		
- Inputs	65,536	65,636
- Outputs	65,536	65,636
- Inputs, of which central	1.024	256
- Outputs, of which central	1.024	256
Analog channels		
- Inputs	4,096	4,096
- Outputs	4,096	4,096
- Inputs, of which central	256	64
- Outputs, of which central	256	64
Configuration		
•Racks, max.	4	1
•Modules per rack, max.	8	8
Number of DP masters		
- integral	1	2
- via CP	4	2
Number of FMs and CPs that can be operated (recommendation)		
- FM	8	8
- CP, point-to-point	8	8
- CP, LAN	10	10
Time		
Clock		
- Hardware clock (realtime clock)	Yes	Yes
- buffered	Yes	Yes
- Deviation per day, max	10 s	10 s
Run-time meter		
- Quantity	4	4
- Number	0 to 3	0 to 3
- Range of values	0 to 2 ³¹ hours (when using SFC 101)	0 to 2 ³¹ hours (when using SFC 101)
- Granularity	1 hour	1 hour
- retentive	Yes; must be restarted on each complete restart	Yes; must be restarted on each complete restart
Time synchronization		
- supported	Yes	Yes
- on MPI, master	Yes	Yes
- on MPI, slave	Yes	Yes
- in AS, master	Yes	Yes
- in AS, slave	Yes	Yes

	6ES7 317-2EJ10-0AB0	6ES7 317-6TJ10-0AB0
S7 message functions		
•Number of stations that can log on for message functions, max.	32; depending on the connections configured for PG/OP and S7 basic communication	32; depending on the connections configured for PG/OP and S7 basic communication
•Process diagnostic messages	Yes	Yes
•simultaneously active Alarm-S blocks, max.	60	60
Test and startup functions		
Status/modify		
- Variable	Yes	Yes
- Variables	Inputs, outputs, flags, DB, timers, counters	Inputs, outputs, flags, DB, timers, counters
- Number of variables, max.	30	30
- of which status variables, max.	30	30
- of which modify variables, max.	14	14
Forcing		
- Forcing	Yes	Yes
- Forcing, variables	Inputs, outputs	Inputs, outputs
- Forcing, number of variables, max.	10	10
•Status block	Yes	Yes
•Single step	Yes	Yes
•Number of breakpoints	2	2
Diagnostic buffer		
- available	Yes	Yes
- Number of inputs, max.	100	100
- adjustable		No
Communication functions		
•PG/OP communication	Yes	Yes
•Routing	Yes	Yes
Global data communication		
- supported	Yes	Yes
- Size of GD packets, max.	22 Byte	22 Byte
S7 basic communication		
- supported	Yes	Yes
S7 communication		
- supported	Yes	Yes
S5 compatible communication		
- supported	Yes; via CP and loadable FC	Yes; via CP and loadable FC
Standard communication		
- TCP/IP	Yes	
- Number of connections, max.	8	
- Data length, max.	1.460 Byte	
Number of connections		
- overall	32	32
- usable for PG communication	31	31
- usable for OP communication	31	31
- usable for S7 basic communication	30	31

Technical specifications (continued)

	6ES7 317-2EJ10-0AB0	6ES7 317-6TJ10-0AB0
Communication functions (continued)		
PROFINET CBA (at 50 % Communication Load)		
- Number of remote interconnection nodes	32	
- Sum of all Master/Slave connectors	1,000	
- Data length of all input Master/Slave connectors	4,000 Byte	
- Data length of all output Master/Slave connectors	4,000 Byte	
- Data length for arrays and structures (acyclic interconnection), max.	1,400 Byte	
- Data length for arrays and structures (cyclic interconnection), max.	450 Byte	
- Data length for arrays and structures (local interconnection), max.	128 Byte; Slave-dependent	
• Remote interconnections with acyclic transmission		
- Sample frequency: sample interval, min.	500 ms	
- Number of input interconnections	100	
- Number of output interconnections	100	
- Data length of all input interconnections	2,000 Byte	
- Data length of all output interconnections	2,000 Byte	
• Remote interconnections with cyclic transmission		
- Transmission frequency: transmission interval, min.	10 ms	
- Number of input interconnections	200	
- Number of output interconnections	200	
- Data length of all input interconnections	2,000 Byte	
- Data length of all output interconnections	2,000 Byte	
• HMI variables via PROFINET (acyclic)		
- Update HMI variables	500 ms	
- Number of HMI variables	200	
- Data length of all HMI variables	2,000 Byte	
• PROFIBUS Proxy Functionality		
- supports	Yes	
- Number of coupled PROFIBUS devices	16	
- Number of device internals and PROFIBUS interconnections	500	
- Data length of all device internals and PROFIBUS interconnections	4,000 Byte	
1st interface		
• Type of interface		
	integrated RS 485 interface	integrated RS 485 interface
• Physical		
	RS 485	RS 485
• Isolated		
	Yes	Yes
• Power supply to interface (15 to 30 V DC), max.		
	200 mA	200 mA

	6ES7 317-2EJ10-0AB0	6ES7 317-6TJ10-0AB0
Functionality		
- MPI	Yes	Yes
- DP master	Yes	Yes
- DP slave	Yes	Yes
- Point-to-point connection	No	No
MPI		
- Number of connections	16	
• Services		
- PG/OP communication	Yes	Yes
- Routing	Yes	Yes
- Global data communication	Yes	Yes
- S7 basic communication	Yes	Yes
- S7 communication	Yes	Yes
- S7 communication, as client	No; via CP and loadable FB	Yes; via CP and loadable FB
- S7 communication, as server	Yes	Yes
- Transmission rates, max.	12 Mbit/s	12 Mbit/s
DP master		
• Services		
- PG/OP communication	Yes	Yes
- Routing	Yes	Yes
- Global data communication	No	No
- S7 basic communication	No	No
- S7 communication	No	No
- Equidistance support	Yes	Yes
- SYNC/FREEZE	Yes	Yes
- DPV1	Yes	Yes
- Transmission rates, max.	12 Mbit/s	12 Mbit/s
- Number of DP slaves, max.	124	124
• Address area		
- Inputs, max.	244 KByte	244 KByte
- Outputs, max.	244 KByte	244 KByte
DP slave		
• Services		
- Routing	Yes; with active interface	Yes
- Global data communication	No	No
- S7 Basic communication	No	No
- S7 communication	No	No
- Direct data exchange (lateral communication)	Yes	Yes
- DPV1	No	No
- Transmission rates, max.	12 Mbit/s	12 Mbit/s
• Intermediate memory		
- Inputs	244 Byte	244 Byte
- Outputs	244 Byte	244 Byte
- Address areas, max.	32	32
- User data per address area, max.	32 Byte	32 Byte

Technical specifications (continued)

	6ES7 317-2EJ10-0AB0	6ES7 317-6TJ10-0AB0		6ES7 317-2EJ10-0AB0	6ES7 317-6TJ10-0AB0
2nd interface			CPU/ programming		
•Type of interface	Integrated Ethernet inter-face	integrated RS 485 inter-face	Programming language - STEP 7	Yes; as of V 5.3	Yes; as of V 5.2 SP 1 and the S7-Technology option pack
•Physical	Ethernet	RS 485	- LAD	Yes	Yes
•Isolated	Yes	Yes	- FBD	Yes	Yes
•Power supply to interface (15 to 30 V DC), max.	0 mA	200 mA	- STL	Yes	Yes
•Automatic transmission speed de-tection	Yes		- SCL	Yes	
Functionality			- GRAPH	Yes	
- MPI	No	No	- HiGraph®	Yes	
- DP master	No	Yes; DP(DRIVE)-Master			
- DP slave	No	No	Software library		
- Point-to-point connection	No	No	•Instruction set	See instruction list	See instruction list
- PROFINET CBA	Yes	No	•Bracket levels	8	8
- PROFINET IO-Controller	Yes; as of firmware version V2.3	No	•User program protection/pass-word protection	Yes	Yes
DP master			•System functions (SFC)	See instruction list	See instruction list
•Services			•System function blocks (SFB)	see instruction list	see instruction list
- PG/OP communication		No	Digital inputs		
- Routing		No	•Number of digital inputs		4
- Global data communication		No	•Functions		technological functions, e.g. reference point detection (BERO); Digital inputs also have (restricted) use in the STEP 7 user program.
- S7 basic communication		No			
- S7 communication		No	Number of inputs that can be driven in parallel		
- Equidistance support		Yes	- Number of inputs that can be driven in parallel, up to 40 °C		4
- SYNC/FREEZE		No	- Number of inputs that can be driven in parallel, up to 60 °C		4
- Activate/deactivate DP slaves		No			
- DPV1		No	Length of cable		1,000 m
- Transmission rates, max.		12 Mbit/s	- Length of cable shielded, max		600 m
- Number of DP slaves, max.		32	- Length of cable unshielded, max		
•Address area			•Standard DI		
- Inputs, max.		244 KByte	•Input characteristic to comply with IEC 1131, Type 1		Yes
- Outputs, max.		244 KByte	Input voltage		
PROFINET CBA			- Rated value, DC		24 V
- acyclic transmission	Yes		- for signal "0"		-3 to 5 V
- cyclic transmission	Yes		- for signal "1"		15 to 30 V
- PG/OP communication	Yes		Input current		
- Routing	Yes		- for 1 signal, typical		7 mA
- S7 communication	Yes		Input delay (at rated value of the input voltage)		
- Open IE Communication	Yes		•for counters/technological functions		
- Transmission rates, max.	100 Mbit/s		- at 0 after 1, max.		10 µs; typ.
- Number connectable IO de-vices, max.	128		- at 1 after 0, max.		10 µs; typ.
- Inputs, max.	8 KByte				
- Outputs, max.	8 KByte				
- User data consistency, max.	256 Byte				

Technical specifications (continued)

	6ES7 317-2EJ10-0AB0	6ES7 317-6TJ10-0AB0
Digital outputs		
•Number of digital outputs		8
•Functions		for technological functions, e.g. rapid cam switching signals
•Length of cable shielded, max.		1,000 m
•Length of cable unshielded, max.		600 m
•Short-circuit protection of the output		Yes
•Limitation of voltage induced on circuit interruption to		2L+ (-48 V)
•Lamp load, max.		5 W
•Driving a digital input		No
Output voltage		
- for 0 signal (DC), max.		3 V
- for 1 signal		2L+ (-2.5 V)
Output current		
- for 1 signal rated value		0.5 A
- for 1 signal permissible range for 0 to 60 °C, min.		5 mA
- for 1 signal permissible range for 0 to 60 °C, max.		0.6 A
- for 0 signal residual current, max.		0.3 mA
Parallel switching of 2 outputs		
- to increase power		No
- to redundantly drive a load		No
Switching frequency		
- at resistive load, max.		100 Hz
- at inductive load, max.		0.2 Hz; to IEC 947-5-1, DC13
- at lamp load, max.		100 Hz
Summation current of the outputs (per group)		
•horizontal mounting positions		4 A
- up to 40°C., max.		3 mA
- up to 60°C., max.		3 mA
- up to 40°C., max.		3 mA
Load impedance range		
- lower limit		48 Ω
- upper limit		4 kΩ
Sensor		
Connectable encoders		
- 2-wire BEROs		No
Potentials/ electrical isolation		
Digital output functions		
- between the channels and the backplane bus		Yes
Digital input functions		
- between the channels and the backplane bus		Yes

	6ES7 317-2EJ10-0AB0	6ES7 317-6TJ10-0AB0
Dimensions and weight		
•Weight, approx.	460 g	750 g
•Width	80 mm	160 mm
•Height	125 mm	125 mm
•Depth	130 mm	130 mm
	6ES7 315-6FF01-0AB0	6ES7 317-6FF00-0AB0
Product version		
•Associated programming package	STEP 7 as of V 5.1 + SP 6	STEP 7 as of V 5.2 + SP1; S7 Distributed Safety as of V5.2 + SP1
Supply voltages		
Rated value		
- 24 V DC	Yes	Yes
- permissible range, lower limit (DC)	20.4 V	20.4 V
- permissible range, upper limit (DC)	28.8 V	28.8 V
Current consumption		
•Inrush current, typ.	2.5 A	2.5 A
•I _{PT}	0.5 A²s	0.5 A²s
•Power dissipation, typical	2.5 W	2.5 W
Memory/backup		
Memory		
•Working memory		
- integral	192 KByte; Compared with a standard program the number of F statements is limited because of the F-specific overheads; depending on the method of programming, about 36 K F statements are possible.	512 KByte; of which max. 256kB for retentive DB
- expandable	No	No
•Load memory		
- pluggable (MMC)	Yes	Yes
- pluggable (MMC), max.	8 MByte	8 MByte
Backup		
- available	Yes; guaranteed by MMC (maintenance-free)	Yes; guaranteed by MMC (maintenance-free)

SIMATIC S7-300

Central processing units

CPU 312C to CPU 317F-2 DP

Technical specifications (continued)

	6ES7 315-6FF01-0AB0	6ES7 317-6FF00-0AB0
CPU/blocks		
DB		
- Number, max.	1,023; DB 0 reserved	2,047; DB 0 reserved
- Size, max.	16 KByte	64 KByte
FB		
- Number, max.	2,048; see instruction list	2,048; see instruction list
- Size, max.	16 KByte	64 KByte
FC		
- Number, max.	2,048; See instruction list	2,048; see instruction list
- Size, max.	16 KByte	64 KByte
OB		
- Number, max.	see instruction list	see instruction list
- Size, max.	16 KByte	64 KByte
Nesting depth		
- per priority class	8	8
- additional levels within an error OB	4	4
CPU/processing times		
•for bit instruction, min.	0.1 µs	0.1 µs
•for word instruction, min.	0.2 µs	0.1 µs
•for integer math, min.	2 µs	0.2 µs
•for floating-point math, min.	6 µs	2 µs
Timers/counters and their retentive characteristics		
S7 counter		
- Number	256	512
•of which retentive without battery		
- adjustable	Yes	Yes
•Counting range		
- lower limit	0	0
- upper limit	999	999
IEC counter		
- available	Yes	Yes
- Type	SFB	SFB
S7 times		
- Number	256	512
•Retentivity		
- adjustable	Yes	Yes
- preset	No retention	No retention
•Timing range		
- lower limit	10 ms	10 ms
- upper limit	9,990 s	9,990 s
IEC timer		
- available	Yes	Yes
- Type	SFB	SFB

	6ES7 315-6FF01-0AB0	6ES7 317-6FF00-0AB0
Data areas and their retentive characteristics		
Flags		
- Number	2,048 Byte	4,096 Byte
- adjustable retentivity	Yes; MB 0 to MB 2047	Yes; MB 0 to MB 4095
- Number of clock memories	8; 1 memory byte	8; 1 memory byte
Data blocks		
- Number, max.	1,023; DB 0 reserved	2,047; DB 0 reserved
- Size, max.	16 KByte	64 KByte
Local data		
- per priority class, max.	1,024 Byte	1,024 Byte
Address area		
I/O address area		
- Inputs	2 KByte	8 KByte
- Outputs	2 KByte	8 KByte
•of which distributed		
- Inputs	2 KByte	8 KByte
- Outputs	2 KByte	8 KByte
Process image		
- Inputs	384 Byte	1,024 Byte
- Outputs	384 Byte	1,024 Byte
Digital channels		
- Inputs	16,384	65,536
- Outputs	16,384	65,536
- Inputs, of which central	1,024	1,024
- Outputs, of which central	1,024	1,024
Analog channels		
- Inputs	1,024	1,024
- Outputs	1,024	1,024
- Inputs, of which central	256	256
- Outputs, of which central	256	256
Configuration		
•Racks, max.	4	4
•Modules per rack, max.	8	8
Number of DP masters		
- integral	1	2
- via CP	1	2
Number of FMs and CPs that can be operated (recommendation)		
- FM	8	8
- CP, point-to-point	8	8
- CP, LAN	10	10

Technical specifications (continued)

	6ES7 315-6FF01-0AB0	6ES7 317-6FF00-0AB0
Time		
Clock		
- Hardware clock (realtime clock)	Yes	Yes
- buffered	Yes	Yes
- Deviation per day, max.	10 s	10 s
Run-time meter		
- Quantity	1	4
- Number	0	0 to 3
- Range of values	0 to 2 ³¹ hours (when using SFC 101)	0 to 2 ³¹ hours (when using SFC 101)
- Granularity	1 hour	1 hour
- retentive	Yes; must be restarted on each complete restart	Yes; must be restarted on each complete restart
Time synchronization		
- supported	Yes	Yes
- on MPI, master	Yes	Yes
- on MPI, slave	Yes	Yes
- in AS, master	Yes	Yes
S7 message functions		
•Number of stations that can log on for message functions, max.	16; depending on the connections configured for PG/OP and S7 basic communication	32; depending on the connections configured for PG/OP and S7 basic communication
•Process diagnostic messages	Yes	Yes
•simultaneously active Alarm-S blocks, max.	40	60
Test and startup functions		
Status/modify		
- Variable	Yes	Yes
- Variables	Inputs, outputs, flags, DB, timers, counters	Inputs, outputs, flags, DB, timers, counters
- Number of variables, max.	30	30
- of which status variables, max.	30	30
- of which modify variables, max.	14	14
Forcing		
- Forcing	Yes	Yes
- Forcing, variables	Inputs, outputs	Inputs, outputs
- Forcing, number of variables, max.	10	10
•Status block	Yes	Yes
•Single step	Yes	Yes
•Number of breakpoints	2	2
Diagnostic buffer		
- available	Yes	Yes
- Number of inputs, max.	100	100
- adjustable	No	No

	6ES7 315-6FF01-0AB0	6ES7 317-6FF00-0AB0
Communication functions		
•PG/OP communication	Yes	Yes
•Routing	Yes	Yes
Global data communication		
- supported	Yes	Yes
- Size of GD packets, max.	22 Byte	22 Byte
S7 basic communication		
- supported	Yes	Yes
S7 communication		
- supported	Yes	Yes
S5 compatible communication		
- supported	Yes; via CP and loadable FC	Yes; via CP and loadable FC
Number of connections		
- overall	16	32
- usable for PG communication	15	31
- usable for OP communication	15	31
- usable for S7 basic communication	13	31
1st interface		
•Type of interface	integrated RS 485 interface	integrated RS 485 interface
•Physical	RS 485	RS 485
•Isolated	No	No
•Power supply to interface (15 to 30 V DC), max.	200 mA	200 mA
Functionality		
- MPI	Yes	Yes
- DP master	No	Yes
- DP slave	No	No
- Point-to-point connection	No	No
MPI		
- Number of connections	16	32
•Services		
- PG/OP communication	Yes	Yes
- Routing	Yes	Yes
- Global data communication	Yes	Yes
- S7 basic communication	Yes	Yes
- S7 communication	Yes	Yes
- S7 communication, as client	Yes; via CP and loadable FB	Yes; via CP and loadable FB
- S7 communication, as server	Yes	Yes
- Transmission rates, max.	187.5 kBit/s	12 Mbit/s

SIMATIC S7-300

Central processing units

CPU 312C to CPU 317F-2 DP

Technical specifications (continued)

	6ES7 315-6FF01-0AB0	6ES7 317-6FF00-0AB0		6ES7 315-6FF01-0AB0	6ES7 317-6FF00-0AB0
1st interface (continued)			2nd interface (continued)		
DP master			DP slave		
- Number of connections, max.		32	- Number of connections	16	32
•Services			•Services		
- PG/OP communication		Yes	- PG/OP communication	Yes	Yes
- Routing		Yes	- Routing	Yes; with active interface	Yes; with active interface
- Global data communication		No	- Global data communication	No	No
- S7 basic communication		No	- S7 basic communication	No	No
- S7 communication		No	- S7 communication, as client	No	No
- Equidistance support		Yes	- S7 communication, as server	No	No
- SYNC/FREEZE		Yes	- Direct data exchange (lateral communication)	Yes	Yes
- DPV1		Yes	- DPV1	No	No
- Transmission rates, max.		12 Mbit/s	- GSD file	http://www.ad.siemens.com/csi_e/gsd	http://www.ad.siemens.com/csi_e/gsd
- Number of DP slaves, max.		125	- Transmission rates, max.	12 Mbit/s	12 Mbit/s
•Address area			•Intermediate memory		
- Inputs, max.		244 KByte	- Inputs	244 Byte	244 Byte
- Outputs, max.		244 KByte	- Outputs	244 Byte	244 Byte
			- Address areas, max.	32	32
			- User data per address area, max.	32 Byte	32 Byte
2nd interface			CPU/ programming		
•Type of interface	integrated RS 485 interface	integrated RS 485 interface	Programming language		
•Physical	RS 485	RS 485	- STEP 7	Yes; as of V5.1 SP6	Yes; STEP 7 as of V 5.2 + SP1 S7 Distributed Safety as of V5.2 SP1
•Isolated	Yes	Yes	- LAD	Yes	Yes
•Power supply to interface (15 to 30 V DC), max.	200 mA	200 mA	- FBD	Yes	Yes
			- STL	Yes	Yes
Functionality			- SCL	Yes	Yes
- MPI	No	No	Software library		
- DP master	Yes	Yes	•Instruction set	See instruction list	See instruction list
- DP slave	Yes	Yes	•Bracket levels	8	8
- Point-to-point connection	No	No	•User program protection/password protection	Yes	Yes
DP master			•System functions (SFC)	See instruction list	See instruction list
- Number of connections, max.	16	32	•System function blocks (SFB)	See instruction list	See instruction list
•Services					
- PG/OP communication	Yes	Yes			
- Routing	Yes	Yes			
- Global data communication	No	No			
- S7 basic communication	No	No			
- S7 communication	No	No			
- Equidistance support	Yes	Yes			
- SYNC/FREEZE	Yes	Yes			
- DPV1	Yes	Yes			
- Transmission rates, max.	12 Mbit/s	12 Mbit/s			
- Number of DP slaves, max.	125	125			
•Address area					
- Inputs, max.	244 KByte	244 KByte			
- Outputs, max.	244 KByte	244 KByte			

Technical specifications (continued)

	6ES7 315-6FF01-0AB0	6ES7 317-6FF00-0AB0
CPU/ programming		
Programming language		
- STEP 7	Yes; as of V5.1 SP6	Yes; STEP 7 as of V 5.2 + SP1 S7 Distributed Safety as of V5.2 SP1
- LAD	Yes	Yes
- FBD	Yes	Yes
- STL	Yes	Yes
- SCL	Yes	Yes
Software library		
• Instruction set	See instruction list	See instruction list
• Bracket levels	8	8
• User program protection/ password protection	Yes	Yes
• System functions (SFC)	See instruction list	See instruction list
• System function blocks (SFB)	See instruction list	See instruction list
Dimensions and weight		
• Weight, approx.	290 g	560 g
• Width	40 mm	80 mm
• Height	125 mm	125 mm

Ordering data

Order No.

CPU 312C	6ES7 312-5BD01-0AB0
Compact CPU, 16 KB RAM, 24 V DC supply voltage, 10 DI/6 DO integrated, integrated functions, MPI; including slot number labels and 2 keys; MMC is necessary	
CPU 313C	6ES7 313-5BE01-0AB0
Compact CPU, 32 KB RAM, 24 V DC supply voltage, 24 DI/16 DO, 4 AI/2 AO integrated, integrated functions, MPI; MMC is necessary	
CPU 313C-2 PtP	6ES7 313-6BE01-0AB0
Compact CPU, 32 KB RAM, 24 V DC supply voltage, 16 DI/16 DO integrated, integrated functions, MPI, RS 422/485 interface; MMC is necessary	
CPU 313C-2 DP	6ES7 313-6CE01-0AB0
Compact CPU, 32 KB RAM, 24 V DC supply voltage, 16 DI/16 DO integrated, integrated functions, MPI, PROFIBUS DP master/slave interface; MMC is necessary	
CPU 314C-2 PtP	6ES7 314-6BF01-0AB0
Compact CPU, 48 KB RAM, 24 V DC supply voltage, 24DI/16DO/4AI/2AO integrated, integrated functions, MPI, RS 422/485 interface; MMC is necessary	
CPU 314C-2 DP	6ES7 314-6CF01-0AB0
Compact CPU, 48 KB RAM, 24 V DC supply voltage, 24DI/16DO/4AI/2AO integrated, integrated functions, MPI, PROFIBUS DP master/slave interface; MMC is necessary	
CPU 312^{A)}	6ES7 312-1AD10-0AB0
16 KB RAM, 24 V DC supply voltage, MPI; MMC is necessary	
CPU 314	6ES7 314-1AF10-0AB0
48 KB RAM, 24 V DC supply voltage, MPI; MMC is necessary	
CPU 315-2 DP	6ES7 315-2AG10-0AB0
128 KB RAM, 24 V DC supply voltage, MPI, PROFIBUS DP master/slave interface; MMC is necessary	
CPU 317-2 DP	6ES7 317-2AJ10-0AB0
512 KB RAM, 24 V DC supply voltage, MPI, PROFIBUS DP master/slave interface; MMC is necessary	
CPU 317-2 PN/DP	6ES7 317-2EJ10-0AB0
512 KB RAM, 24 V DC supply voltage, combined MPI/PROFIBUS DP-master/slave interface, Ethernet/PROFINET interface; MMC is necessary	

A) Subject to export regulations: AL: N and ECCN: EAR99H

SIMATIC S7-300

Central processing units

CPU 312C to CPU 317F-2 DP

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Ordering data	Order No.	Order No.	
CPU 317T-2 DP 512 KB RAM, 24 V DC supply voltage, MPI, PROFIBUS DP master/slave inter- face, PROFIBUS DP(DRIVE) inter- face; with technology/motion control functions; MMC is necessary	6ES7 317-6TJ10-0AB0	FEPRAM memory card for CPU 318-2 DP 16 KB 32 KB 64 KB 128 KB 256 KB 512 KB 1 MB 2 MB 4 MB	6ES7 951-0KD00-0AA0 6ES7 951-0KE00-0AA0 6ES7 951-0KF00-0AA0 6ES7 951-0KG00-0AA0 6ES7 951-1KH00-0AA0 6ES7 951-0KJ00-0AA0 6ES7 951-1KK00-0AA0 6ES7 951-1KL00-0AA0 6ES7 951-1KM00-0AA0
CPU 318-2 DP 512 KB RAM, 24 V DC supply voltage, PROFIBUS DP mas- ter/slave interface, MPI, slot for memory card, casing for backup battery; including slot number labels and 2 keys	6ES7 318-2AJ00-0AB0	RAM memory card for CPU 318-2 DP 128 KB 256 KB 512 KB 1 MB 2 MB	6ES7 951-0AG00-0AA0 6ES7 951-1AH00-0AA0 6ES7 951-1AJ00-0AA0 6ES7 951-1AK00-0AA0 6ES7 951-1AL00-0AA0
CPU 315F-2 DP CPU for SIMATIC S7-300F; 128 KB RAM, 24 V DC supply voltage, MPI, PROFIBUS DP mas- ter/slave interface; incl. slot num- ber labels and 2 keys	6ES7 315-6FF01-0AB0	MPI cable For connecting SIMATIC S7 and the PG through MPI; length 5 m	6ES7 901-0BF00-0AA0
CPU 317F-2 DP 512 KB RAM, 24 V DC supply voltage, MPI, PROFIBUS DP mas- ter/slave interface; MMC is neces- sary	6ES7 317-6FF00-0AB0	Backup battery for CPU 318-2 DP; 3.6 V, 850 mA	6ES7 971-1AA00-0AA0
S7-Technology V1.0 <u>Task:</u> Options package for configuring and programming technological tasks with the SIMATIC S7 CPU 317T-2 DP <u>Prerequisite:</u> STEP 7 V5.2 or later <u>Delivery type:</u> on CD; incl. documentation for CPU 317T-2 DP (included on CD)	6ES7 864-1CC10-0YX0	Spare key for CPU 2 items (spare part)	6ES7 911-0AA00-0AA0
Options package S7 F Distributed Safety for generating failsafe programs for the S7-300F	6ES7 833-1FC00-0YX0	Point-to-point link for connection to CPU 31xC-2 PTP; length 5 m 5 m 10 m 50 m	6ES7 902-3AB00-0AA0 6ES7 902-3AC00-0AA0 6ES7 902-3AG00-0AA0
Micro memory card 64 KB 128 KB 512 KB 2 MB 4 MB 8 MB	6ES7 953-8LF11-0AA0 6ES7 953-8LG11-0AA0 6ES7 953-8LJ11-0AA0 6ES7 953-8LL11-0AA0 6ES7 953-8LM11-0AA0 6ES7 953-8LP11-0AA0	Sub-D connector for connection to the second serial interface of CPU 31xC-2 PTP 15-pin, pins	6ES5 750-2AA21
Programming adapter for micro memory card For PG 720 and PG 740	6ES7 798-0BA00-0XA0	Front connector (1 item) for compact CPUs, CPU 31xF-2 DP, CPU 317T-2 DP 40-pin, screw-type contacts • 1 item • 100 items 40-pin with spring-loaded terminals	6ES7 392-1AM00-0AA0 6ES7 392-1AM00-1AB0 6ES7 392-1BM01-0AA0
		Mounting location number plates	6ES7 912-0AA00-0AA0
		S7-300 Manual Configuration, CPU data, module data, command list German English French Spanish Italian	6ES7 398-8FA10-8AA0 6ES7 398-8FA10-8BA0 6ES7 398-8FA10-8CA0 6ES7 398-8FA10-8DA0 6ES7 398-8FA10-8EA0

Ordering data	Order No.		Order No.
S7 Distributed Safety documentation package System description for configuration and programming, failsafe PROFISAFE modules German English French	 6ES7 988-8FB10-8AA0 6ES7 988-8FB10-8BA0 6ES7 988-8FB10-8CA0	"Communication for SIMATIC S7-300/400" manual German English French Spanish Italian	 6ES7 398-8EA00-8AA0 6ES7 398-8EA00-8BA0 6ES7 398-8EA00-8CA0 6ES7 398-8EA00-8DA0 6ES7 398-8EA00-8EA0
SIMATIC Manual Collection ^{B)} Electronic manuals on CD-ROM, 5 languages: S7-200/-300/-400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, Engineering Software, Runtime Software, PCS 7, SIMATIC HMI, SIMATIC NET	6ES7 998-8XC01-8YE0	SIMATIC S7 Demo Case with mounting equipment for installation of S7-200 and S7-300	6ES7 910-3AA00-0XA0
SIMATIC Manual Collection update service for 1 year ^{B)} Up-to-date Manual Collection CD as well as the three subsequent updates	6ES7 998-8XC01-8YE2	Accumulator for real-time clock	6ES7 971-5BB00-0AA0
Power supply connector For compact CPUs, innovated standard CPUs and CPU 315F-2 DP (10 items, spare part)	6ES7 391-1AA00-0AA0	PROFIBUS DP bus connector RS 485 •With 90° cable outlet, max. transmission rate 12 Mbps - without PG interface - with PG interface •With 90° cable outlet for Fast-Connect connection technique, max. transmission rate 12 Mbps - without PG interface - with PG interface •With axial cable outlet for SIMATIC OP, for connecting to PPI, MPI, PROFIBUS	 6ES7 972-0BA12-0XA0 6ES7 972-0BB12-0XA0 6ES7 972-0BA50-0XA0 6ES7 972-0BB50-0XA0 6GK1 500-0EA02
Labeling strips For compact CPUs, standard CPUs as well as CPU 315F-2 DP (10 items, spare part)	6ES7 392-2XX00-0AA0	PROFIBUS Fast Connect bus cable Standard type specially designed for quick installation, 2-core, shielded, sold by the meter; Max. length supplied 1000 m, minimum order quantity 20 m	6XV1 830-0EH10
Label cover For compact CPUs, standard CPUs as well as CPU 315F-2 DP (10 items, spare part)	6ES7 392-2XY00-0AA0	Repeater RS 485 for PROFIBUS Transmission rate of up to 12 Mbps 24 V DC; IP20 casing	6ES7 972-0AA01-0XA0
S7 SmartLabel Software for labeling modules mechanically directly in the STEP 7 project	2XV9 450-1SL01-0YX0	PROFIBUS bus components For establishing MPI/PROFIBUS communication	see Catalogs IK PI and CA 01
Sheets of labels for machine inscription For 16-channel signal modules, DIN A4, for printing using a laser printer; 10 items Petrol Light beige Yellow Red For 32-channel signal modules, DIN A4, for printing using a laser printer; 10 items Petrol Light beige Yellow Red	 6ES7 392-2AX00-0AA0 6ES7 392-2BX00-0AA0 6ES7 392-2CX00-0AA0 6ES7 392-2DX00-0AA0 6ES7 392-2AX10-0AA0 6ES7 392-2BX10-0AA0 6ES7 392-2CX10-0AA0 6ES7 392-2DX10-0AA0		

B) Subject to export regulations: AL: N and ECCN: EAR99S

SIMATIC S7-300

SIPLUS central processing units

SIPLUS CPU 312C, CPU 313C,
CPU 314, CPU 315-2 DP

SIPLUS CPU 312C



- The compact CPU with integrated digital inputs and outputs
- For small applications with high requirements in terms of processing power
- With process-related functions

Micro memory card required to operate the CPU.

- These modules are designed for
- an ambient range of -25 °C to $+70\text{ °C}$, condensation permissible.
- extraordinary medial load (for example by chloric and sulphuric atmospheres).

SIPLUS CPU 314



- For installations with medium requirements on program scope
- High processing performance in binary and floating-point arithmetic

Micro memory card is required to operate the CPU.

- These modules are designed for
- an ambient range of -25 °C to $+70\text{ °C}$, condensation permissible.
- extraordinary medial load (for example by chloric and sulphuric atmospheres).

SIPLUS CPU 313C



- The compact CPU with integrated digital and analog inputs and outputs
- For installations with high requirements in terms of processing power and response time.
- With process-related functions

Micro memory card required to operate the CPU.

- These modules are designed for
- an ambient range of -25 °C to $+70\text{ °C}$, condensation permissible.
- extraordinary medial load (for example by chloric and sulphuric atmospheres).

SIPLUS CPU 315-2 DP



- The CPU with medium to large program memory and quantity framework for the use, if required, of SIMATIC Engineering Tools
- High processing performance in binary and floating-point arithmetic
- PROFIBUS DP master/slave interface
- For extensive I/O configurations
- For setting up distributed I/O structures

Micro memory card is required to operate the CPU.

These modules are designed for

- an ambient range of -25 °C to $+70\text{ °C}$, condensation permissible.
- extraordinary medial load (for example by chloric and sulphuric atmospheres).

SIMATIC S7-300

SIPLUS central processing units

SIPLUS CPU 312C, CPU 313C,
CPU 314, CPU 315-2 DP

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Technical specifications		Ordering data	Order No.
SIPLUS CPU 312C	see CPU 312C	SIPLUS CPU 312C^{A)} (extended temperature range and extraordinary medial load) Compact CPU, 16 KB RAM, 24 V DC supply voltage, 10 DI/6 DO integrated, integrated functions, MPI; including slot number labels and 2 keys; MMC is necessary	6AG1 312-5BD01-2AB0
SIPLUS CPU 313C	see CPU 313C		
SIPLUS CPU 314	see CPU 314	SIPLUS CPU 313C^{A)} (extended temperature range and extraordinary medial load) Compact CPU, 32 KB RAM, 24 V DC supply voltage, 24 DI/16 DO, 4 AI/2 AO integrated, integrated functions, MPI; MMC is necessary	6AG1 313-5BE01-2AB0
SIPLUS CPU 315-2 DP	see CPU 315-2 DP		
		SIPLUS CPU 314^{A)} (extended temperature range and extraordinary medial load) 48 KB RAM, 24 V DC supply voltage, MPI MMC is necessary	6AG1 314-1AF10-2AB0
		SIPLUS CPU 315-2 DP^{A)} (extended temperature range and extraordinary medial load) 128 KB RAM, 24 V DC supply voltage, MPI, PROFIBUS DP master/slave interface; MMC is necessary	6AG1 315-2AG10-2AB0
		Accessories	see ordering data for S7-300 central processing units

A) Subject to export regulations: AL: N and ECCN: EAR99H

SIMATIC S7-300

Digital modules

SM 321 digital input modules

Overview



- Digital inputs
- For connecting standard switches and two-wire proximity switches (BERO)

Technical specifications

	6ES7 321-1BH02-0AA0	6ES7 321-1BH50-0AA0	6ES7 321-1BL00-0AA0	6ES7 321-1BH10-0AA0
Voltages and currents				
Load voltage L+ - Rated value (DC)	24 V	24 V	24 V	24 V
Current consumption				
•from load voltage L+ (no load), max.	25 mA			
•from backplane bus 5 V DC, max.	10 mA	10 mA	15 mA	110 mA
•Power dissipation, typical	3.5 W	3.5 W	6.5 W	3.8 W
Connection system				
•Requisite front connector	20-pin	20-pin	40-pin	20-pin
Clock synchronism				
•Clock synchronous operation	No	No	No	Yes
Digital inputs				
•Number of digital inputs	16	16	32	16
Number of inputs that can be driven in parallel				
•vertical mounting positions - up to 40°C	16	16	32	16
•horizontal mounting positions - up to 40°C - up to 60°C	16 16	16 16	32 16	16 16
Length of cable - Length of cable shielded, max. - Length of cable unshielded, max.	1,000 m 600 m	1,000 m 600 m	1,000 m 600 m	1,000 m 600 m
•Input characteristic to comply with IEC 1131, Type 1	Yes	Yes	Yes	Yes
Input voltage				
- Rated value, DC - for signal "0" - for signal "1"	24 V -30 V to 5 V 13 to 30 V	24 V 30 V to -5V -13 to -30 V	24 V -30 to 5 V 13 to 30 V	24 V -30 V to 5 V 13 to 30 V
Input current				
- for 1 signal, typical	7 mA	7 mA	7 mA	7 mA
Input delay (at rated value of the input voltage)				
•For standard inputs - at 0 to 1, min. - at 0 to 1, max.	1.2 ms 4.8 ms	1.2 ms 4.8 ms	1.2 ms 4.8 ms	25 µs 75 µs

Technical specifications (continued)

	6ES7 321-1BH02-0AA0	6ES7 321-1BH50-0AA0	6ES7 321-1BL00-0AA0	6ES7 321-1BH10-0AA0
Sensor				
Connectable encoders				
- 2-wire BEROs	Yes	Yes	Yes	Yes
- permissible closed-circuit current (2-wire BEROs), max.	1.5 mA	1.5 mA	1.5 mA	1.5 mA
Status information/ interrupts/ diagnostics				
Interrupts				
- Interrupts	No	No	No	No
Diagnostics				
- Diagnostic functions	No	No	No	No
Diagnostic display LED				
- Status display digital input (green)	Yes	Yes	Yes	Yes
Insulation				
•Insulation tested with	500 V DC	500 V DC	500 V DC	500 V DC
Potentials/ electrical isolation				
Digital input functions				
- between the channels	16	16	Yes 16	16
- between the channels, in groups of	Yes; Optocoupler	Yes; Optocoupler	Yes; Optocoupler	Yes; Optocoupler
- between the channels and the backplane bus				
Dimensions and weight				
•Weight, approx.	200 g	200 g	260 g	200 g
•Width	40 mm	40 mm	40 mm	40 mm
•Height	125 mm	125 mm	125 mm	125 mm
•Depth	120 mm	120 mm	120 mm	120 mm

	6ES7 321-7BH01-0AB0	6ES7 321-1CH00-0AA0	6ES7 321-1CH20-0AA0	6ES7 321-1FH00-0AA0
Voltages and currents				
Load voltage L+				
- Rated value (DC)	24 V	24 V	48 V	
Load voltage L1				
- Rated value (AC)		24 V		230 V; 120/230V AC, same phase only
Current consumption				
•from load voltage L+ (no load), max.	90 mA			
•from backplane bus 5 V DC, max.	130 mA	100 mA	40 mA	29 mA
•Power dissipation, typical	4 W	1.5 W; at 24 V; 2.8 W at 48 V	4.3 W	4.9 W
Connection system				
•Requisite front connector	20-pin	40-pin	20-pin	20-pin
Clock synchronism				
•Clock synchronous operation	Yes	No	No	No

SIMATIC S7-300

Digital modules

SM 321 digital input modules

Technical specifications (continued)

	6ES7 321-7BH01-0AB0	6ES7 321-1CH00-0AA0	6ES7 321-1CH20-0AA0	6ES7 321-1FH00-0AA0
Digital inputs				
• Number of digital inputs	16	16	16	16
Number of inputs that can be driven in parallel				
• vertical mounting positions - up to 40°C	16	16	8	16
• horizontal mounting positions - up to 50°C - up to 60°C	16	16	8 8; 6 to Ue 146 V	16
Length of cable - Length of cable shielded, max. - Length of cable unshielded, max.	1,000 m 600 m	1,000 m 600 m	1,000 m 600 m	1,000 m 600 m
• Input characteristic to comply with IEC 1131, Type 1		Yes	Yes	Yes
• Input characteristic to comply with IEC 1131, Type 2	Yes			
Input voltage - Rated value, AC - Rated value, DC - for signal "0" - for signal "1" - Frequency range	24 V -30 to 5 V 13 to 30 V	24 V; AC 24 to 48 V 24 V; DC 24 to 48 V AC -5 to 5 V AC 14 to 60 V 0 to 63 Hz	48 V; DC 48 to 125 V DC -146 V to 15 V DC 30 to 146 V	230 V; AC 120/230 V 0 to 40 V 79 to 264 V 47 to 63 Hz
Input current - for 1 signal, typical	7 mA	2.7 mA	3.5 mA	8 mA; (120V, 60Hz), 16mA (230V, 50Hz)
Input delay (at rated value of the input voltage) • For standard inputs - Parameterizable - at 0 to 1, min. - at 0 to 1, max.	Yes; 0.1 / 0.5 / 3 / 15 / 20 ms	No 16 ms	0.1 ms 3.5 ms	No 25 ms
Sensor				
Connectable encoders - 2-wire BEROs - permissible closed-circuit current (2-wire BEROs), max.	Yes 2 mA	Yes 1 mA	Yes 1 mA	Yes 2 mA
Status information/ interrupts/ diagnostics				
Interrupts - Interrupts - Diagnostic interrupt - Process interrupt	Yes Yes; parameterizable Yes; parameterizable	No No No	No No No	No No No
Diagnostics - Diagnostic functions	Yes; parameterizable	No	No	No
Diagnostic display LED - Status display digital input (green)	Yes	Yes	Yes	Yes
Insulation				
• Insulation tested with	500 V DC	1500 V AC	1500 V DC	4000 V DC

Technical specifications (continued)

	6ES7 321-7BH01-0AB0	6ES7 321-1CH00-0AA0	6ES7 321-1CH20-0AA0	6ES7 321-1FH00-0AA0
Potentials/ electrical isolation				
Digital input functions				
- between the channels	16	Yes 1	Yes 8	Yes 4
- between the channels, in groups of	Yes; Optocoupler	Yes; Optocoupler	Yes; Optocoupler	Yes; Optocoupler
- between the channels and the backplane bus				
Dimensions and weight				
•Weight, approx.	200 g	260 g	200 g	240 g
•Width	40 mm	40 mm	40 mm	40 mm
•Height	125 mm	125 mm	125 mm	125 mm
•Depth	120 mm	120 mm	120 mm	120 mm

	6ES7 321-1EL00-0AA0	6ES7 321-1FF01-0AA0	6ES7 321-1FF10-0AA0
Voltages and currents			
Load voltage L1			
- Rated value (AC)	120 V	230 V; 120/230V AC	230 V; 120/230 V AC, same phase only
Current consumption			
•from backplane bus 5 V DC, max.	16 mA	29 mA	100 mA
•Power dissipation, typical	4 W	4.9 W	4.9 W
Connection system			
•Requisite front connector	40-pin	20-pin	40-pin
Clock synchronism			
•Clock synchronous operation	No	No	No
Digital inputs			
•Number of digital inputs	32	8	8
Number of inputs that can be driven in parallel			
•vertical mounting positions			
- up to 40°C	32	8	8
•horizontal mounting positions			
- up to 40°C	32		
- up to 60°C	24	8	8
Length of cable			
- Length of cable shielded, max.	1,000 m	1,000 m	1,000 m
- Length of cable unshielded, max.	600 m	600 m	600 m
•Input characteristic to comply with IEC 1131, Type 1		Yes	Yes
•Input characteristic to comply with IEC 1131, Type 2	Yes		
Input voltage			
- Rated value, AC	120 V	230 V; 120/230 V AC	120 V; 120/230 V AC
- for signal "0"	0 to 20 V	0 to 40 V	0 to 40 V
- for signal "1"	74 to 132 V	79 to 264 V	79 to 264 V
- Frequency range	47 to 63 Hz	47 to 63 Hz	47 to 63 Hz
Input current			
- for 1 signal, typical	21 mA	6.5 mA; (120 V); 11mA (230 V)	7.5 mA; (120 V); 17.3 mA (230 V)
Input delay (at rated value of the input voltage)			
•For standard inputs			
- Parameterizable	No	No	No
- at 0 to 1, max.	15 ms	25 ms	25 ms

Technical specifications (continued)

	6ES7 321-1EL00-0AA0	6ES7 321-1FF01-0AA0	6ES7 321-1FF10-0AA0
Sensor			
Connectable encoders			
- 2-wire BEROs	Yes	Yes	Yes
- permissible closed-circuit current (2-wire BEROs), max.	4 mA	2 mA	2 mA
Status information/ interrupts/ diagnostics			
Interrupts			
- Interrupts	No	No	No
- Diagnostic interrupt	No	No	No
- Process interrupt	No	No	No
Diagnostics			
- Diagnostic functions	No	No	No
Diagnostic display LED			
- Status display digital input (green)	Yes	Yes	Yes
Insulation			
• Insulation tested with	2500 V DC	4000 V DC	1500 V AC
Potentials/ electrical isolation			
Digital input functions			
- between the channels	Yes	Yes	Yes
- between the channels, in groups of	8	2	1
- between the channels and the backplane bus	Yes; Optocoupler	Yes; Optocoupler	Yes; Optocoupler
Dimensions and weight			
• Weight, approx.	300 g	240 g	240 g
• Width	40 mm	40 mm	40 mm
• Height	125 mm	125 mm	125 mm
• Depth	120 mm	120 mm	120 mm

Ordering data	Order No.	Order No.
SM 321 digital input modules		
incl. labeling strips, bus connectors		
16 inputs, 24 V DC	6ES7 321-1BH02-0AA0	
16 inputs, 24 V DC, active low	6ES7 321-1BH50-0AA0	
32 inputs, 24 V DC	6ES7 321-1BL00-0AA0	
16 inputs, 24 to 48 V DC	6ES7 321-1CH00-0AA0	
16 inputs, 48 to 125 V DC	6ES7 321-1CH20-0AA0	
16 inputs, 24 V DC, for operation in isochrone mode	6ES7 321-1BH10-0AA0	
32 inputs, 120 V AC	6ES7 321-1EL00-0AA0	
8 inputs, 120/230 V AC	6ES7 321-1FF01-0AA0	
8 inputs, 120/230 V AC, single connection to common potential ^{A)}	6ES7 321-1FF10-0AA0	
16 inputs, 120/230 V AC	6ES7 321-1FH00-0AA0	
16 inputs, 24 V DC, for operation in isochrone mode; with diagnostics capability	6ES7 321-7BH01-0AB0	
Front connector		
20-pin, with screw-type terminals		
• 1 item	6ES7 392-1AJ00-0AA0	
• 100 items	6ES7 392-1AJ00-1AB0	
20-pin, with spring-loaded terminals	6ES7 392-1BJ00-0AA0	
40-pin, screw-type contacts		
• 1 item	6ES7 392-1AM00-0AA0	
• 100 items	6ES7 392-1AM00-1AB0	
40-pin with spring-loaded terminals	6ES7 392-1BM01-0AA0	
Front door, enhanced version ^{A)}	6ES7 328-0AA00-7AA0	
e.g. for 32-channel modules; supports the connection of 1.3 mm ² /16 AWG wires		
SIMATIC TOP connect	see page 4/157	
Bus connectors	6ES7 390-0AA00-0AA0	
1 item (spare part)		
Labeling strips		
10 items (spare part)		
For signal modules (not 32-channel), function modules	6ES7 392-2XX00-0AA0	
For 32-channel signal modules	6ES7 392-2XX10-0AA0	
Label cover		
10 items (spare part)		
For signal modules (not 32-channel), function modules	6ES7 392-2XY00-0AA0	
For 32-channel signal modules	6ES7 392-2XY10-0AA0	
S7 SmartLabel		2XV9 450-1SL01-0YX0
Software for labeling modules mechanically directly in the STEP 7 project		
Sheets of labels for machine inscription		
For 16-channel signal modules, DIN A4, for printing using a laser printer; 10 items		
Petrol	6ES7 392-2AX00-0AA0	
Light beige	6ES7 392-2BX00-0AA0	
Yellow	6ES7 392-2CX00-0AA0	
Red	6ES7 392-2DX00-0AA0	
For 32-channel signal modules, DIN A4, for printing using a laser printer; 10 items		
Petrol	6ES7 392-2AX10-0AA0	
Light beige	6ES7 392-2BX10-0AA0	
Yellow	6ES7 392-2CX10-0AA0	
Red	6ES7 392-2DX10-0AA0	
SIMATIC Manual Collection ^{B)}		6ES7 998-8XC01-8YE0
Electronic manuals on CD-ROM, multi-language: S7-200, TD 200, S7-300, C7, S7-400, STEP 7, engineering tools, runtime soft- ware, SIMATIC DP (distributed I/O), SIMATIC HMI (human machine interface), SIMATIC NET (industrial commu- nication)		
SIMATIC Manual Collection Maintenance service for 1 year ^{B)}		6ES7 998-8XC01-8YE2
Current S7 Manual Collection CD as well as the three following updates		
S7-300 manual		
Design, CPU data, module data, operation list		
German	6ES7 398-8FA10-8AA0	
English	6ES7 398-8FA10-8BA0	
French	6ES7 398-8FA10-8CA0	
Spanish	6ES7 398-8FA10-8DA0	
Italian	6ES7 398-8FA10-8EA0	

A) Subject to export regulations: AL: N and ECCN: EAR99H

B) Subject to export regulations: AL: N and ECCN: EAR99S

SIMATIC S7-300

Digital modules

SM 322 digital output modules

Overview



- Digital outputs
- For connecting solenoid valves, contactors, low-power motors, lamps and motor starters

Technical specifications

	6ES7 322-1BH01-0AA0	6ES7 322-1BH10-0AA0	6ES7 322-1BL00-0AA0	6ES7 322-8BF00-0AB0	6ES7 322-5GH00-0AB0	6ES7 322-1CF00-0AA0
Voltages and currents						
Load voltage L+ - Rated value (DC)	24 V	24 V	24 V	24 V	24 V; 24/48	48 V; DC 48 to 125 V
Current consumption						
• from load voltage L+ (no load), max.	80 mA	110 mA	160 mA	90 mA	200 mA	2 mA
• from backplane bus 5 V DC, max.	80 mA	70 mA	110 mA	70 mA	100 mA	100 mA
• Power dissipation, typical	4.9 W	5 W	6.6 W	5 W	2.8 W	7.2 W
Connection system						
• Requisite front connector	20-pin	20-pin	40-pin	20-pin	40-pin	20-pin
Digital outputs						
• Number of digital outputs	16	16	32	8	16	8
• Length of cable shielded, max.	1,000 m	1,000 m	1,000 m	1,000 m	1,000 m	1,000 m
• Length of cable unshielded, max.	600 m	600 m	600 m	600 m	600 m	600 m
• Short-circuit protection of the output	Yes; electronic	Yes; electronic	Yes; electronic	Yes; electronic	No; provided externally	Yes; electronic
• Limitation of voltage induced on circuit interruption to	L+ (-53 V)	L+ (-53 V)	L+ (-53 V)	L+ (-45 V)		M (-1V)
• Lamp load, max.	5 W	5 W	5 W	5 W	2.5 W	15 W; 15 W (48 V) or 40 W (125 V)
Output voltage - for 1 signal	L+ (-0.8 V)	L+ (-0.8 V)	L+ (-0.8 V)	L+ (-0.8 V to -1.6 V)	L+ (-0.25 V)	L+ (-1.2V)
Output current						
- for 1 signal rated value	0.5 A	0.5 A	0.5 A	0.5 A	0.5 A	1.5 A
- for 1 signal permissible range for 0 to 40 °C, min.	5 mA	5 mA	5 mA	10 mA		10 mA
- for 1 signal permissible range for 0 to 40 °C, max.	0.6 A	0.6 A	0.6 A	0.6 A		1.5 A
- for 1 signal permissible range for 40 to 60 °C, min.	5 mA	5 mA	5 mA	10 mA		10 mA
- for 1 signal permissible range for 40 to 60 °C, max.	0.6 A	0.6 A	0.6 A	0.6 A		1.5 A
- for 1 signal minimum load current	5 mA	5 mA	5 mA	10 mA		10 mA
- for 1 signal permissible surge current, max.					1.5 A; for 50 ms, 1 A ² s one-off	3 A; for 10 ms
- for 0 signal residual current, max.	0.5 mA	0.5 mA	0.5 mA	0.5 mA	10 µA	0.5 mA

Technical specifications (continued)

	6ES7 322-1BH01-0AA0	6ES7 322-1BH10-0AA0	6ES7 322-1BL00-0AA0	6ES7 322-8BF00-0AB0	6ES7 322-5GH00-0AB0	6ES7 322-1CF00-0AA0
Digital outputs (continued)						
Switching frequency						
- at resistive load, max.	100 Hz	1,000 Hz	100 Hz	100 Hz	10 Hz	25 Hz
- at inductive load, max.	0.5 Hz	0.5 Hz	0.5 Hz	2 Hz		0.5 Hz
- at lamp load, max.	10 Hz	10 Hz	10 Hz	10 Hz	0.5 Hz	10 Hz
Summation current of the outputs (per group)						
•vertical mounting positions						
- up to 40°C., max.	2 A	2 A	2 A	4 A		4 A
•horizontal mounting positions						
- up to 40°C., max.	4 A	4 A	4 A	4 A		6 A
- up to 50°C., max.						4 A
- up to 60°C., max.	3 A	3 A	3 A	3 A	0.5 A	3 A
•all other mounting positions						
- up to 40°C., max.					0.5 A	
Status information/ interrupts/ diagnostics						
Interrupts						
- Diagnostic interrupt	No	No	No	Yes; by channel	Yes; parameterizable	No
Diagnostics						
- Diagnostics	No	No	No	Yes	Yes; Parameters can be assigned	No
Insulation						
•Insulation tested with	500 V DC	500 V DC	500 V DC	500 V DC	1500 V AC	1500 V AC
Potentials/ electrical isolation						
Digital output functions						
- between the channels, in groups of	8	8	8	8	1	4
- between the channels and the backplane bus	Yes; Optocoupler	Yes; Optokopler	Yes; Optokopler	Yes; Optokopler	Yes; Optokopler	Yes; Optokopler
Dimensions and weight						
•Weight, approx.	190 g	200 g	260 g	210 g	260 g	250 g
•Width	40 mm	40 mm	40 mm	40 mm	40 mm	40 mm
•Height	125 mm	125 mm	125 mm	125 mm	125 mm	125 mm
•Depth	120 mm	120 mm	120 mm	120 mm	120 mm	120 mm
	6ES7 322-1BF01-0AA0	6ES7 322-1FF01-0AA0	6ES7 322-5FF00-0AB0	6ES7 322-1FH00-0AA0	6ES7 322-1FL00-0AA0	6ES7 322-1HF01-0AA0
Voltages and currents						
Load voltage L+						
- Rated value (DC)	24 V					24 V
Load voltage L1						
- Rated value (AC)		230 V; AC 120/230 V	230 V; AC 120/230 V	230 V; AC 120/230 V	120 V; AC 120/230 V	
Current consumption						
•from load voltage L+ (no load), max.	60 mA			2 mA		110 mA; Relay current consumption
•from load voltage L1 (no load), max.		2 mA	2 mA	3 mA	10 mA	110 mA
•from backplane bus 5 V DC, max.	40 mA	100 mA	100 mA	200 mA	190 mA	40 mA
•Power dissipation, typical	6.8 W	8.6 W	8.6 W	8.6 W	25 W	3.2 W
Connection system						
•Requisite front connector	20-pin	20-pin	40-pin	20-pin	20-pin	20-pin

SIMATIC S7-300

Digital modules

SM 322 digital output modules

Technical specifications (continued)

	6ES7 322-1BF01-0AA0	6ES7 322-1FF01-0AA0	6ES7 322-5FF00-0AB0	6ES7 322-1FH00-0AA0	6ES7 322-1FL00-0AA0	6ES7 322-1HF01-0AA0
Digital outputs						
• Number of digital outputs	8	8	8	16	32	8; Relais
• Length of cable shielded, max.	1,000 m	1,000 m	1,000 m	1,000 m	1,000 m	1,000 m
• Length of cable unshielded, max.	600 m	600 m	600 m	600 m	600 m	600 m
• Short-circuit protection of the output	Yes; electronic	Yes; Fusing	Yes; provided externally	Yes; Fusing in groups of 8	No	
• Limitation of voltage induced on circuit interruption to	L+ (-48 V)					
• Lamp load, max.	10 W	50 W	50 W	50 W	50 W	50 W
Output voltage - for 1 signal	L+ (-0.8 V)	L1 (-1.5 V)	L1 (-8.5V)	L+(-0.8V)	L1 (-0.8 V)	
Output current						
- for 1 signal rated value	2 A	2 A	2 A	1 A	1 A	
- for 1 signal permissible range for 0 to 40 °C, min.	5 mA	10 mA	10 mA	10 mA	10 mA	
- for 1 signal permissible range for 0 to 40 °C, max.	2.4 A	2 A	2 A	1 A	1 A	
- for 1 signal permissible range for 40 to 60 °C, min.	5 mA	10 mA	10 mA	10 mA	10 mA	
- for 1 signal permissible range for 40 to 60 °C, max.	2.4 A	1 A	1 A	0.5 A	1 A	
- for 1 signal minimum load current	5 mA	10 mA	10 mA	10 mA	10 mA	5 mA
- for 1 signal permissible surge current, max.		20 A; max. 1 AC cycle	20 A; with 2 half-waves	20 A; with 2 half-waves	10 A; per group (for 2 AC cycles)	
- for 0 signal residual current, max.	0,5 mA	2 mA	2 mA	2 mA	2 mA	
Switching frequency						
- at resistive load, max.	100 Hz	10 Hz	10 Hz	10 Hz	10 Hz	2 Hz
- at inductive load, max.	0.5 Hz	0.5 Hz	0.5 Hz	0.5 Hz	0.5 Hz	0.5 Hz
- at lamp load, max.	10 Hz	1 Hz	1 Hz	1 Hz	1 Hz	2 Hz
- Mechanical, max.						10 Hz
Summation current of the outputs (per group)						
• vertical mounting positions - up to 40°C., max.	4 A	2 A	4 A	2 A	4 A	
• horizontal mounting positions - up to 40°C., max.		4 A	8 A	4 A	4 A	
- up to 60°C., max.	4 A	2 A	4 A	2 A	3 A	
Relay outputs						
• Rated supply voltage of the relay L+ (DC)						24 V; 110 mA
• Number of operating cycles						300,000; 230 V AC: 100000, 120 V AC: 200000, 24 V DC : 300000 (at 2 A)
Switching capacity of the contacts						
- at inductive load, max.						2 A; 2 A (230 V AC), 2 A (24 V DC)
- at resistive load, max.						2 A

Technical specifications (continued)

	6ES7 322-1BF01-0AA0	6ES7 322-1FF01-0AA0	6ES7 322-5FF00-0AB0	6ES7 322-1FH00-0AA0	6ES7 322-1FL00-0AA0	6ES7 322-1HF01-0AA0
Status information/ interrupts/ diagnostics						
Interrupts						
- Diagnostic interrupt	No	No	Yes; parameterizable	No	No	No
Diagnostics						
- Diagnostics	No	Yes	Yes; OFF / last value / substitute value	Yes	Yes	No
Insulation						
• Insulation tested with	500 V DC	1500 V AC	1500 V AC	4000 V DC	4000 V DC	1500 V AC
Potentials/ electrical isolation						
Digital output functions						
- between the channels, in groups of	4	4	1	8	8	2
- between the channels and the backplane bus	Yes; Optocoupler	Yes; Optokopler	Yes; Optokopler	Yes; Optokopler	Yes; Optokopler	Yes; Optokopler
Dimensions and weight						
• Weight, approx.	190 g	275 g	275 g	275 g	500 g	190 g
• Width	40 mm	40 mm	40 mm	40 mm	80 mm	40 mm
• Height	125 mm	125 mm	125 mm	125 mm	125 mm	125 mm
• Depth	120 mm	120 mm	120 mm	120 mm	117 mm	120 mm

	6ES7 322-1HF10-0AA0	6ES7 322-5HF00-0AB0	6ES7 322-1HH01-0AA0
Voltages and currents			
Load voltage L+			
- Rated value (DC)	120 V	24 V	120 V
Load voltage L1			
- Rated value (AC)	230 V	230 V	230 V
Current consumption			
• from backplane bus 5 V DC, max.	40 mA	100 mA	100 mA
• Power dissipation, typical	4.2 W	3.5 W	4.5 W
Connection system			
• Requisite front connector	40-pin	40-pin	20-pin
Digital outputs			
• Number of digital outputs	8; Relay	8; Relay	8; Relay
• Length of cable shielded, max.	1,000 m	1,000 m	1,000 m
• Length of cable unshielded, max.	600 m	600 m	600 m
• Short-circuit protection of the output	No; provided externally	No; provided externally	
• Lamp load, max.	1,500 W; AC 230 V	1,500 W; AC 230 V	50 W; AC 230 V
Output current			
- for 1 signal minimum load current	5 mA	10 mA	10 mA
Switching frequency			
- at resistive load, max.	2 Hz	2 Hz	1 Hz
- at inductive load, max.	0.5 Hz	0.5 Hz	0.5 Hz
- at lamp load, max.	2 Hz	2 Hz	1 Hz
- Mechanical, max.	10 Hz	10 Hz	10 Hz
Summation current of the outputs (per group)			
• vertical mounting positions			
- up to 40°C., max.	5 A	5 A	8 A
• horizontal mounting positions			
- up to 60°C., max.	5 A	5 A	8 A

Technical specifications (continued)

	6ES7 322-1HF10-0AA0	6ES7 322-5HF00-0AB0	6ES7 322-1HH01-0AA0
Relay outputs			
• Rated supply voltage of the relay L+ (DC)	24 V		24 V
• Number of operating cycles	300,000; 300000 (24 V DC, at 2 A), 200000 (120 V AC, at 3 A), 100000 (230 V AC, at 3 A)	100,000; 100000 (24 V DC, at 5 A), 100000 (230 V AC, at 5 A)	100,000; 50000 (24 V DC, at 2 A), 700000 (120 V AC, at 2 A), 100000 (230 V AC, at 2 A)
Switching capacity of the contacts			
- at inductive load, max.	3 A; 3 A (230 V AC), 2 A (24 V DC)	5 A; 5 A (230 V AC), 5 A (24 V DC)	2 A; 2 A (230 V AC), 2 A (24 V DC)
- at resistive load, max.	8 A; 8 A (230 V AC), 5 A (24 V DC)	5 A; 5 A (230 V AC), 5 A (24 V DC)	2 A; 2 A (230 V AC), 2 A (24 V DC)
Status information/ interrupts/ diagnostics			
Interrupts			
- Diagnostic interrupt	No	Yes; parameterizable	No
Diagnostics			
- Diagnostics	No	Yes; OFF / last value / substitute value	No
Insulation			
• Insulation tested with	2000 V AC	1500 V AC	1500 V AC
Potentials/ electrical isolation			
Digital output functions			
- between the channels, in groups of	1	1	8
- between the channels and the backplane bus	Yes; Optocoupler	Yes; Optocoupler	Yes; Optocoupler
Dimensions and weight			
• Weight, approx.	320 g	320 g	250 g
• Width	40 mm	40 mm	40 mm
• Height	125 mm	125 mm	125 mm
• Depth	120 mm	120 mm	120 mm

Ordering data	Order No.	Order No.
SM 322 digital output modules		
including labeling strips, bus connector		
8 outputs, 24 V DC, 2 A	6ES7 322-1BF01-0AA0	
16 outputs, 24 V DC, 0.5 A	6ES7 322-1BH01-0AA0	
16 outputs, 24 V DC, 0.5 A, high speed	6ES7 322-1BH10-0AA0	
32 outputs, 24 V DC, 0.5 A	6ES7 322-1BL00-0AA0	
8 outputs, 24 V DC, 0.5 A, diagnostics capability	6ES7 322-8BF00-0AB0	
16 outputs, 24/48 V DC, 0.5 A ^{A)}	6ES7 322-5GH00-0AB0	
8 outputs, 48 to 125 V DC, 1.5 A ^{A)}	6ES7 322-1CF00-0AA0	
8 outputs, 120/230 V AC, 1 A	6ES7 322-1FF01-0AA0	
8 outputs, 120/230 V AC, 2 A ^{A)}	6ES7 322-5FF00-0AB0	
16 outputs, 120/230 V AC, 1 A	6ES7 322-1FH00-0AA0	
32 outputs, 120 V AC, 1 A	6ES7 322-1FL00-0AA0	
8 outputs, relay contacts, 2 A	6ES7 322-1HF01-0AA0	
8 outputs, relay contacts, 5 A	6ES7 322-1HF10-0AA0	
8 outputs, relay contacts, 5 A, with RC filter for overvoltage protection ^{A)}	6ES7 322-5HF00-0AB0	
16 outputs, relay contacts, 8 A	6ES7 322-1HH01-0AA0	
Front connector		
20-pin, with screw-type terminals		
• 1 item	6ES7 392-1AJ00-0AA0	
• 100 units	6ES7 392-1AJ00-1AB0	
20-pin, with spring-loaded termi- nals	6ES7 392-1BJ00-0AA0	
40-pin, with screw-type terminals		
• 1 item	6ES7 392-1AM00-0AA0	
• 100 units	6ES7 392-1AM00-1AB0	
40-pin, with spring-loaded termi- nals	6ES7 392-1BM01-0AA0	
Front door, elevated design ^{A)}	6ES7 328-0AA00-7AA0	
e.g. for 32-channel modules; permits connection of 1.3 mm ² /16 AWG conductors		
SIMATIC TOP connect	see page 4/157	
Bus connector	6ES7 390-0AA00-0AA0	
1 unit (spare part)		
Fuse set for SM 322 ^{A)}	6ES7 973-1HD00-0AA0	
10 fuses, 8 A fast-action, 2 fuse holders		
Labeling strip		
10 units (spare part)		
for signal modules (not 32-channel modules), function modules	6ES7 392-2XX00-0AA0	
for 32-channel signal modules	6ES7 392-2XX10-0AA0	
Label cover		
10 units (spare part)		
for signal modules (not 32-channel modules), function modules	6ES7 392-2XY00-0AA0	
for 32-channel signal modules	6ES7 392-2XY10-0AA0	
S7-SmartLabel	2XV9 450-1SL01-0YX0	
Software for machine labeling of modules directly from the STEP 7 project		
Labeling sheets for machine labeling		
for 16-channel signal module, DIN A4, for printing using laser printer; 10 units		
Petrol	6ES7 392-2AX00-0AA0	
Light beige	6ES7 392-2BX00-0AA0	
Yellow	6ES7 392-2CX00-0AA0	
Red	6ES7 392-2DX00-0AA0	
for 32-channel signal module, DIN A4, for printing using laser printer; 10 units		
Petrol	6ES7 392-2AX10-0AA0	
Light beige	6ES7 392-2BX10-0AA0	
Yellow	6ES7 392-2CX10-0AA0	
Red	6ES7 392-2DX10-0AA0	
SIMATIC Manual Collection ^{B)}	6ES7 998-8XC01-8YE0	
Electronic manuals on CD-ROM, multi-language: S7-200, TD 200, S7-300, C7, S7-400, STEP 7, engineering tools, runtime soft- ware, SIMATIC DP (distributed I/O), SIMATIC HMI (human machine interface), SIMATIC NET (industrial communication)		
SIMATIC Manual Collection Maintenance service for 1 year ^{B)}	6ES7 998-8XC01-8YE2	
Current S7 Manual Collection CD as well as the three following updates		
S7-300 manual		
Design, CPU data, module data, operation list		
German	6ES7 398-8FA10-8AA0	
English	6ES7 398-8FA10-8BA0	
French	6ES7 398-8FA10-8CA0	
Spanish	6ES7 398-8FA10-8DA0	
Italian	6ES7 398-8FA10-8EA0	

A) Subject to export regulations: AL: N and ECCN: EAR99H

B) Subject to export regulations: AL: N and ECCN: EAR99S

SIMATIC S7-300

Digital modules

SM 323/SM 327 digital input/output modules

Overview



- Digital inputs and outputs
- For connecting standard switches, two-wire proximity switches (BERO), solenoid valves, contactors, low-power motors, lamps and motor starters

Technical specifications

	6ES7 323-1BH01-0AA0	6ES7 323-1BL00-0AA0	6ES7 327-1BH00-0AB0
Voltages and currents			
Load voltage L+ - Rated value (DC)	24 V	24 V	24 V
Current consumption			
• from load voltage L+ (no load), max.	40 mA	80 mA	20 mA
• from backplane bus 5 V DC, max.	40 mA	80 mA	60 mA
• Power dissipation, typical	3.5 W	6.5 W	3 W
Connection system			
• Requisite front connector	20-pin	40-pin	20-pin
Clock synchronism			
• Clock synchronous operation	No	No	No
Digital inputs			
• Number of digital inputs	8	16	8; 8 hard-wired and 8 more for individual parameter assignment
Number of inputs that can be driven in parallel			
- Number of inputs that can be driven in parallel, up to 40 °C	8	16	16
- Number of inputs that can be driven in parallel, up to 60 °C	8	8	16
Length of cable			
- Length of cable shielded, max	1,000 m	1,000 m	1,000 m
- Length of cable unshielded, max	600 m	600 m	600 m
• Input characteristic to comply with IEC 1131, Type 1	Yes	Yes	Yes
Input voltage			
- Rated value, DC	24 V	24 V	24 V
- for signal "0"	-30 to 5 V	-30 to 5 V	-30 to 5 V
- for signal "1"	13 to 30 V	13 to 30 V	15 to 30 V
Input current			
- for 1 signal, typical	7 mA	7 mA	6 mA
Input delay (at rated value of the input voltage)			
• For standard inputs			
- at 0 to 1, min.	1.2 ms	1.2 ms	1.2 ms
- at 0 to 1, max.	4.8 ms	4.8 ms	4.8 ms
- at 1 to 0, min	1.2 ms	1.2 ms	1.2 ms
- at 1 to 0, max.	4.8 ms	4.8 ms	4.8 ms

Technical specifications (continued)

	6ES7 323-1BH01-0AA0	6ES7 323-1BL00-0AA0	6ES7 327-1BH00-0AB0
Digital outputs			
• Number of digital outputs	8	16	8; also parameterizable individually as DI
• Length of cable shielded, max.	1,000 m	1,000 m	1,000 m
• Length of cable unshielded, max.	600 m	600 m	600 m
• Short-circuit protection of the output	Yes; electronic	Yes; electronic	Yes; electronic
• Short-circuit protection of the output, response threshold, typical			1,0 A
• Limitation of voltage induced on circuit interruption to	L+ (-53 V)	L+ (-48 V)	L+ (-54 V)
• Lamp load, max.	5 W	5 W	5 W
• Driving a digital input	Yes	Yes	Yes
Output voltage - for 1 signal	L+ (-0.8 V)	L+ (-0.8 V)	L+ (-1.5 V)
Output current - for 1 signal rated value	0.5 A	0.5 A	0.5 A
- for 1 signal permissible range for 0 to 60 °C, min.			5 mA
- for 1 signal permissible range for 0 to 60 °C, max.			0.6 A
- for 1 signal minimum load current	5 mA	5 mA	
- for 0 signal residual current, max.	0.5 mA	0.5 mA	0.5 mA
Output delay at resistive load - "0" to "1", max.	100 µs	100 µs	350 µs
- "1" to "0", max.	500 µs	500 µs	500 µs
Parallel switching of 2 outputs - to increase power	No	No	No
- to redundantly drive a load	Yes; only outputs of the same group	Yes; only outputs of the same group	Yes; only outputs of the same group
Switching frequency - at resistive load, max.	100 Hz	100 Hz	100 Hz
- at inductive load, max.	0.5 Hz	0.5 Hz	0.5 Hz
- at lamp load, max.	10 Hz	100 Hz	10 Hz
Summation current of the outputs (per group)			
• vertical mounting positions - up to 40°C., max.	4 A	2 A	2 A
• horizontal mounting positions - up to 40°C., max.		4 A	4 A
- up to 60°C., max.	4 A	3 A	3 A
Load impedance range - lower limit	48 Ω	48 Ω	48 Ω
- upper limit	4 kΩ	4 kΩ	4 kΩ
Sensor			
Connectable encoders - 2-wire BEROs	Yes	Yes	Yes
- permissible closed-circuit current (2-wire BEROs), max.	2 mA	1.5 mA	1.5 mA
Status information/ interrupts/ diagnostics			
Interrupts - Interrupts	No	No	No
Diagnostics - Diagnostic functions	No	No	No

Technical specifications (continued)

	6ES7 323-1BH01-0AA0	6ES7 323-1BL00-0AA0	6ES7 327-1BH00-0AB0
Diagnostic display LED			
- Status display digital output (green)	Yes	Yes	Yes
- Status display digital input (green)	Yes	Yes	Yes
Insulation			
• Insulation tested with	500 V DC	500 V DC	500 V DC
Potentials/ electrical isolation			
Digital output functions			
- between the channels	Yes	Yes	No
- between the channels, in groups of	8	8	
- between the channels and the backplane bus	Yes; Optocoupler	Yes; Optocoupler	Yes; Optocoupler
Digital input functions			
- between the channels	Yes	Yes	No
- between the channels, in groups of	8	16	
- between the channels and the backplane bus	Yes; Optocoupler	Yes; Optocoupler	Yes; Optocoupler
Permissible potential difference			
• between different circuits	75 V DC/ 60 V AC	75 V DC/ 60 V AC	75 V DC/ 60 V AC
Dimensions and weight			
• Weight, approx.	220 g	260 g	200 g
• Width	40 mm	40 mm	40 mm
• Height	125 mm	125 mm	125 mm
• Depth	120 mm	120 mm	120 mm

Ordering data	Order No.		Order No.
SM 323 digital I/O modules incl. labeling strips, bus connectors 8 inputs, 8 outputs 16 inputs, 16 outputs	6ES7 323-1BH01-0AA0 6ES7 323-1BL00-0AA0	Sheets of labels for machine inscription For 16-channel signal modules, DIN A4, for printing using a laser printer; 10 items Petrol Light beige Yellow Red For 32-channel signal modules, DIN A4, for printing using a laser printer; 10 items Petrol Light beige Yellow Red	6ES7 392-2AX00-0AA0 6ES7 392-2BX00-0AA0 6ES7 392-2CX00-0AA0 6ES7 392-2DX00-0AA0
SM 327 digital I/O modules incl. labeling strips, bus connectors 8 inputs, 8 inputs or outputs (configurable)	6ES7 327-1BH00-0AB0		
Front connector 20-pin, screw-type terminals • 1 item • 100 items 20-pin, with spring-loaded terminals 40-pin, screw-type contacts • 1 item • 100 items 40-pin with spring-loaded terminals	6ES7 392-1AJ00-0AA0 6ES7 392-1AJ00-1AB0 6ES7 392-1BJ00-0AA0 6ES7 392-1AM00-0AA0 6ES7 392-1AM00-1AB0 6ES7 392-1BM01-0AA0	SIMATIC Manual Collection ^{B)} Electronic manuals on CD-ROM, multilingual: S7-200, TD 200, S7-300, C7, S7-400, STEP 7, Engineering Tools, Runtime Soft- ware, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Commu- nication)	6ES7 392-2AX10-0AA0 6ES7 392-2BX10-0AA0 6ES7 392-2CX10-0AA0 6ES7 392-2DX10-0AA0
Front door, enhanced version ^{A)} e.g., for 32-channel modules; supports the connection of 1.3 mm ² /16 AWG wires	6ES7 328-0AA00-7AA0	SIMATIC Manual Collection update service for 1 year ^{B)} Up-to-date Manual Collection CD as well as the three subsequent updates	6ES7 998-8XC01-8YE0 6ES7 998-8XC01-8YE2
SIMATIC TOP connect	see page 4/157		
Bus connectors 1 item (spare part)	6ES7 390-0AA00-0AA0	S7-300 Manual Configuration, CPU data, module data, command list German English French Spanish Italian	6ES7 398-8FA10-8AA0 6ES7 398-8FA10-8BA0 6ES7 398-8FA10-8CA0 6ES7 398-8FA10-8DA0 6ES7 398-8FA10-8EA0
Labeling strips 10 items (spare part) For signal modules (not 32-channel), function modules For 32-channel signal modules	6ES7 392-2XX00-0AA0 6ES7 392-2XX10-0AA0		
Label cover 10 items (spare part) For signal modules (not 32-channel), function modules For 32-channel signal modules	6ES7 392-2XY00-0AA0 6ES7 392-2XY10-0AA0		
S7 SmartLabel Software for labeling modules mechanically directly in the STEP 7 project	2XV9 450-1SL01-0YX0		

A) Subject to export regulations: AL: N and ECCN: EAR99H

B) Subject to export regulations: AL: N and ECCN: EAR99S

SIMATIC S7-300

SIPLUS digital modules

SIPLUS SM 321 digital input modules

Overview



- Digital inputs
- For connecting standard switches and two-wire proximity switches (BERO)

These modules are designed for

- an ambient range of $-25\text{ }^{\circ}\text{C}$ to $+70\text{ }^{\circ}\text{C}$, condensation permissible.
- extraordinary medial load (for example by chloric and sulphuric atmospheres).

Technical specifications

6AG1 321-1BH02-2AA0	see 6ES7 321-1BH02-0AA0
6AG1 321-1BL00-2AA0	see 6ES7 321-1BL00-0AA0
6AG1 321-1CH20-2AA0	see 6ES7 321-1CH20-0AA0
6AG1 321-7BH01-2AB0	see 6ES7 321-7BH01-0AB0
6AG1 321-1FF01-2AA0	see 6ES7 321-1FF01-0AA0

Ordering data

Order No.

SIPLUS SM 321 digital input modules

(extended temperature range and extraordinary medial load)
incl. labeling strips,
bus connectors

16 inputs, 24 V DC ^{A)}

32 inputs, 24 V DC ^{A)}

16 inputs, 48 to 120 V DC ^{A)}

16 inputs, 24 V DC,
for operation in isochrone mode ^{A)}

8 inputs, 120/230 V AC ^{A)}

Accessories

6AG1 321-1BH02-2AA0

6AG1 321-1BL00-2AA0

6AG1 321-1CH20-2AA0

6AG1 321-7BH01-2AB0

6AG1 321-1FF01-2AA0

see ordering data for
S7-300 digital input modules

A) Subject to export regulations: AL: N and ECCN: EAR99H

Overview



- Digital inputs and outputs
- for connecting standard switches, two-wire proximity switches (BERO), solenoid valves, contactors, low-power motors, lamps and motor starters

These modules are designed for

- an ambient range of -25 °C to + 70 °C, condensation permissible.
- extraordinary medial load (for example by chloric and sulphuric atmospheres).

Ordering data	Order No.
SIPLUS SM 322 digital output modules (extended temperature range and extraordinary medial load) incl. labeling strips, bus connectors	
16 outputs, 24 V DC; 0.5 A	6AG1 322-1BH01-2AA0
8 outputs, 24 V DC, 0.5 A, diagnostics capability	6AG1 322-8BF00-2AB0
8 outputs, 48 to 125 V DC, 1.5 A ^{A)}	6AG1 322-1CF00-2AA0
8 outputs, relay contacts, 5 A	6AG1 322-1HF10-2AA0
8 outputs, 120/230 V AC, 1 A	6AG1 322-1FF01-2AA0
Accessories	see ordering data for S7-300 digital input modules

A) Subject to export regulations: AL: N and ECCN: EAR99H

SIMATIC S7-300

SIPLUS digital modules

SIPLUS SM 323 digital input/output modules

Overview



- Digital inputs and outputs
- for connecting standard switches, two-wire proximity switches (BERO), solenoid valves, contactors, low-power motors, lamps and motor starters

These modules are designed for

- an ambient range of -25°C to $+70^{\circ}\text{C}$, condensation permissible.
- extraordinary medial load (for example by chloric and sulphuric atmospheres).

Technical specifications

6AG1 323-1BH01-2AA0

see 6ES7 323-1BH01-0AA0

Ordering data

Order No.

SM 323 digital I/O module

(extended temperature range and extraordinary medial load)
incl. labeling strips,
bus connectors

8 inputs, 8 outputs ^{A)}

6AG1 323-1BH01-2AA0

Accessories

see ordering data for
S7-300 digital input modules

A) Subject to export regulations: AL: N and ECCN: EAR99H

Overview



- Analog inputs
- For connection of voltage and current sensors, thermocouples, resistors and resistance thermometers

Technical specifications

	6ES7 331-7KF02-0AB0	6ES7 331-7HF01-0AB0	6ES7 331-1KF01-0AB0	6ES7 331-7KB02-0AB0
Voltages and currents				
Load voltage L+				
- Rated value (DC)	24 V	24 V		24 V
- Reverse polarity protection	Yes	Yes		Yes
Current consumption				
• from load voltage L+ (no load), max.	200 mA	50 mA		80 mA
• from backplane bus 5 V DC, max.	50 mA	60 mA	90 mA	50 mA
• Power dissipation, typical	1 W	1.5 W	0.4 W	1.3 W
Connection system				
• Requisite front connector	20-pin	20-pin	40-pin	20-pin
Clock synchronism				
• Clock synchronous operation	No	Yes	No	No
Analog inputs				
• Number of analog inputs	8	8	8	2
• Number of analog inputs for resistance measurement	4		8	1
• Length of cable shielded, max.	200 m; 50 m at 80 mV and thermocouples	200 m	200 m; max. 50 m at 50 mV	200 m; 50 m at 80 mV and thermocouples
• Permissible input voltage for the voltage input (destruction limit), max.	20 V; permanent; 75V for max. 1s (pulse duty ratio 1:20)	20 V; 20 V permanent; 75 V for max. 1 s (pulse duty ratio 1:20)	30 V; 12 V continuous, 30 V for max. 1 s	20 V; permanent; 75V for max. 1s (pulse duty ratio 1:20)
• Permissible input voltage for the current input (destruction limit), max.	40 mA	40 mA	40 mA	40 mA
Input ranges (rated values), voltages				
- 0 to +10 V			Yes	
- 1 to +5 V	Yes	Yes	Yes	Yes
- 1 to +10 V		Yes	No	
- 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		No	Yes
- 250 mV to +250 mV	Yes		No	Yes
- 5 V to +5 V	Yes	Yes	Yes	Yes
- 50 mV to +50 mV			Yes	
- 500 mV to +500 mV	Yes		Yes	Yes
- 80 mV to +80 mV	Yes			Yes

Technical specifications (continued)

	6ES7 331-7KF02-0AB0	6ES7 331-7HF01-0AB0	6ES7 331-1KF01-0AB0	6ES7 331-7KB02-0AB0
Analog inputs (continued)				
Input ranges (rated values), currents				
- 0 to 20 mA	Yes	Yes	Yes	Yes
- -10 to +10 mA	Yes			Yes
- -20 to +20 mA	Yes	Yes	Yes	Yes
- -3.2 to +3.2 mA	Yes			Yes
- 4 to 20 mA	Yes	Yes	Yes	Yes
Input ranges (rated values), thermocouples				
- Type E	Yes			Yes
- Type J	Yes			Yes
- Type K	Yes			Yes
- Type N	Yes			Yes
Input ranges (rated values), resistances				
- 0 to 150 ohms	Yes			Yes
- 0 to 300 ohms	Yes			Yes
- 0 to 600 ohms	Yes		Yes	Yes
- 0 to 6000 ohms			Yes	
Input ranges (rated values), resistance thermometer				
- Ni 100	Yes; Standard		Yes; Standard/climate	Yes
- LG-Ni 1000			Yes; Standard/climate	
- Pt 100	Yes; Standard		Yes; Standard/climate	Yes
Characteristic curve linearization				
- parameterizable	Yes		Yes	Yes
- for thermocouples	Type N, E, J, K, L			Type N, E, J, K, L
- for resistance thermometer	Pt 100 (standard range, climatic range), Ni 100 (standard range, climatic range)		yes; Pt100 standard/climatic; Ni100 standard/climatic; Ni1000 standard/climatic; LG-Ni1000 standard/climatic	Pt 100 (standard range, climatic range), Ni 100 (standard range, climatic range)
Temperature compensation				
- parameterizable	Yes			Yes
- external temperature compensation with compensating box possible	Yes			Yes
- internal temperature compensation possible	Yes			Yes
Analog value formation				
• Measuring principle	integrating	Conversion of instantaneous values	integrating	integrating
Integration and conversion time/triggering per channel				
- with over-range (bits incl. sign), max.	15 Bit; unipolar: 9 / 12 / 12 / 14 bits, bipolar: 9 + VZ/12 + VZ/12 + VZ/14 + VZ bits	14 Bit; unipolar: 14 bits; bipolar: 13+VZ bits	13 Bit	15 Bit; unipolar: 9 / 12 / 12 / 14 bits, bipolar: 9 + VZ/12 + VZ/12 + VZ/14 + VZ bits
- Integration time parameterizable	Yes; 2.5 / 16.67 / 20 / 100 ms	Yes	Yes; 60 / 50 ms	Yes; 2.5 / 16.67 / 20 / 100 ms
- Basic conversion time incl. integration time, ms	3 / 17 / 22 / 102 ms		66 / 55 ms	6 / 34 / 44 / 204 ms
- Basic conversion time, ms				
- Interference voltage suppression for interference frequency f1 in Hz	400 / 60 / 50 / 10 Hz	52 µs per channel 400 / 60 / 50 / 10 Hz	66 / 55 ms 50 / 60 Hz	400 / 60 / 50 / 10 Hz

Technical specifications (continued)

	6ES7 331-7KF02-0AB0	6ES7 331-7HF01-0AB0	6ES7 331-1KF01-0AB0	6ES7 331-7KB02-0AB0
Sensor				
Sensing element connection				
- for current measurement, as 2-wire measuring transducer	Yes	Yes	Yes; with extreme power supply	Yes
- for current measurement, as 4-wire measuring transducer	Yes	Yes	Yes	Yes
- for resistance measurement, with 2-wire connection	Yes		Yes	Yes
- for resistance measurement, with 3-wire connection	Yes		Yes	Yes
- for resistance measurement, with 4-wire connection	Yes		Yes	Yes
Error/accuracies				
Operational limit in the entire temperature range				
- relative to the input range, voltage	+/- 1 %; +/-1% (80 mV), +/-0.6% (250-1000 mV), +/-0.8% (2.5-10 mV)	+/- 0.4 %	+/- 0.6 %; +/-0.6% (+/-5V,10V,1-5V,0-10V; +/-0.5% (+/-50mV,500mV,1V	+/- 1 %; +/-1% (80mV), +/- 0.6% (250-1000mV), +/- 0.8% (2.5-10V)
- relative to the input range, current	+/- 0.7 %; from 3.2 - 20mA	+/- 0.3 %	+/- 0.5 %; +/-20mA,0-20mA,4-20mA	+/- 0.7 %; from 3.2 to 20mA
- relative to the input range, resistance	+/- 0.7 %; 50, 300, 600 ohms		+/- 0.5 %; 0-6kOhms, 0-600kOhms	+/- 0.7 %; 150, 300, 600 ohms
- relative to the input range, resistance thermometer	+/- 0.7 %; +/-0.7% (Pt100/ Ni100) +/-0.8% (Pt100 climat)		1 Kelvin (Pt100,Ni100,climatic; Ni1000,LG-Ni1000,stan- dard; Ni1000,LG- Ni1000,climatic); 1.2 Kelvin (Pt100,Ni100, standard)	+/- 0.7 %; +/-0.7% (Pt100/ Ni100) +/-0.8% (Pt100 climat)
Basic error limit (operational limit at 25 °C)				
- relative to the input range, voltage	+/- 0.6 %; +/-0.4% (250-1000mV) +/-0.6% (2.5-10mV) +/-0.7% (80mV)	+/- 0.25 %	+/- 0.4 %; 0.4% (+/-5V,10V,1-5V,0-10V); 0.3% (+/- 50mV,500mV,1V)	+/- 0.6 %; +/-0.6% (80mV, 2.5-10V) +/-0.4% (250-1000mV)
- relative to the input range, current	+/- 0.5 %; 3.2-20 mA	+/- 0.2 %	+/- 0.3 %; +/-20mA, 0-20mA, 4-20mA	+/- 0.5 %; 3.2-20 mA
- relative to the input range, resistance	+/- 0.5 %; 150, 300, 600 ohms		+/- 0.3 %; 0-6kOhms,0-600kOhms	+/- 0.5 %; 1 50, 300, 600 ohms
- relative to the input range, resistance thermometer	+/- 0.6 %; +/-0.5% (Pt100/ Ni100) +/-0.6% (Pt100 climatic)		1 Kelvin (Pt100,Ni100,standard) 0.8 Kelvin (Pt100,Ni100,climatic; Ni1000,LG-Ni1000, standard; Ni1000, LG-Ni1000,climatic)	+/- 0.6 %; +/-0.5% (Pt100/ Ni100) +/-0.6% (Pt100 climatic)
Status information/ interrupts/ diagnostics				
Interrupts				
- Diagnostic interrupt	Yes; parameterizable channels 0 and 2	Yes; parameterizable	No	Yes
- Limit value interrupt	Yes; parameterizable	Yes; parameterizable channels 0 and 2	No	Yes; parameterizable; channel 0
Diagnostics				
- Diagnostic information can be read out	Yes	Yes	No	Yes

SIMATIC S7-300

Analog modules

SM 331 analog input modules

Technical specifications (continued)

	6ES7 331-7KF02-0AB0	6ES7 331-7HF01-0AB0	6ES7 331-1KF01-0AB0	6ES7 331-7KB02-0AB0
Insulation				
• Insulation tested with	500 V DC	500 V DC	500 V DC	500 V DC
Potentials/ electrical isolation				
Analog output functions				
- between the channels	Yes	No	No	No
- between the channels, in groups of	2			
- between the channels and the backplane bus	Yes	Yes	Yes	Yes
Dimensions and weight				
• Weight, approx.	250 g	200 g	250 g	250 g
• Width	40 mm	40 mm	40 mm	40 mm
• Height	125 mm	125 mm	125 mm	125 mm
• Depth	120 mm	120 mm	117 mm	120 mm

	6ES7 331-7PF00-0AB0	6ES7 331-7PF10-0AB0	6ES7 331-7NF00-0AB0	6ES7 331-7NF10-0AB0
Voltages and currents				
Load voltage L+				
- Rated value (DC)	24 V	24 V		24 V
- Reverse polarity protection	Yes	Yes		Yes
Current consumption				
• from load voltage L+ (no load), max.	240 mA	200 mA		200 mA
• from backplane bus 5 V DC, max.	100 mA	100 mA	130 mA	100 mA
• Power dissipation, typical	4.6 W	3 W	0.6 W	3 W
Connection system				
• Requisite front connector	40-pin	40-pin	40-pin	40-pin
Clock synchronism				
• Clock synchronous operation	No	No	No	No
Analog inputs				
• Number of analog inputs	8	8	8	8
• Number of analog inputs for resistance measurement	8			
• Length of cable shielded, max	200 m	100 m	200 m	200 m
• Permissible input voltage for the voltage input (destruction limit), max.	75 V; 35 V permanent, 75 V for max. 1 s (cycle factor 1:20)	75 V; 20 V DC continuous; 75 V DC for max. 1s (pulse duty ratio 1:20)	50 V; permanent	75 V; 35 V continuous; 75 V for max. 1s (pulse duty ratio 1:20)
• Permissible input voltage for the current input (destruction limit), max.			32 mA	40 mA
Input ranges (rated values), voltages				
- 1 to +5 V			Yes	Yes
- -10 V to +10 V			Yes	Yes
- -5 V to +5 V			Yes	Yes
Input ranges (rated values), currents				
- 0 to 20 mA			Yes	Yes
- -20 to +20 mA			Yes	Yes
- 4 to 20 mA			Yes	Yes

Technical specifications (continued)

	6ES7 331-7PF00-0AB0	6ES7 331-7PF10-0AB0	6ES7 331-7NF00-0AB0	6ES7 331-7NF10-0AB0
Analog inputs (continued)				
Input ranges (rated values), thermocouples				
- 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), resistances				
- 0 to 150 ohms	Yes			
- 0 to 300 ohms	Yes			
- 0 to 600 ohms	Yes			
Input ranges (rated values), resistance thermometer				
- Cu 10	Yes			
- Ni 100	Yes			
- Ni 1000	Yes			
- Ni 120	Yes			
- Ni 200	Yes			
- Ni 500	Yes			
- Pt 100	Yes			
- Pt 1000	Yes			
- Pt 200	Yes			
- Pt 500	Yes			
Characteristic curve linearization				
- parameterizable	Yes	Yes		
- for thermocouples		Type B, E, J, K, L, N, R, S, T, U, C		
- for resistance thermometer	Pt 100, Pt 200, Pt 500, Pt 1000, Ni 100, Ni 120, Ni 200, Ni 500, Ni 1000, Cu 10 (standard/climatic)			
Temperature compensation				
- parameterizable		Yes		
- external temperature compensation with compensating box possible		Yes		
- external temperature compensation with Pt100		Yes		
- internal temperature compensation possible		Yes		
Analog value formation				
• Measuring principle	integrating	integrating	integrating	integrating
Integration and conversion time/triggering per channel				
- with over-range (bits incl. sign), max	16 Bit; Two's complement	16 Bit; Two's complement	16 Bit; unipolar: 15 / 15 / 15 / 15 bits, bipolar: 15 + VZ/ 15 + VZ/15 + VZ/15 + VZ	16 Bit; unipolar: 15 / 15 / 15 / 15 bits, bipolar: 15 + VZ/ 15 + VZ/15 + VZ/15 + VZ
- Integration time parameterizable	Yes	Yes	Yes; 10 / 16,67 / 20 / 100 ms	Yes; 23 / 72 / 83 / 95 ms
- Basic conversion time, ms	up to 4 channels: 10 ms per module, as of 5 channels: 190 ms per module, 8 channels: 80 ms	up to 4 channels: 10 ms per module, as of 5 channels: 190 ms per module		10 ms (4-channel mode) 95 / 83 / 72 / 23 ms (8-channel mode)
- Interference voltage suppression for interference frequency f1 in Hz	400 / 60 / 50 Hz	400 / 60 / 50 Hz	400 / 60 / 50 / 10 Hz	400 / 60 / 50 Hz, combinations of 400, 60, 50 Hz

Technical specifications (continued)

	6ES7 331-7PF00-0AB0	6ES7 331-7PF10-0AB0	6ES7 331-7NF00-0AB0	6ES7 331-7NF10-0AB0
Sensor				
Sensing element connection				
- for current measurement, as 2-wire measuring transducer			Yes; with external measuring transducer; possible with separate power supply for the measuring transducer	Yes; with external measuring transducer, power supply; possible with separate power supply for the measuring transducer
- for current measurement, as 4-wire measuring transducer			Yes	Yes
- for resistance measurement, with 2-wire connection	Yes; without resistance correction			
- for resistance measurement, with 3-wire connection	Yes			
- for resistance measurement, with 4-wire connection	Yes			
Error/accuracies				
Operational limit in the entire temperature range				
- relative to the input range, voltage		+/- 1 K	+/- 0.1 %; +/-0.7%	+/- 0.1 %
- relative to the input range, current			+/- 0.3 %; +/-0.9%	+/- 0.1 %
- relative to the input range, resistance	+/- 0.1 %			
- relative to the input range, resistance thermometer	+/- 1 K			
Basic error limit (operational limit at 25 °C)				
- relative to the input range, voltage		+/- 0.5 K	+/- 0.05 %	+/- 0.05 %
- relative to the input range, current			+/- 0.05 %	+/- 0.05 %
- relative to the input range, resistance	+/- 0.05 %			
- relative to the input range, resistance thermometer	+/- 0.5 K			
Status information/ interrupts/ diagnostics				
Interrupts				
- Diagnostic interrupt	Yes; parameterizable per group	Yes; parameterizable per group	Yes; parameterizable	Yes; parameterizable
- Limit value interrupt	Yes; parameterizable	Yes; parameterizable	Yes; parameterizable channels 0 and 2	Yes; parameterizable all channels (end-of-cycle interrupt also supported throughout modules)
Diagnostics				
- Diagnostic information can be read out	Yes	Yes	Yes	Yes
Insulation				
•Insulation tested with	500 V DC	500 V DC	500 V DC	500 V AC
Potentials/ electrical isolation				
Analog output functions				
- between the channels	Yes	Yes		Yes
- between the channels, in groups of	2	2		2
- between the channels and the backplane bus	Yes	Yes	Yes	Yes
Dimensions and weight				
•Weight, approx.	272 g	272 g	272 g	272 g
•Width	40 mm	40 mm	40 mm	40 mm
•Height	125 mm	125 mm	125 mm	125 mm
•Depth	120 mm	120 mm	120 mm	120 mm

Ordering data	Order No.	Order No.
Analog input modules SM 331 incl. labeling strips, bus connector, measuring range modules 8 inputs, 13-bit resolution 8 inputs, 9/12/14-bit resolution 2 inputs, 9/12/14-bit resolution ^{A)} 8 inputs, enhanced 16-bit resolution ^{A)} 8 inputs, enhanced 16-bit resolution, 4-channel mode ^{A)} 8 inputs, 14-bit resolution, for operation in isochrone mode 8 inputs for resistance thermometers ^{A)} 8 inputs for thermocouples ^{A)}	6ES7 331-1KF01-0AB0 6ES7 331-7KF02-0AB0 6ES7 331-7KB02-0AB0 6ES7 331-7NF00-0AB0 6ES7 331-7NF10-0AB0 6ES7 331-7HF01-0AB0 6ES7 331-7PF00-0AB0 6ES7 331-7PF10-0AB0	Labeling strips 10 items for signal modules (not 32-channel), function modules 6ES7 392-2XX00-0AA0 S7 SmartLabel Software for labeling modules mechanically directly in the STEP 7 project 2XV9 450-1SL01-0YX0 Sheets of labels for machine inscription For 16-channel signal modules, DIN A4, for printing using a laser printer; 10 items Petrol Light beige Yellow Red 6ES7 392-2AX00-0AA0 6ES7 392-2BX00-0AA0 6ES7 392-2CX00-0AA0 6ES7 392-2DX00-0AA0 For 32-channel signal modules, DIN A4, for printing using a laser printer; 10 items Petrol Light beige Yellow Red 6ES7 392-2AX10-0AA0 6ES7 392-2BX10-0AA0 6ES7 392-2CX10-0AA0 6ES7 392-2DX10-0AA0 SIMATIC Manual Collection ^{B)} Electronic manuals on CD-ROM, multilingual: 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) 6ES7 998-8XC01-8YE0 SIMATIC Manual Collection update service for 1 year ^{B)} Up-to-date Manual Collection CD as well as the three subsequent updates 6ES7 998-8XC01-8YE2 S7-300 Manual Configuration, CPU data, module data, command list German English French Spanish Italian 6ES7 398-8FA10-8AA0 6ES7 398-8FA10-8BA0 6ES7 398-8FA10-8CA0 6ES7 398-8FA10-8DA0 6ES7 398-8FA10-8EA0
Measuring range module for analog inputs 1 module for 2 analog inputs; 2 items (spare part)	6ES7 974-0AA00-0AA0	
Front connectors 1 item 20-pin, with screw-type terminals • 1 item • 100 items 20-pin, with spring-loaded terminals 40-pin, screw-type contacts • 1 item • 100 items 40-pin, with spring-loaded terminals	6ES7 392-1AJ00-0AA0 6ES7 392-1AJ00-1AB0 6ES7 392-1BJ00-0AA0 6ES7 392-1AM00-0AA0 6ES7 392-1AM00-1AB0 6ES7 392-1BM01-0AA0	
Front door, enhanced version ^{A)} e.g. for 32-channel modules; for connecting 1.3 mm ² / 16 AWG conductors	6ES7 328-0AA00-7AA0	
SIMATIC TOP connect	see page 4/157	
Bus connectors 1 item (spare part)	6ES7 390-0AA00-0AA0	
Shield attachment 80 mm wide, with 2 rows each for 4 shield connection terminals	6ES7 390-5AA00-0AA0	
Terminal elements 2 items For 2 cables 2 to 6 mm in diameter For 1 cable 3 to 8 mm in diameter For 1 cable 4 to 13 mm in diameter	6ES7 390-5AB00-0AA0 6ES7 390-5BA00-0AA0 6ES7 390-5CA00-0AA0	
Label cover 10 items for signal modules (not 32-channel), function modules	6ES7 392-2XY00-0AA0	

A) Subject to export regulations: AL: N and ECCN: EAR99H

B) Subject to export regulations: AL: N and ECCN: EAR99S

SIMATIC S7-300

Analog modules

SM 332 analog output modules

Overview



- Analog outputs
- For the connection of analog actuators

Technical specifications

	6ES7 332-5HB01-0AB0	6ES7 332-5HD01-0AB0	6ES7 332-5HF00-0AB0	6ES7 332-7ND01-0AB0
Voltages and currents				
Load voltage L+ - Rated value (DC)	24 V	24 V	24 V	24 V
Current consumption				
• from load voltage L+ (no load), max.	135 mA	240 mA	340 mA	240 mA
• from backplane bus 5 V DC, max.	60 mA	60 mA	100 mA	100 mA
• Power dissipation, typical	3 W	3 W	6 W	3 W
Connection system				
• Requisite front connector	20-pin	20-pin	40-pin	20-pin
Analog outputs				
• Number of analog outputs	2	4	8	4; isochrone mode
• Length of cable shielded, max.	200 m	200 m	200 m	200 m
• Voltage output, short-circuit protection	Yes	Yes	Yes	Yes
• Voltage output, short-circuit current, max	25 mA	25 mA	25 mA	40 mA
• Current output, open-circuit voltage, max.	18 V	18 V	18 V	18 V
Output ranges, voltage				
- 0 to 10 V	Yes	Yes	Yes	Yes
- 1 to 5 V	Yes	Yes	Yes	Yes
- -10 to +10 V	Yes	Yes	Yes	Yes
Output ranges, current				
- 0 to 20 mA	Yes	Yes	Yes	Yes
- -20 to +20 mA	Yes	Yes	Yes	Yes
- 4 to 20 mA	Yes	Yes	Yes	Yes
Burden resistance (in the nominal output range)				
- at voltage outputs, min.	1 k Ω	1 k Ω	1 k Ω	1 k Ω
- at voltage outputs, capacitive load, max.	1 μ F	1 μ F	1 μ F	1 μ F
- at current outputs, max.	500 Ω	500 Ω	500 Ω	500 Ω
- at current outputs, inductive load, max.	10 mH	10 mH	10 mH	1 mH

Technical specifications (continued)

	6ES7 332-5HB01-0AB0	6ES7 332-5HD01-0AB0	6ES7 332-5HF00-0AB0	6ES7 332-7ND01-0AB0
Analog value formation				
Integration and conversion time/triggering per channel				
- with over-range (bits incl. sign), max.	12 Bit; +/- 10 V, +/- 20mA, 4 to 20 mA, 1 to 5 V: 11 bits + sign, 0 to 10 V, 0 to 20 mA: 12 bits	12 Bit; +/- 10 V, +/- 20mA, 4 to 20 mA, 1 to 5 V: 11 bits + sign, 0 to 10 V, 0 to 20 mA: 12 bits	12 Bit; +/- 10 V, +/- 20mA, 4 to 20 mA, 1 to 5 V: 11 bits + sign, 0 to 10 V, 0 to 20 mA: 12 bits	16 Bit; +/-10V(16 bits); 0-10V(15 bits); 1-5V(14 bits); +/-20mA(15 bits); 0-20mA(14 bits); 4-20mA(14 bits)
- Conversion time (per channel)	0.8 ms	0.8 ms	0.8 ms	0.8 ms; 0.8ms (standard mode); 1.6ms (clocked mode)
Settling time				
- for resistive load	0.2 ms	0.2 ms	0.2 ms	0.2 ms
- for capacitive load	3.3 ms	3.3 ms	3.3 ms	3.3 ms
- for inductive load	0.5 ms; 0.5 ms(1mH); 3.3ms(10mH)	0.5 ms; 0.5ms (1mH); 3.3ms (10mH)	0.5 ms; 0.5ms (1mH); 3.3ms (10mH)	0.5 ms; 0.5ms (1mH); 3.3ms (10mH)
Error/accuracies				
Operational limit in the entire temperature range				
- Relative to the output range, voltage	+/- 0.5 %	+/- 0.5 %	+/- 0.5 %	+/- 0.12 %
- Relative to the output range, current	+/- 0.6 %	+/- 0.6 %	+/- 0.6 %	+/- 0.18 %
Basic error limit (operational limit at 25 °C)				
- relative to the output range, voltage	+/- 0.4 %	+/- 0.4 %	+/- 0.4 %	+/- 0.02 %; +/-10V(+/-0.02%); 0-10V(+/-0.02%); 1-5V(+/-0.04%)
- relative to the output range, current	+/- 0.5 %	+/- 0.5 %	+/- 0.5 %	+/- 0.02 %; +/-20mA(+/-0.02%); 0-20mA(+/-0.02%); 4-20mA(+/-0.04%)
Status information/ interrupts/ diagnostics				
•Applying substitute values	Yes; parameterizable	Yes; parameterizable	Yes; parameterizable	Yes; parameterizable
Interrupts				
- Diagnostic interrupt	Yes; parameterizable	Yes; parameterizable	Yes; parameterizable	Yes; parameterizable
Diagnostics				
- Diagnostic information can be read out	Yes	Yes	Yes	Yes
Insulation				
•Insulation tested with	500 V DC	500 V DC	500 V DC	500 V DC
Potentials/ electrical isolation				
Analog output functions				
- between the channels and the backplane bus	Yes	Yes	Yes	Yes
Dimensions and weight				
•Weight, approx.	220 g	220 g	272 g	220 g
•Width	40 mm	40 mm	40 mm	40 mm
•Height	125 mm	125 mm	125 mm	125 mm
•Depth	120 mm	120 mm	120 mm	120 mm

SM 332 analog output modules

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Ordering data	Order No.	Order No.
SM 332 analog output modules including labeling strips, bus connector		S7 SmartLabel Software for labeling modules mechanically directly in the STEP 7 project
4 outputs	6ES7 332-5HD01-0AB0	2XV9 450-1SL01-0YX0
4 outputs, 15 bit ^{A)}	6ES7 332-7ND01-0AB0	
2 outputs	6ES7 332-5HB01-0AB0	
8 outputs	6ES7 332-5HF00-0AB0	
Front connector		Sheets of labels for machine inscription For 16-channel signal modules, DIN A4, for printing using a laser printer; 10 items
1 item		Petrol 6ES7 392-2AX00-0AA0
20-pin, with screw-type terminals		Light beige 6ES7 392-2BX00-0AA0
• 1 item	6ES7 392-1AJ00-0AA0	Yellow 6ES7 392-2CX00-0AA0
• 100 units	6ES7 392-1AJ00-1AB0	Red 6ES7 392-2DX00-0AA0
20-pin, with spring-loaded terminals	6ES7 392-1BJ00-0AA0	
40-pin, with screw-type terminals		For 32-channel signal modules, DIN A4, for printing using a laser printer; 10 items
• 1 item	6ES7 392-1AM00-0AA0	Petrol 6ES7 392-2AX10-0AA0
• 100 units	6ES7 392-1AM00-1AB0	Light beige 6ES7 392-2BX10-0AA0
40-pin, with spring-loaded terminals	6ES7 392-1BM01-0AA0	Yellow 6ES7 392-2CX10-0AA0
		Red 6ES7 392-2DX10-0AA0
Front door, elevated design ^{A)}	6ES7 328-0AA00-7AA0	SIMATIC Manual Collection ^{B)} Electronic manuals on CD-ROM, multilingual: 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)
e.g. for 32-channel modules; permits connection of 1.3 mm ² / 16 AWG conductors		6ES7 998-8XC01-8YE0
SIMATIC TOP connect	see page 4/157	
Bus connector	6ES7 390-0AA00-0AA0	SIMATIC Manual Collection update service for 1 year ^{B)} Up-to-date Manual Collection CD as well as the three subsequent updates
1 unit (spare part)		
Shield connecting element	6ES7 390-5AA00-0AA0	S7-300 Manual Configuration, CPU data, module data, command list
80 mm wide, with 2 rows for 4 terminal elements each		German 6ES7 398-8FA10-8AA0
Terminal elements		English 6ES7 398-8FA10-8BA0
2 units		French 6ES7 398-8FA10-8CA0
For 2 cables with 2 to 6 mm diameter	6ES7 390-5AB00-0AA0	Spanish 6ES7 398-8FA10-8DA0
For 1 cable with 3 to 8 mm diameter	6ES7 390-5BA00-0AA0	Italian 6ES7 398-8FA10-8EA0
For 1 cable with 4 to 13 mm diameter	6ES7 390-5CA00-0AA0	
Label covers	6ES7 392-2XY00-0AA0	
10 units for signal modules (not 32-channel modules), function modules		
Labeling strips	6ES7 392-2XX00-0AA0	
10 units for signal modules (not 32-channel modules), function modules		

A) Subject to export regulations: AL: N and ECCN: EAR99H

B) Subject to export regulations: AL: N and ECCN: EAR99S

Overview



- Analog inputs and outputs
- For the connection of analog sensors and actuators

4

Technical specifications

	6ES7 334-0CE01-0AA0	6ES7 334-0KE00-0AB0
Voltages and currents		
Load voltage L+ - Rated value (DC)	24 V	24 V
Current consumption		
• from load voltage L+ (no load), max.	110 mA	80 mA
• from backplane bus 5 V DC, max.	55 mA	60 mA
• Power dissipation, typical	3 W	2 W
Connection system		
• Requisite front connector	20-pin	20-pin
Analog inputs		
• Number of analog inputs	4	4
• Number of analog inputs for voltage measurement	4	2
• Number of analog inputs for resistance measurement		4
• Permissible input voltage for the voltage input (destruction limit), max.	20 V; max. 20V continuous; 75V for max. 1s (pulse duty ratio 1:20)	20 V; permanent; 75 V for max. 1s (pulse duty ratio 1:20)
• Permissible input voltage for the current input (destruction limit), max.	40 mA	
• Cycle time (all channels)	5 ms; AE+AA	85 ms
Input ranges (rated values), voltages - 0 to +10 V	Yes	Yes
Input ranges (rated values), currents - 0 to 20 mA	Yes	
Input ranges (rated values), resistances - 0 to 10000 ohms		Yes
Input ranges (rated values), resistance thermometer - Pt 100		Yes; climatic range only

	6ES7 334-0CE01-0AA0	6ES7 334-0KE00-0AB0
Analog outputs		
• Number of analog outputs	2	2
• Length of cable shielded, max	200 m	100 m
• Voltage output, short-circuit protection	Yes	Yes
• Voltage output, short-circuit current, max	11 mA	10 mA
• Current output, open-circuit voltage, max.	15 V	
Output ranges, voltage - 0 to 10 V	Yes	Yes
Output ranges, current - 0 to 20 mA	Yes	
Burden resistance (in the nominal output range)		
- at voltage outputs, min.	5 kΩ	2.5 kΩ
- at voltage outputs, capacitive load, max.	1 μF	1 μF
- at current outputs, max.	300 Ω	
- at current outputs, inductive load, max.	1 mH	
Analog value formation		
Integration and conversion time/triggering per channel		
- with over-range (bits incl. sign), max	8 Bit	12 Bit
- Integration time, ms		16,67; 20
Settling time		
- for resistive load	0.3 ms	0.8 ms
- for capacitive load	3 ms	0.8 ms
- for inductive load	0.3 ms	

SIMATIC S7-300

Analog modules

SM 334 analog input/output modules

Technical specifications (continued)

	6ES7 334-0CE01-0AA0	6ES7 334-0KE00-0AB0
Sensor		
Sensing element connection	Yes	
- for current measurement, as 4-wire measuring transducer		Yes
- for resistance measurement, with 2-wire connection		Yes
- for resistance measurement, with 3-wire connection		Yes
- for resistance measurement, with 4-wire connection		Yes
Error/accuracies		
Operational limit in the entire temperature range		
- Relative to the output range, voltage	+/- 0.6 %	+/- 1 %
- Relative to the output range, current	+/- 1 %	
- relative to the input range, voltage	+/- 0.9 %	+/- 0.7 %; 0 to 10 V
- relative to the input range, current	+/- 0.8 %	
- relative to the input range, resistance		+/- 3.5 %; 10 kOhm
- relative to the input range, resistance thermometer		+/- 1 %
Basic error limit (operational limit at 25 °C)		
- relative to the output range, voltage	+/- 0.5 %	+/- 0.85 %
- relative to the output range, current	+/- 0.5 %	
- relative to the input range, voltage	+/- 0.7 %	+/- 0.5 %; 0 to 10 V
- relative to the input range, current	+/- 0.6 %	
- relative to the input range, resistance		+/- 2.8 %; 10 kOhm
- relative to the input range, resistance thermometer		+/- 0.8 %

	6ES7 334-0CE01-0AA0	6ES7 334-0KE00-0AB0
Status information/ interrupts/ diagnostics		
Interrupts		
- Interrupts	No	No
Diagnostics		
- Diagnostic functions	No	No
Insulation		
• Insulation tested with	500 V DC	500 V DC
Potentials/ electrical isolation		
Analog output functions		
- between the channels and the backplane bus	No	Yes
Analog output functions		
- between the channels and the backplane bus	No	Yes
Dimensions and weight		
• Weight, approx.	285 g	200 g
• Width	40 mm	40 mm
• Height	125 mm	125 mm
• Depth	120 mm	120 mm

Ordering data	Order No.	Order No.
SM 334 analog input/output modules incl. labeling strips, bus connector 4 inputs, 2 outputs 4 inputs, 2 outputs; resistance measurement, Pt 100	6ES7 334-0CE01-0AA0 6ES7 334-0KE00-0AB0	S7-SmartLabel Software for machine labeling of modules directly from the STEP 7 project 2XV9 450-1SL01-0YX0
Front connector 1 item 20-pin, with screw-type terminals • 1 item • 100 units 20-pin, with spring-loaded terminals	6ES7 392-1AJ00-0AA0 6ES7 392-1AJ00-1AB0 6ES7 392-1BJ00-0AA0	Labeling sheets for machine labeling for 16-channel signal module, DIN A4, for printing using laser printer; 10 units Petrol Light beige Yellow Red for 32-channel signal module, DIN A4, for printing by laser printer; 10 units Petrol Light beige Yellow Red
Front door, elevated design ^{A)} e.g. for 32-channel modules; permits connection of 1.3 mm ² /16 AWG conductors	6ES7 328-0AA00-7AA0	6ES7 392-2AX00-0AA0 6ES7 392-2BX00-0AA0 6ES7 392-2CX00-0AA0 6ES7 392-2DX00-0AA0
SIMATIC TOP connect	see page 4/157	6ES7 392-2AX10-0AA0 6ES7 392-2BX10-0AA0 6ES7 392-2CX10-0AA0 6ES7 392-2DX10-0AA0
Bus connector 1 unit (spare part)	6ES7 390-0AA00-0AA0	SIMATIC Manual Collection ^{B)} Electronic manuals on CD-ROM, 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)
Shield connecting element 80 mm wide, with 2 rows for 4 terminal elements each	6ES7 390-5AA00-0AA0	6ES7 998-8XC01-8YE0
Terminal elements 2 units For 2 cables with 2 to 6 mm diameter For 1 cable with 3 to 8 mm diameter For 1 cable with 4 to 13 mm diameter	6ES7 390-5AB00-0AA0 6ES7 390-5BA00-0AA0 6ES7 390-5CA00-0AA0	SIMATIC Manual Collection Maintenance service for 1 year ^{B)} Current S7 Manual Collection CD as well as the three following updates
Label covers 10 units for signal modules (not 32-channel modules), function modules	6ES7 392-2XY00-0AA0	S7-300 manual Design, CPU data, module data, operation list German English French Spanish Italian
Labeling strips 10 units for signal modules (not 32-channel modules), function modules	6ES7 392-2XX00-0AA0	6ES7 398-8FA10-8AA0 6ES7 398-8FA10-8BA0 6ES7 398-8FA10-8CA0 6ES7 398-8FA10-8DA0 6ES7 398-8FA10-8EA0

A) Subject to export regulations: AL: N and ECCN: EAR99H

B) Subject to export regulations: AL: N and ECCN: EAR99S

SIMATIC S7-300

Analog modules

SM 335 fast analog I/O module

Overview



- High-speed analog inputs and outputs for the SIMATIC S7-300
- For the connection of analog sensors and actuators
- The SM 335 fast analog input/output module provides:
 - 4 fast analog inputs (basic conversion time for 4 channels max. 1 ms)
 - 4 fast analog outputs (conversion max. 0.8 ms per channel)
 - Encoder power supply 10 V/25 mA
 - 1 counter input (24 V/500 Hz)
- The SM 335 has two special modes:
 - **Comparator:** In this mode the SM 335 compares a setpoint value with an analog value measured at the analog input. Application: very fast comparison of an analog value
 - **Measurement only:** In the „measurement only“ mode, the analog inputs are measured continually without updating the analog outputs. Application: very fast measurement of analog values (< 0.5 ms)

Technical specifications

Module-specific data	
Number of inputs	4
Number of outputs	4
Cable length, shielded	200 m
With wire-break monitoring in range 0 V ... 10 V	30 m
Voltages, currents, potentials	
Rated load voltage	24 V DC
Polarity reversal protection	yes
Galvanic isolation	yes
Permissible potential difference	
• between inputs (U_{CM})	3 V
• between input (M terminal) and central grounding point	75 V DC
• Insulation	tested at 500 V DC
Current consumption	
• from S7-300 backplane bus, max.	75 mA
• from L+, max.	150 mA
Power losses, max.	3.6 W
Status, interrupts, diagnostics	
Interrupts	
• Limit value interrupt	no
• Cycle end interrupt	yes, parameterizable
• Diagnostics interrupt	yes, parameterizable
Diagnostic functions	
• Fault display for grouped fault	yes, red LED
• Diagnostic information can be read out	yes
Analog value generation for inputs	
Measuring principle	successive approximation
Conversion time per channel	200 μ s
• Basic conversion time for 4 channels, max.	1 ms
Resolution	
• Bipolar	13 Bit + Vorzeichen
• Unipolar	14 Bit

Analog inputs	
Interference between inputs	
• at 50 Hz	65 dB
• at 60 Hz	65 dB
Operational limits (over entire temperature range, referred to input range)	
• with voltage measurement	$\pm 0.15\%$ (with 14-bit resolution)
• with current measurement	0.25%
Basic error limit (operational limits at 25 °C, referred to input range)	0.13% (with 14-bit resolution)
Temperature error (referred to input range)	$\pm 0.1\%$ (with 14-bit resolution)
Linearity error (referred to input range)	$\pm 0.015\%$
Repeatability (under steady-state conditions, at 25 °C, referred to input range)	$\pm 0.05\%$
Encoder selection data	
Input range (rated values)/input resistance	
• Voltage	± 1 V; ± 10 V; ± 2.5 V; 0 V ... 2 V; 0 V ... 10 V; 10 M Ω
• Current (max. 2 channels programmable as current inputs)	± 10 mA; 0 mA ... 20 mA; 4 mA ... 20 mA; 100 Ω
Permissible input voltage for voltage input (destruction limit)	± 30 V
Permissible input current for current input (destruction limit)	25 mA
Connection of signal encoder	
• for voltage measurement	possible
• for current measurement	
- as 2-wire transducer	not possible
- as 4-wire transducer	possible
• for resistance measurement	not possible
Output for supplying the transducer (short-circuit proof)	10 V/25 mA

Technical specifications (continued)

Data for encoder supply output

Rated voltage	10 V
Output current, max.	25 mA
Short-circuit proof	yes
Operating limits (over entire temperature range)	0.2%
Temperature error	0.002%/K
Basic error for rated voltage	0.1%

Outputs

Resolution (including overcontrol range)	
• ± 10 V	11 bits + sign
• from 0 V ... 10 V	12 bits
Conversion time per channel, max.	800 μ s
Settling time	
• for resistive load	< 0.1 ms
• for capacitive load	< 3.3 ms
• for inductive load	< 0.5 ms
Interference between outputs	40 dB
Substitute values can be switched in	yes
Operational limits (over entire temperature range, referred to output range)	0.5%
Basic error limit (operational limits at 25 °C, referred to output range)	0.2%
Linearity error (referred to output range)	$\pm 0.05\%$
Repeatability (under steady-state conditions, at 25 °C, referred to output range)	$\pm 0.05\%$
Output ripple (referred to output range)	$\pm 0.05\%$

Actuator selection data

Input ranges (rated values)	± 10 V and 0 V ... 10 V (switchover)
Load impedance	
• for voltage outputs, min.	3 k Ω
• for capacitive load, max.	1 μ F
• for inductive load, max.	1 mH
Voltage output	
• Short-circuit proof	yes
• Short-circuit current, max.	8 mA
Connection of the actuators for voltage output	
• as 2-wire connection	possible
• as 4-wire connection	not possible

Dimensions and weight

Dimensions (w x h x d)	40 mm x 125 mm x 120 mm
Weight, approx.	300 g

Ordering data

Order No.

SM 335 analog input/output module

4 inputs, 4 outputs,
1 pulse input and encoder supply

6ES7 335-7HG01-0AB0

Interference suppressor filter for SM 335

to achieve the noise immunity common to SIMATIC S7; the filter is connected into the 24-V power supply circuit for the SM 335, and can protect up to four SM 335 modules

6ES7 335-7HG00-6AA0

SM 335 manual

German

6ES7 335-7HG00-8AA1

Englisch

6ES7 335-7HG00-8BA1

Front connector

20-pin, with screw-type terminals

- 1 unit
- 100 units

6ES7 392-1AJ00-0AA0

6ES7 392-1AJ00-1AB0

20-pin, with spring-loaded terminals

6ES7 392-1BJ00-0AA0

Shield connecting element

80 mm wide, with 2 rows for 4 terminal elements each

6ES7 390-5AA00-0AA0

Terminal elements

2 units

For 2 cables with 2 to 6 mm diameter

6ES7 390-5AB00-0AA0

For 1 cable with 3 to 8 mm diameter

6ES7 390-5BA00-0AA0

For 1 cable with 4 to 13 mm diameter

6ES7 390-5CA00-0AA0

SIMATIC S7-300

SIPLUS analog modules

SIPLUS SM 331 analog input modules

Overview



- Analog inputs
- For connection of voltage and current sensors, thermocouples, resistors and resistance thermometers

These modules are designed for

- an ambient range of -25 °C to $+70\text{ °C}$, condensation permissible.
- extraordinary medial load (for example by chloric and sulphuric atmospheres).

Technical specifications

6AG1 331-7KB02-2AB0

see 6ES7 331-7KB02-0AB0

Ordering data

Order No.

SIPLUS SM 331

analog input module ^{A)}

(extended temperature range and extraordinary medial load)

incl. labeling strips, bus connector, measuring range modules

2 inputs, 9/12/14-bit resolution

6AG1 331-7KB02-2AB0

Accessories

see ordering data for S7-300 analog input modules

A) Subject to export regulations: AL: N and ECCN: EAR99H

SIPLUS SM 332 analog output modules

Overview



- Analog outputs
- For the connection of analog actuators

These modules are designed for

- an ambient range of -25 °C to + 70 °C, condensation permissible.
- extraordinary medial load (for example by chloric and sulphuric atmospheres).

Technical specifications

6AG1 332-5HB01-2AB0	see 6ES7 332-5HB01-0AB0
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Ordering data	Order No.
SIPLUS SM 332 analog output module ^{A)} (extended temperature range and extraordinary medial load) including labeling strips, bus connector 2 outputs	6AG1 332-5HB01-2AB0
Accessories	see ordering data for S7-300 analog output modules

A) Subject to export regulations: AL: N and ECCN: EAR99H

SIMATIC S7-300

SIPLUS analog modules

SIPLUS SM 334 analog input/output modules

Overview



- Analog inputs and outputs
- For the connection of analog sensors and actuators

These modules are designed for

- an ambient range of $-25\text{ }^{\circ}\text{C}$ to $+70\text{ }^{\circ}\text{C}$, condensation permissible.
- extraordinary medial load (for example by chloric and sulphuric atmospheres).

Technical specifications

6AG1 334-0KE00-2AB0

see 6ES7 334-0KE00-0AB0

Ordering data

Order No.

**SIPLUS SM 334
analog I/O module ^{A)}**

6AG1 334-0KE00-2AB0

(extended temperature range and
extraordinary medial load)
including labeling strips, bus con-
nector

4 inputs, 2 outputs;
resistance measurement, Pt 100

Accessories

see ordering data for
S7-300 analog I/O modules

A) Subject to export regulations: AL: N and ECCN: EAR99H

Overview



- Digital inputs for the failsafe SIMATIC S7 systems
- They are suitable for connecting:
 - Switches and two-wire proximity switches (BERO)
 - Sensors according to NAMUR and connected mechanical contacts, also for signals from hazardous areas
- With integrated safety functions for failsafe operation
- Can be used in failsafe mode
 - Centrally: with S7-31xF-2DP (applies only to 6ES7 326-1BK00-0AB0)
 - Distributed in ET 200M: with SIMATIC S7-31xF-2DP, S7-416F-2 and S7-400F/FH
- Suitable for use in standard operation in the same way as S7-300 modules

4

Technical specifications

	6ES7 326-1RF00-0AB0	6ES7 326-1BK00-0AB0
Supply voltages		
Supply voltage of electronic and sensor components 1L+/2L+ - Rated value (DC)	24 V	24 V
Current consumption		
• from load voltage L+ (no load), max.	160 mA	450 mA
• from backplane bus 5 V DC, max.	90 mA	100 mA
• Power dissipation, typical	4.5 W	10 W
Connection system		
• Requisite front connector	40-pin	40-pin
Digital inputs		
• Number of digital inputs	8; 8 (single-channel); 4 (dual-channel)	24
Number of inputs that can be driven in parallel		
- Number of inputs that can be driven in parallel, up to 40 °C	8; vertical installation	24
- Number of inputs that can be driven in parallel, up to 60 °C	8; horizontal installation	24; (at 24 V) or 18 (at 28.8 V)
Length of cable		
- Length of cable shielded, max.	200 m	200 m
- Length of cable unshielded, max.	100 m	100 m
Input voltage		
- Rated value, DC	to DIN 19234 and NAMUR	24 V
- for signal "0"		-30 to 5 V
- for signal "1"		11 to 30 V
Input current		
- for 0 signal, max (permissible closed-circuit current)	0.35 to 1.2 mA	2 mA
- for 1 signal, typical	2.1 to 7 mA	10 mA

	6ES7 326-1RF00-0AB0	6ES7 326-1BK00-0AB0
Digital inputs (continued)		
Input delay (at rated value of the input voltage)		
• For standard inputs		3.4 ms
- at 0 to 1, max.		3.4 ms
- at 1 to 0, max.		
• for NAMUR inputs		
- at 0 to 1, max	1.2 to 3 ms	
- at 1 to 0, max	1.2 to 3 ms	
Sensor supply		
• Number of outputs	8	4; electrically isolated
• Output voltage	8.2 V DC	
• Output current, rated value		400 mA
Sensor		
Connectable encoders		
- 2-wire BEROs		Yes; when short-circuit test deactivated
- permissible closed-circuit current (2-wire BEROs), max.		2 mA
Ex(i)-modules		
• Module for Ex(i) protection	Yes	
Maximum values of the input circuits (per channel)		
- Ca (permissible external capacity), max.	3 µF	
- Io (short-circuit current), max.	13.9 mA	
- La (permissible external inductance), max.	80 mH	
- Po (load power), max.	33.1 mW	
- Uo (output open-circuit voltage), max.	10 V	
- Um (fault voltage), max	60 V DC/ 30 V AC	
- permissible ambient temperature Ta, max	60 °C	60 °C

SIMATIC S7-300

F digital / analog modules

SM 326 F digital input - Safety Integrated

Technical specifications (continued)

	6ES7 326-1RF00-0AB0	6ES7 326-1BK00-0AB0
Status information/ interrupts/ diagnostics		
Interrupts		
- Diagnostic interrupt	Yes	Yes
Diagnostics		
- Diagnostic information can be read out	Yes	Yes
Insulation		
• Insulation tested with	500 V DC	500 V DC / 350 V AC
Potentials/ electrical insulation		
Digital input functions		
- between the channels	Yes	Yes
- between the channels, in groups of		12
- between the channels and the backplane bus	Yes	Yes

	6ES7 326-1RF00-0AB0	6ES7 326-1BK00-0AB0
Standards, approvals, certification		
• Type of protection to comply with EN 50020 (CENELEC)	II(2)G [Ex ib] IIC to EN 50020	
• KEMA test number	99 ATEX 2671 X	
Maximum safety level that can be achieved in safety mode		
- to comply with DIN VDE 0801	AK 4 (single-channel), AK 5 and 6 (dual-channel)	AK 6
- to comply with EN 954	Cat. 3 (single-channel), Cat. 4 (dual-channel)	Cat. 4
- to comply with IEC 61508	SIL 2 (single-channel), SIL 3 (dual-channel)	SIL 3
Dimensions and weight		
• Weight, approx.	482 g	442 g
• Width	80 mm	80 mm
• Height	125 mm	125 mm
• Depth	120 mm	120 mm

Ordering data	Order No.	Order No.
SM 326 fail-safe digital input modules 24 inputs, 24 V DC 8 inputs, 24 V DC, NAMUR	6ES7 326-1BK00-0AB0 6ES7 326-1RF00-0AB0	Labeling strips for fail-safe modules (spare part); 10 units 6ES7 392-2XX20-0AA0
Labeling sheet with strips for 10 electronic modules • for 16-channel electronic modules incl. supplementary terminals • for 32-channel electronic modules incl. supplementary terminals	6ES7 193-1BH00-0XA0 6ES7 193-1BL00-0XA0	Label covers for fail-safe modules (spare part); 10 units 6ES7 392-2XY20-0AA0
Connecting cable for PROFIBUS 12 Mbit/s, for PG connection to PROFIBUS DP, preassembled with 2x9-pin Sub-D plug, 3 m long	6ES7 901-4BD00-0XA0	LK 393 cable chamber for fail-safe modules; L+ and M connections; 5 units 6ES7 393-4AA10-0AA0
PROFIBUS bus connector • 90° cable outlet, terminating resistor with isolating function, without programming port, up to 12 Mbit/s • Slanting outgoing feeder cable, barrel contacts, without bus terminating resistor, without PG socket, up to 1.5 Mbit/s • 90° cable outlet, terminating resistor with isolating function, with programming port, up to 12 Mbit/s	6ES7 972-0BA12-0XA0 6ES7 972-0BA30-0XA0 6ES7 972-0BB12-0XA0	S7-300 manual Design, CPU data, module data, operation list German 6ES7 398-8FA10-8AA0 English 6ES7 398-8FA10-8BA0 French 6ES7 398-8FA10-8CA0 Spanish 6ES7 398-8FA10-8DA0 Italian 6ES7 398-8FA10-8EA0
DIN rail for active bus modules for max. 5 active bus modules for hot swapping function • Length 483 mm • Length 530 mm • Length 620 mm • Length 2000 mm	6ES7 195-1GA00-0XA0 6ES7 195-1GF30-0XA0 6ES7 195-1GG30-0XA0 6ES7 195-1GC00-0XA0	Documentation for S7-300F System description, configuring and programming, PROFIsafe fail-safe modules German 6ES7 988-8FB10-8AA0 English 6ES7 988-8FB10-8BA0 French 6ES7 988-8FB10-8CA0
Active bus module BM 1 x 80 for 1 module with 80 mm width	6ES7 195-7HC00-0XA0	Manual S7-400F/FH programmable controller Paper version German 6ES7 988-8FA10-8AA0 English 6ES7 988-8FA10-8BA0
SITOP power supply module for ET 200M 120/230 V AC, 24 V DC, 5 A Type PS 307-1E	6ES7 307-1EA00-0AA0	SIMATIC Manual Collection ^{B)} Electronic manuals on CD-ROM, 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) 6ES7 998-8XC01-8YE0
Front connector 40-pin, with screw-type terminals • 1 item • 100 units	6ES7 392-1AM00-0AA0 6ES7 392-1AM00-1AB0	SIMATIC Manual Collection Maintenance service for 1 year ^{B)} Current S7 Manual Collection CD as well as the three following updates 6ES7 998-8XC01-8YE2

B) Subject to export regulations: AL: N and ECCN: EAR99S

SIMATIC S7-300

F digital / analog modules

SM 326 F digital output - Safety Integrated

Overview



- Digital outputs for the failsafe SIMATIC S7 systems
- For connection of solenoid valves, DC contactors and signaling lamps
- With integrated safety functions for failsafe operation
- Can be used in failsafe mode
 - Centrally: with S7-31xF-2 DP
 - Distributed in ET 200M: with SIMATIC S7-31xF-2DP, S7-416F-2 and S7-400F/FH
- Suitable for use in standard operation in the same way as S7-300 modules

Technical specifications

	6ES7 326-2BF01-0AB0
Voltages and currents	
Load voltage L+	
- Rated value (DC)	24 V; 1L+, 2L+, 3L+
Current consumption	
• from load voltage 1L+, max	70 mA; from supply voltage
• from load voltage 2L+ (no load), max.	100 mA
• from load voltage 3L+ (no load), max.	100 mA
• from backplane bus 5 V DC, max.	100 mA
• Power dissipation, typical	12 W
Connection system	
• Requisite front connector	40-pin
Digital outputs	
• Number of digital outputs	10
• Length of cable shielded, max.	1,000 m; 200 m for SIL3, AK 5 and 6, Cat 4
• Length of cable unshielded, max.	600 m
• Short-circuit protection of the output	Yes; electronic
• Limitation of voltage induced on circuit interruption to	L+ (-53 V) without series diode, L+ (-33 V) with series diode
• Lamp load, max.	5 W
Output voltage	
- for 1 signal with series diode	L+ (-1.8 V)
- for 1 signal without series diode, min.	L+ (-1.0 V)
Output current	
- for 1 signal rated value	2 A
- for 1 signal permissible range for 0 to 40 °C, min.	7 mA
- for 1 signal permissible range for 0 to 40 °C, max.	2 A; 2 A for horizontal installation, 1 A for vertical installation
- for 1 signal permissible range for 40 to 60 °C, min.	7 mA
- for 1 signal permissible range for 40 to 60 °C, max.	1 A; for horizontal installation
- for 0 signal residual current, max.	0.5 mA

	6ES7 326-2BF01-0AB0
Digitalausgaben (continued)	
Switching frequency	
- at resistive load, max.	10 Hz
- at inductive load, max.	2 Hz
- at lamp load, max.	10 Hz
Summation current of the outputs (per group)	
• vertical mounting positions	
- up to 40°C, max.	5 A; without series diode, 4 A with series diode
• horizontal mounting positions	
- up to 40°C, max.	7.5 A; without series diode, 5 A with series diode
- up to 60°C, max.	5 A; without series diode, 4 A with series diode
Status information/ interrupts/ diagnostics	
Interrupts	
- Diagnostic interrupt	Yes
Diagnostics	
- Diagnostic information can be read out	Yes
Insulation	
• Insulation tested with	500 V DC/ 350 V AC
Potentials/ electrical insulation	
Digital output functions	
- between the channels	Yes
- between the channels, in groups of	5
- between the channels and the backplane bus	Yes
- between the channels and the electronics power supply	Yes

Technical specifications (continued)

	6ES7 326-2BF01-0AB0		6ES7 326-2BF01-0AB0
Standards, approvals, certification		Dimensions and weight	
Maximum safety level that can be achieved in safety mode		•Weight, approx.	465 g
- to comply with DIN VDE 0801	AK 5 and 6	•Width	80 mm
- to comply with EN 954	Cat. 4	•Height	125 mm
- to comply with IEC 61508	SIL 3	•Depth	120 mm

Ordering data	Order No.		Order No.
SM 326 fail-safe digital output module 10 inputs, 24 V DC, 2 A	6ES7 326-2BF01-0AB0	Labeling strip for fail-safe modules (spare part) 10 units	6ES7 392-2XX20-0AA0
Labeling sheet with strips for 10 electronic modules		Label cover for fail-safe modules (spare part) 10 units	6ES7 392-2XY20-0AA0
•for 16-channel electronic modules incl. supplementary terminals	6ES7 193-1BH00-0XA0	LK 393 cable chamber for fail-safe modules; L+ and M connections, 5 units	6ES7 393-4AA10-0AA0
•for 32-channel electronic modules incl. supplementary terminals	6ES7 193-1BL00-0XA0	S7-300 Manual Design, CPU data, module data, operation list	
Connecting cable for PROFIBUS 12 Mbit/s, for PG connection to PROFIBUS DP, preassembled with 2x9-pin Sub-D plug, 3 m long	6ES7 901-4BD00-0XA0	German	6ES7 398-8FA10-8AA0
PROFIBUS bus connector		English	6ES7 398-8FA10-8BA0
•90° cable outlet, terminating resistor with isolating function, without programming port, up to 12 Mbit/s	6ES7 972-0BA12-0XA0	French	6ES7 398-8FA10-8CA0
•Slanting outgoing feeder cable, barrel contacts, without bus terminating resistor, without PG socket, up to 1.5 Mbit/s	6ES7 972-0BA30-0XA0	Spanish	6ES7 398-8FA10-8DA0
•90° cable outlet, terminating resistor with isolating function, with programming port, up to 12 Mbit/s	6ES7 972-0BB12-0XA0	Italian	6ES7 398-8FA10-8EA0
DIN rail for active bus modules for max. 5 active bus modules for hot swapping function		Documentation for S7-300F System description, configuring and programming, PROFIsafe fail-safe modules	
•Length 483 mm	6ES7 195-1GA00-0XA0	German	6ES7 988-8FB10-8AA0
•Length 530 mm	6ES7 195-1GF30-0XA0	English	6ES7 988-8FB10-8BA0
•Length 620 mm	6ES7 195-1GG30-0XA0	French	6ES7 988-8FB10-8CA0
•Length 2000 mm	6ES7 195-1GC00-0XA0	Manual S7-400F/FH programmable controller Paper version	
Active bus module BM 1 x 80 for 1 module with 80 mm width	6ES7 195-7HC00-0XA0	German	6ES7 988-8FA10-8AA0
SITOP power supply module for ET 200M 120/230 V AC, 24 V DC, 5 A Type PS 307-1E	6ES7 307-1EA00-0AA0	English	6ES7 988-8FA10-8BA0
Front Connector 40-pin, with screw-type terminals		SIMATIC Manual Collection ^{B)} Electronic manuals on CD-ROM, 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)	6ES7 998-8XC01-8YE0
•1 item	6ES7 392-1AM00-0AA0	SIMATIC Manual Collection Maintenance service for 1 year ^{B)} Current S7 Manual Collection CD as well as the three following updates	6ES7 998-8XC01-8YE2
•100 units	6ES7 392-1AM00-1AB0		

B) Subject to export regulations: AL: N and ECCN: EAR99S

SIMATIC S7-300

F digital / analog modules

SM 336 F analog input - Safety Integrated

Overview

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- Analog inputs for the failsafe SIMATIC S7 systems
- For connection of analog sensors with voltage and current signals
- With integrated safety functions for failsafe operation
- Can be used in the ET 200M distributed I/O station with SIMATIC S7-31xF-2 DP, S7-416F-2 and S7-400F/FH
- Suitable for use in standard operation in the same way as S7-300 modules

Technical specifications

	6ES7 336-1HE00-0AB0
Voltages and currents	
Load voltage L+	
- Rated value (DC)	24 V
- Reverse polarity protection	Yes
Current consumption	
• from backplane bus 5 V DC, max.	90 mA
• from supply voltage L+, max.	160 mA; typ.
• Power dissipation, typical	4.25 W
Connection system	
• Requisite front connector	40-pin
Analog inputs	
• Number of analog inputs	6
• Number of analog inputs for voltage measurement	4
• Length of cable shielded, max	200 m
• Permissible input voltage for the voltage input (destruction limit), max.	30 V
• Permissible input voltage for the current input (destruction limit), max.	40 mA
Input ranges (rated values), voltages	
- 0 to +10 V	Yes
Input ranges (rated values), currents	
- 0 to 20 mA	Yes
- 4 to 20 mA	Yes
Analog value formation	
Integration and conversion time/triggering per channel	
- with over-range (bits incl. sign), max	14 Bit
- Integration time, ms	20 ms (at 50 Hz); 16.66 ms (at 60 Hz)
- Interference voltage suppression for interference frequency f1 in Hz	38 dB
Sensor	
Sensing element connection	
- for current measurement, as 2-wire measuring transducer	Yes
- for current measurement, as 4-wire measuring transducer	Yes

	6ES7 336-1HE00-0AB0
Error/accuracies	
Operational limit in the entire temperature range	
- relative to the input range, voltage	+/- 0.48 %
- relative to the input range, current	+/- 0.48 %
Basic error limit (operational limit at 25 °C)	
- relative to the input range, voltage	+/- 0.4 %
- relative to the input range, current	+/- 0.4 %
Status information/ interrupts/ diagnostics	
Alarme	
- Diagnostic interrupt	Yes; parameterizable
Diagnostics	
- Diagnostic information can be read out	Yes
Insulation	
• Insulation tested with	500 V DC/ 350 V AC
Potentials/ electrical isolation	
Analog output functions	
- between the channels	No
- between the channels and the backplane bus	Yes
- between the channels and the electronics power supply	Yes; only when external sensor power supply
Standards, approvals, certification	
Maximum safety level that can be achieved in safety mode	
- to comply with DIN V 19250	AK 6
- to comply with EN 954	Cat. 4
- to comply with IEC 61508	SIL 3
Dimensions and weight	
• Weight, approx.	480 g
• Width	80 mm
• Height	125 mm
• Depth	120 mm

Ordering data	Order No.	Order No.
SM 326 fail-safe analog input module 6 inputs, 14 bit	6ES7 336-1HE00-0AB0	Labeling strips for fail-safe modules (spare part), 10 units 6ES7 392-2XX20-0AA0
Labeling sheet with strips for 10 electronic modules • for 16-channel electronic modules incl. supplementary terminals • for 32-channel electronic modules incl. supplementary terminals	6ES7 193-1BH00-0XA0 6ES7 193-1BL00-0XA0	Label covers for fail-safe modules (spare part), 10 units 6ES7 392-2XY20-0AA0
Connecting cable for PROFIBUS 12 Mbit/s, for PG connection to PROFIBUS DP, preassembled with 2x9-pin Sub-D plug, 3 m long	6ES7 901-4BD00-0XA0	LK 393 cable chamber for fail-safe modules; L+ and M connections, 5 units 6ES7 393-4AA10-0AA0
PROFIBUS bus connector • 90° cable outlet, terminating resistor with isolating function, without programming port, up to 12 Mbit/s • Slanting outgoing feeder cable, barrel contacts, without bus terminating resistor, without PG socket, up to 1.5 Mbit/s • 90° cable outlet, terminating resistor with isolating function, with programming port, up to 12 Mbit/s	6ES7 972-0BA12-0XA0 6ES7 972-0BA30-0XA0 6ES7 972-0BB12-0XA0	S7-300 manual Design, CPU data, module data, operation list German English French Spanish Italian 6ES7 398-8FA10-8AA0 6ES7 398-8FA10-8BA0 6ES7 398-8FA10-8CA0 6ES7 398-8FA10-8DA0 6ES7 398-8FA10-8EA0
DIN rail for active bus modules for max. 5 active bus modules for hot swapping function • Length 483 mm • Length 530 mm • Length 620 mm • Length 2000 mm	6ES7 195-1GA00-0XA0 6ES7 195-1GF30-0XA0 6ES7 195-1GG30-0XA0 6ES7 195-1GC00-0XA0	Documentation for S7-300F System description, configuring and programming, PROFIsafe fail-safe modules German English French 6ES7 988-8FB10-8AA0 6ES7 988-8FB10-8BA0 6ES7 988-8FB10-8CA0
Active bus module BM 1 x 80 for 1 module with 80 mm width	6ES7 195-7HC00-0XA0	Manual S7-400F/FH programmable controller Paper version German English 6ES7 988-8FA10-8AA0 6ES7 988-8FA10-8BA0
SITOP power supply module for ET 200M; 120/230V AC, 24 V DC, 5 A; type PS 307-1E	6ES7 307-1EA00-0AA0	SIMATIC Manual Collection^{B)} Electronic manuals on CD-ROM, 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) 6ES7 998-8XC01-8YE0
Front connector 40-pin, with screw-type terminals • 1 item • 100 units	6ES7 392-1AM00-0AA0 6ES7 392-1AM00-1AB0	SIMATIC Manual Collection Maintenance service for 1 year^{B)} Current S7 Manual Collection CD as well as the three following updates 6ES7 998-8XC01-8YE2

B) Subject to export regulations: AL: N and ECCN: EAR99S

SIMATIC S7-300

SIPLUS F digital modules

SIPLUS SM 326 F digital input - Safety Integrated

Overview

- Digital inputs for the failsafe SIMATIC S7 systems
- They are suitable for connecting:
 - Switches and two-wire proximity switches (BERO)
 - Sensors according to NAMUR and connected mechanical contacts, also for signals from hazardous areas
- With integrated safety functions for failsafe operation
- Can be used in failsafe mode
 - Centrally: with S7-31xF-2DP (applies only to 6ES7 326-1BK00-0AB0)
 - Distributed in ET 200M: with SIMATIC S7-31xF-2DP, S7-416F-2 and S7-400F/FH
- Suitable for use in standard operation in the same way as S7-300 modules

This module is designed for

- an ambient range of $-25\text{ }^{\circ}\text{C}$ to $+70\text{ }^{\circ}\text{C}$, condensation permissible.
- extraordinary medial load (for example by chloric and sulphuric atmospheres).

Technical specifications

6AG1 326-1BK00-2AB0

see 6ES7 326-1BK00-0AB0

Ordering data

Order No.

**SIPLUS SM 326
F digital input module**

(extended temperature range and
extraordinary medial load)
24 inputs, 24 V DC

6AG1 326-1BK00-2AB0

Accessories

see ordering data for
S7-300 F digital input module

SIMATIC S7-300

SIPLUS F digital modules

SIPLUS SM 326 F digital output - Safety Integrated

Overview

- Digital outputs for the failsafe SIMATIC S7 systems
- For connection of solenoid valves, DC contactors and signaling lamps
- With integrated safety functions for failsafe operation
- Can be used in failsafe mode
 - Centrally: with S7-31xF-2 DP
 - Distributed in ET 200M: with SIMATIC S7-31xF-2DP, S7-416F-2 and S7-400F/FH
- Suitable for use in standard operation in the same way as S7-300 modules

This module is designed for

- an ambient range of $-25\text{ }^{\circ}\text{C}$ to $+70\text{ }^{\circ}\text{C}$, condensation permissible.
- extraordinary medial load (for example by chloric and sulphuric atmospheres).

Technical specifications

6AG1 326-2BF01-2AB0

see 6ES7 326-2BF01-0AB0

Ordering data

Order No.

**SIPLUS SM 326
F digital output modules**

(extended temperature range and
extraordinary medial load)
10 outputs, 24 V DC, 2 A

6AG1 326-2BF01-2AB0

Accessories

see ordering data for
S7-300 F digital output module

SIMATIC S7-300

Ex input / output modules

Ex digital I/O modules

Overview



- I/O modules for applications within potentially explosive chemical plants
- For connecting sensors and actuators from zones 1 and 2 in hazardous area installations
- Associated electrical equipment [EEx ib] IIC in accordance with DIN 50020
- For isolating non-intrinsically safe circuits of the programmable logic controller and the intrinsically safe circuits from the process

Technical specifications

	6ES7 321-7RD00-0AB0
Voltages and currents	
Load voltage L+	
- Rated value (DC)	24 V
Current consumption	
• from load voltage L+ (no load), max.	50 mA
• from backplane bus 5 V DC, max.	80 mA
• Power dissipation, typical	1.1 W
Connection system	
• Requisite front connector	20-pin
Digital inputs	
• Number of NAMUR inputs	4
Length of cable	
- Length of cable unshielded, max.	200 m
Input voltage	
- Rated value, DC	8.2 V; from internal circuit supply
Input current	
- At broken wire, max.	0.1 mA
- At short circuit, max.	8.5 mA
• For NAMUR sensor	
- For 0 signal	0.35 to 1.2 mA
- For 1 signal	2.1 to 7 mA
Input delay (at rated value of the input voltage)	
- Input frequency (at 0.1 ms delay time), max.	2 kHz
• for NAMUR inputs	
- parameterizable	Yes; 0.1 / 0.5 / 3 / 15 / 20 ms (parameterizable, plus 0.25 ms preparation time)
Sensor supply	
• Output voltage	via inputs

	6ES7 321-7RD00-0AB0
Sensor	
Connectable encoders	
- NAMUR sensor	Yes; Two-wire connection
Ex(i)-modules	
Maximum values of the input circuits (per channel)	
- Ca (permissible external capacity), max.	3 µF
- Io (short-circuit current), max.	14.1 mA
- La (permissible external inductance), max.	100 mH
- Po (load power), max.	33.7 mW
- Uo (output open-circuit voltage), max.	10 V
Status information/ interrupts/ diagnostics	
Diagnostics	
- Diagnostic information can be read out	Yes
Potentials/ electrical isolation	
Digital input functions	
- Electrical isolation, digital input functions	Yes
- between the channels, in groups of	1
Standards, approvals, certification	
• Type of protection to comply with EN 50020 (CENELEC)	[EEx ib] IIC
• Type of protection to comply with FM	CL.2, DIV 2, GP A,B,C,D T4
• PTB test number	Ex-96.D.2094X
Dimensions and weight	
• Weight, approx.	230 g

Technical specifications

	6ES7 322-5SD00-0AB0	6ES7 322-5RD00-0AB0
Voltages and currents		
Load voltage L+ - Rated value (DC)	24 V	24 V
Current consumption		
• from load voltage L+ (no load), max.	160 mA	160 mA
• from backplane bus 5 V DC, max.	70 mA	70 mA
• Power dissipation, typical	3 W	3 W
Connection system		
• Requisite front connector	20-pin	20-pin
Digital outputs		
• Number of digital outputs	4	4
• Length of cable unshielded, max.	200 m	200 m
• Short-circuit protection of the output	Yes; electronic	Yes; electronic
• Short-circuit protection of the output, response threshold, typical	Output current for short-circuit protection, min. 10 mA + 10 %	Output current for short-circuit protection, min. 20.5 mA + 10 %
Output voltage - Rated value (DC)	24 V	15 V
Output current - for 1 signal permissible range for 0 to 60 °C, max.	10 mA; +/- 10%	20 mA; +/- 10%
Switching frequency - at resistive load, max.	100 Hz	100 Hz
Load impedance range - upper limit	390 Ω; Two-wire connection	200 Ω; Two-wire connection

	6ES7 322-5SD00-0AB0	6ES7 322-5RD00-0AB0
Ex(i)-modules		
Maximum values of the output circuits (per channel)		
- Ca (permissible external capacity), max.	90 nF	500 nF
- Io (short-circuit current), max.	70 mA	85 mA
- La (permissible external inductance), max.	6.7 mH	5 mH
- Po (load power), max.	440 mW	335 mW
- Uo (output open-circuit voltage), max.	25.2 V	15.75 V
Status information/ interrupts/ diagnostics		
Diagnostics		
- Diagnostic information can be read out	Yes	Yes
- Short circuit	Yes	Yes
- Group error	Yes	Yes
Potentials/ electrical isolation		
Digital output functions		
- Electrical isolation, digital output functions	Yes	Yes
- between the channels, in groups of	1	1
Standards, approvals, certification		
• Type of protection to comply with EN 50020 (CENELEC)	[Ex ib] IIC	[Ex ib] IIC
• Type of protection to comply with FM	CL I, DIV 2, GP A,B,C,D T4	AIS CL. 1, DIV 1, GP A,B,C,D; CL.I, DIV 2, GP A,B,C,D T4
• PTB test number	Ex-96.D.2093X	Ex-96.D.2102X
Dimensions and weight		
• Weight, approx.	230 g	230 g

SIMATIC S7-300

Ex input / output modules

Ex digital I/O modules

4

Ordering data	Order No.		Order No.
Ex digital input modules 4 inputs, electrically isolated, NAMUR	6ES7 321-7RD00-0AB0	S7-SmartLabel Software for machine labeling of modules directly from the STEP 7 project	2XV9 450-1SL01-0YX0
Ex digital output modules 4 outputs, electrically isolated, 24 V DC, 10 mA 4 outputs, electrically isolated, 15 V DC, 20 mA	6ES7 322-5SD00-0AB0 6ES7 322-5RD00-0AB0	Labeling sheets for machine labeling for 16-channel signal module, DIN A4, for printing using laser printer; 10 units Petrol Light beige Yellow Red	6ES7 392-2AX00-0AA0 6ES7 392-2BX00-0AA0 6ES7 392-2CX00-0AA0 6ES7 392-2DX00-0AA0
Front connector 20-pin, with screw-type terminals • 1 piece • 100 pieces	6ES7 392-1AJ00-0AA0 6ES7 392-1AJ00-1AB0	for 32-channel signal module, DIN A4, for printing by laser printer; 10 units Petrol Light beige Yellow Red	6ES7 392-2AX10-0AA0 6ES7 392-2BX10-0AA0 6ES7 392-2CX10-0AA0 6ES7 392-2DX10-0AA0
Front door, elevated design e.g. for 32-channel modules; permits connection of 1.3 mm ² /16 AWG conductors ^{A)}	6ES7 328-0AA00-7AA0	SIMATIC Manual Collection ^{B)}	6ES7 998-8XC01-8YE0
LK 393 cable chamber essential for Ex operation	6ES7 393-4AA00-0AA0	SIMATIC Manual Collection Maintenance service for 1 year ^{B)}	6ES7 998-8XC01-8YE2
Labeling strips 10 units (spare part) for signal modules (not 32-channel modules), function modules	6ES7 392-2XX00-0AA0	Reference manual: S7-300 Ex I/O modules, ET 200M German English	6ES7 398-8RA00-8AA0 6ES7 398-8RA00-8BA0
Label covers 10 units for signal modules (not 32-channel modules), function modules	6ES7 392-2XY00-0AA0		

A) Subject to export regulations: AL: N and ECCN: EAR99H

B) Subject to export regulations: AL: N and ECCN: EAR99S

Overview



- I/O modules for applications within potentially explosive chemical plants
- For connecting sensors and actuators from zones 1 and 2 in hazardous area installations
- Associated electrical equipment [EEx ib] IIC in accordance with DIN 50020
- For isolation of non-IS circuits of the automation system and the IS circuits from the process

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Technical specifications

	6ES7 331-7RD00-0AB0	6ES7 331-7SF00-0AB0
Voltages and currents		
Load voltage L+ - Rated value (DC)	24 V	24 V
Power supply of measuring transducers - Available - Rated value (DC) - Open-circuit voltage (DC)	Yes 13 V; at 22 mA 25.2 V	
Current consumption		
• from backplane bus 5 V DC, max.	60 mA	120 mA
• from supply voltage L+, max.	150 mA	
• Power dissipation, typical	3 W	0.6 W
Connection system		
• Requisite front connector	20-pin	20-pin
Analog inputs		
• Number of analog inputs	4	8; 8 x thermocouples, 4 x RTD thermistors
• Length of cable shielded, max	200 m	200 m; HTC: 50 m
• Permissible input voltage for the current input (destruction limit), max.	40 mA	
Input ranges (rated values), currents - 0 to 20 mA - 4 to 20 mA	Yes Yes	

	6ES7 331-7RD00-0AB0	6ES7 331-7SF00-0AB0
Analog inputs (continued)		
Input ranges (rated values), thermocouples - Type B - Type E - Type J - Type K - Type L - Type N - Type R - Type S - Type T - Type U		Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes
Input ranges (rated values), resistance thermometer - Ni 100 - Pt 100 - Pt 200		Yes Yes Yes
Analog value formation		
• Measuring principle	SIGMA-DELTA	SIGMA-DELTA
Integration and conversion time/triggering per channel - with over-range (bits incl. sign), max. - Integration time parameterizable - Interference voltage suppression for interference frequency f1 in Hz	16 Bit; 10 to 15 bits + sign Yes; 2.5 to 100 ms 10 to 400 Hz	16 Bit; 10 to 15 bits + sign Yes; 2.5 to 100 ms 10 to 400 Hz

SIMATIC S7-300

Ex input / output modules

Ex analog I/O modules

Technical specifications (continued)

	6ES7 331-7RD00-0AB0	6ES7 331-7SF00-0AB0
Sensor		
Sensing element connection		
- for current measurement, as 2-wire measuring transducer	Yes	Yes
- for current measurement, as 4-wire measuring transducer	Yes	Yes
Ex(i)-modules		
Maximum values of the input circuits (per channel)		
- Ca (permissible external capacity), max.	90 nF	60 µF
- Io (short-circuit current), max.	68.5 mA	28.8 mA
- La (permissible external inductance), max.	7.5 mH	40 mH
- Po (load power), max.	431 mW	41.4 mW
- Ri, max	50 Ω	
- Uo (output open-circuit voltage), max.	25.2 V	5.9 V
Error/accuracies		
• Temperature error (relative to the input range)		Temperature error: 0.001 to 0.002 %/K
Operational limit in the entire temperature range		
- relative to the input range, current	+/- 0.45 %	
- relative to the input range, resistance thermometer		0.09 to 0.04 %
Basic error limit (operational limit at 25 °C)		
- relative to the input range, current	+/- 0.1 %	
- relative to the input range, resistance thermometer		+/- 0.1 %
Interference voltage suppression for $f = n \times (f_l \pm 1 \%)$		
- Series-mode interference (peak value of interference < rated value input range)	60 dB	60 dB
- Common-mode interference, min	130 dB	130 dB

	6ES7 331-7RD00-0AB0	6ES7 331-7SF00-0AB0
Status information/ interrupts/ diagnostics		
Diagnostics		
- Diagnostic information can be read out	Yes	Yes
- Range overflow	Yes	Yes
- Wire break in sensor cable	Yes	Yes
- Short circuit in sensor cable	Yes	Yes
Potentials/ electrical isolation		
Analog output functions		
- Electrical isolation, analog inputs	Yes	Yes
Permissible potential difference		
• between the inputs (UCM)	60 V DC	60 V DC
• between the inputs and MANA (UCM)	60 V DC	30 V DC
Standards, approvals, certification		
• Type of protection to comply with EN 50020 (CENELEC)	[EEx ib] IIC	[EEx ib] IIC
• Type of protection to comply with FM	CL.I, DIV 2, GP A,B,C,D T4	CL.I, DIV 2, GP A,B,C,D T4
• PTB test number	Ex-96.D.2092X	Ex-96.D.2108X
Dimensions and weight		
• Weight, approx.	290 g	210 g

Technical specifications (continued)

	6ES7 332-5RD00-0AB0
Voltages and currents	
Load voltage L+	
- Rated value (DC)	24 V
Current consumption	
• from load voltage L+ (no load), max.	180 mA
• from backplane bus 5 V DC, max.	80 mA
• Power dissipation, typical	4 W
Connection system	
• Requisite front connector	20-pin
Analog outputs	
• Number of analog outputs	4
• Length of cable shielded, max	200 m
• Voltage output, short-circuit protection	Yes
• Voltage output, short-circuit current, max	70 mA
• Current output, open-circuit voltage, max.	14 V
Output ranges, current	
- 0 to 20 mA	Yes
- 4 to 20 mA	Yes
Actuator connection	
- for current output 2-wire connection	Yes
Burden resistance (in the nominal output range)	
- at current outputs, max.	500 MΩ
Analog value formation	
Integration and conversion time/triggering per channel	
- with over-range (bits incl. sign), max.	15 Bit
- Basic conversion time, ms	2.5 ms
Ex(i)-modules	
Maximum values of the output circuits (per channel)	
- Ca (permissible external capacity), max.	850 nF
- Io (short-circuit current), max.	70 mA
- La (permissible external inductance), max.	6.6 mH
- Po (load power), max.	440 mW
- Uo (output open-circuit voltage), max.	14 V

	6ES7 332-5RD00-0AB0
Error/accuracies	
Operational limit in the entire temperature range	
- Relative to the output range, current	+/- 0.55 %
Basic error limit (operational limit at 25 °C)	
- relative to the output range, current	+/- 0.2 %
Status information/ interrupts/ diagnostics	
Diagnostics	
- Diagnostic information can be read out	Yes
- Range overflow	Yes
- Wire break in actuator cable	Yes
- Group error	Yes
Potentials/ electrical isolation	
Analog output functions	
- Electrical isolation, analog output functions	Yes
Permissible potential difference	
• between the outputs and MANA (UCM)	60 V DC/ 30 V AC
• between the outputs (UCM)	60 V DC/ 30 V AC
Standards, approvals, certification	
• Type of protection to comply with EN 50020 (CENELEC)	[EEx ib] IIC
• Type of protection to comply with FM	CL.I, DIV 2, GP A,B,C,D T4
• PTB test number	Ex-96.D.2026X
Dimensions and weight	
• Weight, approx.	280 g

SIMATIC S7-300

Ex input / output modules

Ex analog I/O modules

4

Ordering data	Order No.		Order No.
Ex analog input modules		S7-SmartLabel	2XV9 450-1SL01-0YX0
4 inputs, electrically isolated, 0/4 to 20 mA, 15 bit	6ES7 331-7RD00-0AB0	Software for machine labeling of modules directly from the STEP 7 project	
8/4 inputs, electrically isolated, for thermocouples and Pt100, Pt200, Ni100	6ES7 331-7SF00-0AB0	Labeling sheets for machine labeling	
Ex analog output module ^{A)}	6ES7 332-5RD00-0AB0	for 16-channel signal module, DIN A4, for printing using laser printer; 10 units	
4 outputs, electrically isolated, for thermocouples and Pt100, Pt200, Ni100		Petrol	6ES7 392-2AX00-0AA0
Front connector		Light beige	6ES7 392-2BX00-0AA0
20-pin, with screw-type terminals		Yellow	6ES7 392-2CX00-0AA0
• 1 item	6ES7 392-1AJ00-0AA0	Red	6ES7 392-2DX00-0AA0
• 100 items	6ES7 392-1AJ00-1AB0	for 32-channel signal module, DIN A4, for printing using laser printer; 10 units	
Front door, elevated design		Petrol	6ES7 392-2AX10-0AA0
e.g. for 32-channel modules; permits connection of 1.3 mm ² /16 AWG conductors ^{A)}	6ES7 328-0AA00-7AA0	Light beige	6ES7 392-2BX10-0AA0
LK 393 cable chamber	6ES7 393-4AA00-0AA0	Yellow	6ES7 392-2CX10-0AA0
essential for Ex operation		Red	6ES7 392-2DX10-0AA0
Labeling strips	6ES7 392-2XX00-0AA0	SIMATIC Manual Collection ^{B)}	6ES7 998-8XC01-8YE0
10 units (spare part) for signal modules (not 32-channel modules), function modules		SIMATIC Manual Collection Maintenance service for 1 year ^{B)}	6ES7 998-8XC01-8YE2
Label covers	6ES7 392-2XY00-0AA0	Reference manual: S7-300 Ex I/O modules, ET 200M	
10 units for signal modules (not 32-channel modules), function modules		• German	6ES7 398-8RA00-8AA0
		• English	6ES7 398-8RA00-8BA0

A) Subject to export regulations: AL: N and ECCN: EAR99H

B) Subject to export regulations: AL: N and ECCN: EAR99S

Overview



- Single-channel intelligent counter module for simple counting tasks
- For direct connection of incremental encoders
- Comparison function with 2 selectable comparison values
- Integrated digital outputs to output the response upon reaching the comparison value.
- Operating modes:
 - Continuous counting
 - One-shot counting
 - Periodic counting
- Special functions;
 - Set counter
 - Latch counter
- Start/stop counter with gate function

Note:

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

Additional information is available in the Internet under:

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

Technical specifications

	6ES7 350-1AH03-0AE0
Voltages and currents	
Auxiliary voltage 1L+, load voltage 2 L+	
- Rated value (DC)	24 V
•permissible range (including ripple)	
- dynamic, lower limit (DC)	18.5 V
- dynamic, upper limit (DC)	30.2 V
- static, lower limit (DC)	20.4 V
- static, upper limit (DC)	28.8 V
•Non-periodic snap-over	
- Duration	500 ms
- Recovery time	50 s
- Value	35 V
Current consumption	
•from load voltage 1L+ (no load), max.	40 mA
•from backplane bus 5 V DC, max.	160 mA
•Power dissipation, typical	4.5 W
Connection system	
•Requisite front connector	1 x 20-pin
Digital inputs	
•Number of digital inputs	3
•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 1 signal, typical	9 mA

	6ES7 350-1AH03-0AE0
Digital outputs	
•Number of digital outputs	2
•Short-circuit protection of the output	Yes; clocking electronically
•Limitation of voltage induced on circuit interruption to	2L+ (-39 V)
Output voltage	
- for 0 signal (DC), max.	3 V
- for 1 signal	2L+ (-1.5 V)
Output current	
- for 1 signal rated value	0.5 A
- for 1 signal permissible range for 0 to 60 °C, min.	5 mA
- für Signal 1 zulässiger Bereich für 0 bis 60 °C, max.	0.6 A
Output delay at resistive load	
- "0" to "1", max.	300 µs
Sensor supply	
5 V - sensor supply	
- 5 V	Yes; 5.2 V +/-2%
- Output current, max.	300 mA
24 V - sensor supply	
- 24 V	Yes; 1L+ (-3V)
- Output current, max.	400 mA
Sensor	
Connectable encoders	
- Incremental encoder (symmetrical)	Yes; with 2 pulse trains offset by 90°
- Incremental encoder (asymmetrical)	Yes
- 24 V initiator	Yes
- 24 V directional sensor	Yes; 1 pulse train, 1 direction level

SIMATIC S7-300

Function modules

FM 350-1 counter module

Technical specifications (continued)

	6ES7 350-1AH03-0AE0
Counter	
• Number of counter inputs	1
• Counting range, description	32 Bit or +/-31 Bit
• Minimum pulse width, adjustable	Yes; 2.5 µs and 25 µs
Counter input 5 V	
- Type	RS 422
- Terminating resistance, approx.	220 Ω
- Differential input voltage	1.3 V
- Count frequency, max.	500 kHz
Counter input 24 V	
- Input voltage, for 0 signal	-28.8 to +5 V
- Input voltage, for 1 signal	+11 to +28.8 V
- Input current, for 1 signal, typical	9 mA
- Count frequency, max.	200 kHz
- Minimum pulse width	2.5 µs

	6ES7 350-1AH03-0AE0
Insulation	
• Insulation tested with	500 V
Potentials/ electrical isolation	
Digital output functions	
- between the channels and the backplane bus	Yes; Optocoupler
Digital input functions	
- between the channels and the backplane bus	Yes; Optocoupler
Electrical isolation, counters	
- between the channels and the backplane bus	Yes; Optocoupler
Permissible potential difference	
• between different circuits	75 V DC/ 60 V AC
Dimensions and weight	
• Weight, approx.	250 g
• Width	40 mm
• Height	125 mm
• Depth	120 mm

Ordering data

	Order No.
FM 350-1 counter module with 1 channel, max. 500 kHz; for incremental encoders	6ES7 350-1AH03-0AE0
Coding connector - range card for analog inputs Spare part	6ES7 974-0AA00-0AA0
Front connector 20-pin, with screw-type terminals	
• 1 item	6ES7 392-1AJ00-0AA0
• 100 items	6ES7 392-1AJ00-1AB0
20-pin, with spring-loaded terminals	6ES7 392-1BJ00-0AA0
Bus connector 1 unit (spare part)	6ES7 390-0AA00-0AA0
Labeling strips 10 units (spare part)	6ES7 392-2XX00-0AA0
S7-SmartLabel Software for machine labeling of modules directly from the STEP 7 project	2XV9 450-1SL01-0YX0
Labeling sheets for machine labeling	see "Accessories"

Order No.

Slot number label Spare part	6ES7 912-0AA00-0AA0
Shield connecting element 80 mm wide, with 2 rows for 4 terminal elements each	6ES7 390-5AA00-0AA0
Terminal elements 2 units	
For 2 cables with 2 to 6 mm diameter	6ES7 390-5AB00-0AA0
For 1 cable with 3 to 8 mm diameter	6ES7 390-5BA00-0AA0
For 1 cable with 4 to 13 mm diameter	6ES7 390-5CA00-0AA0
FM 350-1 manual	
German	6ES7 350-1AH00-8AG0
English	6ES7 350-1AH00-8BG0
French	6ES7 350-1AH00-8CG0
Italian	6ES7 350-1AH00-8EG0
Connectable incremental encoders 6FX2 001-2...	Refer to A&D Mall under SIMO-DRIVE Sensor or Motion Connect 500 (see also www.siemens.com/simatic-technology)

Overview



- 8-channel intelligent counter module for universal counter and measurement tasks

- For direct connection of 24 V incremental encoders, directional elements, initiators or NAMUR sensors
- Compare function with programmable comparison values (number depends on operating mode).
- Integrated digital outputs to output the response upon reaching the comparison value.
- Operating modes:
 - Continuous/one-shot/periodic counting
 - Frequency/speed control
 - Period measurement
 - Proportioning

Note:

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

Additional information is available in the Internet under:

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

Technical specifications

	6ES7 350-2AH00-0AE0
Voltages and currents	
Auxiliary voltage 1L+, load voltage 2 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 load voltage L+ (no load), max.	150 mA
•from backplane bus 5 V DC, max.	100 mA
•Power dissipation, typical	10 W
Connection system	
•Requisite front connector	1 x 40-pin
Digital inputs	
•Number of digital inputs	8
•Functions	1 each for gate start / gate stop
Length of cable	
- Length of cable shielded, max	100 m
Input voltage	
- for signal "0"	-3 to 5 V
- for signal "1"	11 to 30.2 V
Input current	
- for 0 signal, max.(permissible closed-circuit current)	2 mA
- for 1 signal, typical	9 mA
Input delay (at rated value of the input voltage)	
•For standard inputs	
- at 0 to 1, max.	50 µs

	6ES7 350-2AH00-0AE0
Digital outputs	
•Number of digital outputs	8
•Length of cable shielded, max.	600 m
•Length of cable unshielded, max.	100 m
•Short-circuit protection of the output	Yes
•Limitation of voltage induced on circuit interruption to	L+ (-40 V)
Output voltage	
- for 1 signal	L+ (-0.8 V)
Output current	
- for 1 signal rated value	0.5 A
- for 0 signal residual current, max.	0.5 mA
Output delay at resistive load	
- "0" to "1", max.	300 µs
Switching frequency	
- at resistive load, max.	500 Hz
- at inductive load, max.	0.5 Hz
Summation current of the outputs (per group)	
- vertical installation, up to 40 °C, max.	2 A
- horizontal installation, up to 40 °C, max.	4 A
- horizontal installation, up to 60 °C, max.	2 A
Sensor supply	
•Output voltage	NAMUR sensor supply: 8.2 V +/-2%
•Output current, rated value	200 mA
•Short-circuit protection	Yes

SIMATIC S7-300

Function modules

FM 350-2 counter module

Technical specifications (continued)

	6ES7 350-2AH00-0AE0
Sensor	
Connectable encoders	
- Incremental encoder (asymmetrical)	Yes
- 24 V initiator	Yes
- 24 V directional sensor	Yes
- NAMUR sensor	Yes
- 2-wire BEROs	Yes
NAMUR sensor	
- Number of NAMUR inputs	8
- Input signal	to DIN 19 234
- Input current, for "0" signal, max.	1.2 mA
- Input current, for 1 signal, min.	2.1 mA
- Input delay, max.	50 µs
- Input frequency, max.	20 kHz
- Length of cable shielded, max.	100 m
Counter	
Counter input 24 V	
- Number	8; 32 Bit or +/-31 Bit
- Input voltage, for 0 signal	-3 to 5 V
- Input voltage, for 1 signal	11 V to 30.2 V
- Input current for 0 signal max (permiss. closed-circuit current)	2 mA
- Input current, for 1 signal, typical	9 mA
- Input delay, max.	50 µs
- Count frequency, max.	20 kHz; 24 V incremental encoder: 10 kHz, 24 V directional element: 20 kHz, 24 V initiator: 20 kHz, NAMUR sensor: 20 kHz
- Length of cable, max.	100 m
Status information/ interrupts/ diagnostics	
Interrupts	
- Diagnostic interrupt	Yes; parameterizable
- Process interrupt	Yes; parameterizable
Diagnostics	
- Diagnostic functions	Yes; Diagnostic information can be read out
Potentials/ electrical isolation	
Digital output functions	
- between the channels and the backplane bus	Yes; and shielding
Digital input functions	
- between the channels and the backplane bus	Yes; and shielding
- between the channels and the backplane bus (NAMUR)	Yes, to backplane bus and shielding
Electrical isolation, counters	
- between the channels and the backplane bus	Yes; and shielding
Dimensions and weight	
•Weight, approx.	460 g
•Width	80 mm
•Height	125 mm
•Depth	120 mm

Ordering data

Order No.

FM 350-2 counter module	6ES7 350-2AH00-0AE0
With 8 channels, max. 20 kHz; for 24 V incremental encoders and NAMUR sensors; incl. configuring package and electronic documentation on CD	
Front connector	
40-pin, screw-type contacts	
•1 item	6ES7 392-1AM00-0AA0
•100 items	6ES7 392-1AM00-1AB0
40-pin with spring-loaded terminals	6ES7 392-1BM01-0AA0
Bus connectors	
1 item (spare part)	6ES7 390-0AA00-0AA0
Labeling strips	
10 items (spare part)	6ES7 392-2XX00-0AA0
S7 SmartLabel	
Software for labeling modules mechanically directly in the STEP 7 project	2XV9 450-1SL01-0YX0
Labeling sheets for machine labeling	
	see "Accessories"
Slot number plate	
Spare part	6ES7 912-0AA00-0AA0
Shield connecting element	
80 mm wide, with 2 rows each for 4 terminals	6ES7 390-5AA00-0AA0
Terminal elements	
2 items	
For 2 cables 2 to 6 mm in diameter	6ES7 390-5AB00-0AA0
For 1 cable 3 to 8 mm in diameter	6ES7 390-5BA00-0AA0
For 1 cable 4 to 13 mm in diameter	6ES7 390-5CA00-0AA0

Overview



- Two-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.

Additional information is available in the Internet under:

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

Technical specifications

	6ES7 351-1AH01-0AE0
Supply voltages	
Rated value	
- 24 V DC	Yes
Current consumption	
• Current consumption, max.	350 mA
Connection system	
• Requisite front connector	1 x 20-pin
Digital inputs	
• Number of digital inputs	8
• Functions	Reference cam, reversing cam, set actual value on-the-fly, start/stop positioning motion
Input voltage	
- Rated value, DC	24 V
- for signal "0"	-3 to 5 V
- for signal "1"	11 to 30 V
Input current	
• For 2-wire BERO	
- For 0 signal, typical	2 mA
- For 1 signal, typical	6 mA
Digital outputs	
• Number of digital outputs	8
• Functions	Rapid traverse, creep speed, clockwise rotation, counter-clockwise rotation
• Short-circuit protection of the output	Yes
Output voltage	
- Rated value (DC)	24 V
- for 1 signal	UP - 0.8 V
Output current	
- for 1 signal permissible range for 0 to 60 °C, min.	5 mA; at UPmax
- for 1 signal permissible range for 0 to 60 °C, max.	600 mA; at UPmax
- for 0 signal residual current, max.	0.5 mA

	6ES7 351-1AH01-0AE0
Sensor supply	
5 V - sensor supply	
- 5 V	Yes
- Output current, max.	350 mA
- Length of cable, max.	32 m
24 V - sensor supply	
- 24 V	Yes
- Output current, max.	400 mA; per channel
- Length of cable, max.	100 m
Sensor	
Connectable encoders	
- Incremental encoder (symmetrical)	Yes
- Incremental encoder (asymmetrical)	Yes
- Absolute encoder (SSI)	Yes
- 2-wire BERO	Yes
- permissible closed-circuit current (2-wire BERO), max.	2 mA; at signal "0", max. 2 mA; at signal "1", max. 6 mA
Incremental encoder (symmetrical)	
- Track mark signals	A, notA, B, notB
- Zero mark signal	N, notN
- Input signal	5 V differential signal (phys. RS 422)
- Input frequency, max.	0,5 MHz
Incremental encoder (asymmetrical)	
- Track 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
Absolute encoder (SSI)	
- Input signal	5 V differential signal (phys. RS 422)
- Data signal	DATA, notDATA
- Clock signal	CL, notCL
- Frame length	13 or 25 Bit
- Clock frequency, max.	1 MHz
- Gray code	Yes
- Length of cable (shielded), max.	300 m; at max. 125 kHz

SIMATIC S7-300

Function modules

FM 351 positioning module

Technical specifications (continued)

	6ES7 351-1AH01-0AE0		6ES7 351-1AH01-0AE0
Potentials/ electrical isolation		Dimensions and weight	
Digital output functions		•Weight, approx.	550 g
- Electrical isolation, digital output functions	Yes	•Width	80 mm
Digital input functions		•Height	125 mm
- Electrical isolation, digital input functions	Yes	•Depth	120 mm

Ordering data

	Order No.		Order No.
FM 351 positioning module	6ES7 351-1AH01-0AE0	Sub-D connector	6ES5 750-2AA21
for rapid traverse and creep-speed drives		15-pin, male	
703 connecting cable		Front connector	
to connect FM 351, FM 352, FM 354 to:		20-pin, with screw-type terminals	
•Siemens incremental position encoder 6FX2 001-...		•1 item	6ES7 392-1AJ00-0AA0
- 5 m, outgoing feeder cable downwards	6ES5 703-1BF00	•100 items	6ES7 392-1AJ00-1AB0
- 10 m, outgoing feeder cable upwards	6ES5 703-1CB01	20-pin, with spring-loaded terminals	6ES7 392-1BJ00-0AA0
- 20 m, outgoing feeder cable upwards	6ES5 703-1CC01	Bus connector	6ES7 390-0AA00-0AA0
•Incremental position encoder for 5 V signals (RS 422), supply voltage 5 V, 1 end open		1 unit (spare part)	
- 5 m, outgoing feeder cable upwards	6ES5 703-2BF01	Labeling strip	6ES7 392-2XX00-0AA0
- 10 m, outgoing feeder cable downwards	6ES5 703-2CB00	10 units (spare part)	
- 10 m, outgoing feeder cable upwards	6ES5 703-2CB01	Slot number label	6ES7 912-0AA00-0AA0
•Incremental position encoder for 24 V signals (RS 422), supply voltage 24 V, 1 end open		S7-SmartLabel	2XV9 450-1SL01-0YX0
- 10 m, outgoing feeder cable downwards	6ES5 703-4CB00	Software for machine labeling of modules directly from the STEP 7 project	
- 32 m, outgoing feeder cable downwards	6ES5 703-4CD20	Labeling sheets for machine labeling	see "Accessories"
•Absolute SSI position encoder, supply voltage 24 V, 1 end open		Spare part	
- 20 m, outgoing feeder cable downwards	6ES5 703-5CC00	Shield connecting element	6ES7 390-5AA00-0AA0
- 20 m, outgoing feeder cable upwards	6ES5 703-5CC01	80 mm wide, with 2 rows for 4 terminal elements each	
- 50 m, outgoing feeder cable downwards	6ES5 703-5CF00	Terminal elements	
- 50 m, outgoing feeder cable upwards	6ES5 703-5CF01	2 units	
		For 2 cables with 2 to 6 mm diameter	6ES7 390-5AB00-0AA0
		For 1 cable with 3 to 8 mm diameter	6ES7 390-5BA00-0AA0
		For 1 cable with 4 to 13 mm diameter	6ES7 390-5CA00-0AA0

Overview



- Extremely high-speed electronic cam controller
- Low-cost alternative to mechanical cam controllers
- 32 cam tracks, 13 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.

Additional information is available in the Internet under:

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

Technical specifications

	6ES7 352-1AH01-0AE0
Supply voltages	
Rated value	
- 24 V DC	Yes
Current consumption	
• from load voltage L+ (no load), max.	200 mA
• from backplane bus 5 V DC, max.	100 mA
Connection system	
• Requisite front connector	1 x 20-pin
Digital inputs	
• Number of digital inputs	4
• Functions	Reference point switches, set actual value on-the-fly/inprocess length measurement, brake enabling, enable track output No. 3
Input voltage	
- Rated value, DC	24 V
- for signal "0"	-3 to 5 V
- for signal "1"	11 to 30 V
Input current	
• For 2-wire BERO	
- For 0 signal, typical	2 mA
- For 1 signal, typical	9 mA
Digital outputs	
• Number of digital outputs	13
• Functions	Cam track
• Short-circuit protection of the output	Yes
Output voltage	
- Rated value (DC)	24 V
- for 1 signal	UP - 0.8 V
Output current	
- for 1 signal permissible range or 0 to 60 °C, min.	5 mA; at UPmax
- for 1 signal permissible range for 0 to 60 °C, max.	600 mA; at Upmax
- for 0 signal residual current, max.	0.5 mA

	6ES7 352-1AH01-0AE0
Sensor supply	
5 V - sensor supply	
- 5 V	Yes
- Output current, max.	300 mA
- Length of cable, max.	32 m
24 V - sensor supply	
- 24 V	Yes
- Output current, max.	300 mA
- Length of cable, max.	100 m
Sensor	
Connectable encoders	
- Incremental encoder (symmetrical)	Yes
- Incremental encoder (asymmetrical)	Yes
- Absolute encoder (SSI)	Yes
- 2-wire BERO	Yes
- permissible closed-circuit current (2-wire BERO), max.	2 mA; at signal "0", max. 2 mA; at signal "1", max. 9 mA
Incremental encoder (symmetrical)	
- Track mark signals	A, notA, B, notB
- Zero mark signal	N, notN
- Input signal	5 V differential signal (phys. RS 422)
- Input frequency, max.	1 MHz
Incremental encoder (asymmetrical)	
- Track 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
Absolute encoder (SSI)	
- Data signal	DATA, notDATA
- Clock signal	CL, notCL
- Frame length	13 or 25 Bit
- Clock frequency, max.	1 MHz
- Gray code	Yes
- Length of cable (shielded), max.	320 m; at max. 125 kHz

SIMATIC S7-300

Function modules

FM 352 electronic cam controller

Technical specifications (continued)

	6ES7 352-1AH01-0AE0
Potentials/ electrical isolation	
Digital output functions - Electrical isolation, digital output functions	No
Digital input functions - Electrical isolation, digital input functions	No

	6ES7 352-1AH01-0AE0
Dimensions and weight	
•Weight, approx.	550 g
•Width	80 mm
•Height	125 mm
•Depth	120 mm

Ordering data	Order No.
FM 352 electronic cam controller	6ES7 352-1AH01-0AE0
Manual for FM 352	
German	6ES7 352-1AH00-8AG0
English	6ES7 352-1AH00-8BG0
French	6ES7 352-1AH00-8CG0
Italian	6ES7 352-1AH00-8EG0
Plug-in cable 703	see FM 351
Sub-D connector	6ES5 750-2AA21
15-pin, male	
Front connectors	
20-pin, with screw-type terminals	
•1 item	6ES7 392-1AJ00-0AA0
•100 items	6ES7 392-1AJ00-1AB0
20-pin, with spring-loaded terminals	6ES7 392-1BJ00-0AA0
Bus connectors	6ES7 390-0AA00-0AA0
1 item (spare part)	

Ordering data	Order No.
Labeling strips	6ES7 392-2XX00-0AA0
10 items (spare part)	
S7 SmartLabel	2XV9 450-1SL01-0YX0
Software for labeling modules mechanically directly in the STEP 7 project	
Labeling sheets for machine labeling	see "Accessories"
Slot number label	6ES7 912-0AA00-0AA0
Spare part	
Shield connecting element	6ES7 390-5AA00-0AA0
80 mm wide, with 2 rows each for 4 terminals	
Terminal elements	
2 items	
For 2 cables 2 to 6 mm in diameter	6ES7 390-5AB00-0AA0
For 1 cable 3 to 8 mm in diameter	6ES7 390-5BA00-0AA0
For 1 cable 4 to 13 mm in diameter	6ES7 390-5CA00-0AA0

Overview



- The FM 352-5 High-speed Boolean processor offers an extremely fast binary control and some of the quickest switching procedures ever possible (cycle duration: 1 µs)
- Programming with LAD or FBD is possible
- The instruction set available includes bit instructions (instruction subset of STEP 7), timers, counters, frequency dividers, frequency generators, and shift registers
- 12 integrated DI/8 integrated DO
- 2 versions: Current sinking or current sourcing digital outputs
- 1 channel for connecting a 24 V incremental encoder, a 5 V incremental encoder (RS422) or a serial interface absolute encoder

A micro memory card is required for operation of the FM 352-5.

Note:

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

Additional information is available in the Internet under:

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

Technical specifications

	6ES7 352-5AH00-0AE0	6ES7 352-5AH10-0AE0
Supply voltages		
Rated value		
- 24 V DC	Yes	Yes
Voltages and currents		
Load voltage L+		
- Rated value (DC)	24 V	24 V
- Reverse polarity protection	Yes	Yes
- 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 1L+, max	150 mA; typ. 60 mA	150 mA; typ. 60 mA
• from load voltage 2L+ (no load), max.	200 mA; typ. 60 mA, DE/DA supply	200 mA; typ. 60 mA, DE/DA supply
• from load voltage 3L+ (with sensor), max.	600 mA; typ. 80 mA plus encoder power supply	600 mA; typ. 80 mA plus encoder power supply
• from load voltage 3L+ (no sensor), max.	200 mA; typ. 80 mA	200 mA; typ. 80 mA
• from backplane bus 5 V DC, max.	100 mA; typ.	100 mA; typ.
• Power dissipation, typical	6.5 W	6.5 W
Memory/backup		
Memory		
- Memory card, RAM	128 KByte; required for operation, MMC	128 KByte; required for operation, MMC
Interfaces		
• Update time	PLC interface: 5ms (2.6 ms typ.)	PLC interface: 5ms (2.6 ms typ.)
Connection system		
• Requisite front connector	1 x 40-pin	1 x 40-pin

	6ES7 352-5AH00-0AE0	6ES7 352-5AH10-0AE0
CPU/ programming		
• Program cycle time (scan)	1 µs	1 µs
Digital inputs		
• Number of digital inputs	8; as standard and up to 12 at 24 V DC encoder inputs as digital inputs	8; as standard and up to 12 at 24 V DC encoder inputs as digital inputs
Length of cable		
- Length of cable shielded, max	600 m; shielded cable advisable when filtering set at 1.6 ms raster.	600 m; shielded cable advisable when filtering set at 1.6 ms raster.
- Length of cable unshielded, max.	100 m	100 m
Input voltage		
- Rated value, DC	24 V	24 V
- for signal "0"	-30 V to 5 V	-30 V to 5 V
- for signal "1"	11 to 30 V	11 to 30 V
Input current		
- for 0 signal, max (permissible closed-circuit current)	1.5 mA	1.5 mA
- for 1 signal, typical	3.8 mA	3.8 mA
Input delay (at rated value of the input voltage)		
- Input frequency (at 0.1ms delay time), max.	200 kHz	200 kHz
- Programmable digital filter delay	none, 5µs, 10µs, 15µs, 20µs, 50µs, 1.5ms	none, 5µs, 10µs, 15µs, 20µs, 50µs, 1.5ms
- Minimum pulse width for program reaction	1µs, 5µs, 10µs, 15µs, 20µs, 50µs, 1.6ms	1µs, 5µs, 10µs, 15µs, 20µs, 50µs, 1.6ms
• For standard inputs		
- at 0 to 1, max.	3 µs; typ. 1.5 µs	3 µs; typ. 1.5 µs

SIMATIC S7-300

Function modules

FM 352-5 High-Speed Boolean Processor

Technical specifications (continued)

	6ES7 352-5AH00-0AE0	6ES7 352-5AH10-0AE0
Digital outputs		
• Number of digital outputs	8	8
• M-switching	Yes	
• P-switching		Yes
• Length of cable shielded, max.	600 m	600 m
• Length of cable unshielded, max.	100 m	100 m
• Short-circuit protection of the output	Yes; Overvoltage protection, thermal protection	Yes; Overvoltage protection, thermal protection
• Short-circuit protection of the output, response threshold, typical	1.7 A to 3.5 A	1.7 A to 3.5 A
• Limitation of voltage induced on circuit interruption to	2M +45 V typ, (40 ..55 V) Note: no protection against inductive kick-back >55mJ	2M +45 V typ, (40 ..55 V) Note: no protection against inductive kick-back >55mJ
• Lamp load, max.	5 W	5 W
• Driving a digital input	No	No
Output voltage		
- Rated value (DC)	24 V	24 V
- for 0 signal (DC), max.	28.8 V	28.8 V
- for 1 signal (DC), max.	0.5 V	0.5 V
Output current		
- for 1 signal rated value	0.5 A; at 60 °C	0.5 A; at 60 °C
- for 1 signal permissible range for 0 to 60 °C, min.	5 mA	5 mA
- for 1 signal permissible range for 0 to 60 °C, max.	600 mA	600 mA
- for 0 signal residual current, max.	1 mA	1 mA
Output delay at resistive load		
- "0" to "1", max.	1 µs; 0.6 µs 50 mA / 1.0 µs 0.5 Amp	1 µs; 0.6 µs 50 mA / 1.0 µs 0.5 Amp
- "1" to "0", max.	1.5 µs; 1.7 µs 50 mA / 1.5 µs 0.5 Amp	1.5 µs; 1.7 µs 50 mA / 1.5 µs 0.5 Amp
Parallel switching of 2 outputs		
- to increase power	Yes; 2	Yes; 2
Switching frequency		
- at resistive load, max.	100 kHz; 20 kHz at 0.5 amps; 100 kHz at 0.25 amp	100 kHz; 20 kHz at 0.5 amps; 100 kHz at 0.25 amp
- at inductive load, max.	2 Hz; 2 Hz at 0.5 amps with external commutator diodes; 0.5 Hz at 0.5 amps without external commutator diodes	2 Hz; 2 Hz at 0.5 amps with external commutator diodes; 0.5 Hz at 0.5 amps without external commutator diodes
- at lamp load, max.	10 Hz	10 Hz

	6ES7 352-5AH00-0AE0	6ES7 352-5AH10-0AE0
Sensor supply		
5 V - sensor supply		
- 5 V	Yes	Yes
- Short-circuit protection	Yes; Electronic overload protection. Not protected when normal or counter voltage applied.	Yes; Electronic overload protection. Not protected when normal or counter voltage applied.
- Output current, max.	250 mA	250 mA
24 V - sensor supply		
- 24 V	Yes	Yes
- Short-circuit protection	Yes; Overcurrent and overheating protection on overload. Diagnostics, if output temperature limit reached. Not protected when normal or counter voltage applied	Yes; Overcurrent and overheating protection on overload. Diagnostics, if output temperature limit reached. Not protected when normal or counter voltage applied
- Output current, max.	400 mA	400 mA
Sensor		
Connectable encoders		
- Incremental encoder (symmetrical)	Yes	Yes
- Incremental encoder (asymmetrical)	Yes	Yes
- Absolute encoder (SSI)	Yes	Yes
- permissible closed-circuit current (2-wire BEROs), max.	Yes; typ. 1 A	Yes; typ. 1 A
Incremental encoder (symmetrical)	1.5 mA	1.5 mA
- Track mark signals		
- Zero mark signal	A, notA, B, notB	A, notA, B, notB
- Input signal	N, notN	N, notN
- Input frequency, max.	5 V-Differenz-signal (phys. RS 422)	5 V-Differenz-signal (phys. RS 422)
- Length of cable (shielded), max.	1 MHz	1 MHz
- permissible closed-circuit current (2-wire BEROs), max.	100 m; Cable length, RS-422 (5V) incremental encoder, Siemens Type 6FX201-2, 5V supply: 500kHz, 32 meters, shielded, max.; cable length, RS-422 (5V) incremental encoder, Siemens Type 6FX201-2, 24V supply: 500 kHz, 100 meters, shielded, max.	100 m; Cable length, RS-422 (5V) incremental encoder, Siemens Type 6FX201-2, 5V supply: 500kHz, 32 meters, shielded, max.; cable length, RS-422 (5V) incremental encoder, Siemens Type 6FX201-2, 24V supply: 500 kHz, 100 meters, shielded, max.

Technical specifications (continued)

	6ES7 352-5AH00-0AE0	6ES7 352-5AH10-0AE0
Sensor (continued)		
Incremental encoder (asymmetrical)		
- Track mark signals	A, B	A, B
- Zero mark signal	N	N
- Input voltage	24 V	24 V
- Input frequency, max.	200 kHz	200 kHz
- Length of cable (shielded), max.	50 m; Cable length, HTL incremental encoder, Siemens, Type 6FX2001-4: 50kHz, 25 m shielded, max., 25kHz, 50 m shielded, max.	50 m; Cable length, HTL incremental encoder, Siemens, Type 6FX2001-4: 50kHz, 25 m shielded, max., 25kHz, 50 m shielded, max.
Absolute encoder (SSI)		
- Data signal	DATA, notDATA	DATA, notDATA
- Clock signal	CK, notCK	CK, notCK
- Frame length	13 or 25 bits	13 or 25 bits
- Clock frequency, max.	1 MHz; 125 kHz, 250 kHz, 500 kHz, or 1 MHz	1 MHz; 125 kHz, 250 kHz, 500 kHz, or 1 MHz
- Length of cable (shielded), max.	320 m; Cable length, RS-422 SSI absolute encoder Siemens Type 6FX201-5, 24V supply: 125kHz, 320 meters shielded, max., 250kHz, 160 meters shielded, max., 500kHz, 60 meters shielded, max., 1MHz, 20 meters shielded, max.	320 m; Cable length, RS-422 SSI absolute encoder Siemens Type 6FX201-5, 24V supply: 125kHz, 320 meters shielded, max., 250kHz, 160 meters shielded, max., 500kHz, 60 meters shielded, max., 1MHz, 20 meters shielded, max.
- Monoflop time	adjustable: 16/32/48/64 µs	adjustable: 16/32/48/64 µs
- Listening mode	Yes; up to two stations	Yes; up to two stations
- Multi-turn	Yes; 25 bit frame	Yes; 25 bit frame
Sensor signal evaluation		
- Count direction, up	Yes	Yes
- Count direction, down	Yes	Yes
Response times		
• Input response time to output response time	5V input to 24V output, 0 filter: 1 to 4µs (typ); 24V input to 24V output, 0 filter: 2 to 6µs (type)	5V input to 24V output, 0 filter: 1 to 4µs (typ); 24V input to 24V output, 0 filter: 2 to 6µs (type)

	6ES7 352-5AH00-0AE0	6ES7 352-5AH10-0AE0
Counter		
• Counting range, description	Counting range (16-bit counter): - 32768 to 32767 (user-specific within this range); counting range (32-bit counter): - 2,147,483,648 to 2,147,483,647 (user-specific within this range)	Counting range (16-bit counter): - 32768 to 32767 (user-specific within this range); counting range (32-bit counter): - 2,147,483,648 to 2,147,483,647 (user-specific within this range)
• Counting range, lower limit	-2,147,483,648	-2,147,483,648
• Counting range, upper limit	2,147,483,647	2,147,483,647
Count mode		
- Single	Yes	Yes
- Continuous	Yes	Yes
- Periodic	Yes	Yes
Status information/ interrupts/ diagnostics		
Interrupts		
- Diagnostic interrupt	Yes; 1L, 2L, 3L missing; MMC error; output overload (8); overloaded encoder supply; differential broken wire; parameterization error; SSI frame overrun	Yes; 1L, 2L, 3L missing; MMC error; output overload (8); overloaded encoder supply; differential broken wire; parameterization error; SSI frame overrun
- Process interrupt	Yes; 8 available; to be generated by the user program	Yes; 8 available; to be generated by the user program
Diagnostics		
- Wire break in sensor cable	Yes	Yes
- Overflow/underflow	Yes	Yes
- No load voltage	Yes	Yes
Potentials/ electrical isolation		
• between 1L and 2L and 3L	Yes; 75 V DC / 60 V AC	Yes; 75 V DC / 60 V AC
• between the digital I/O & 2L and sensor I/O & 3L	Yes (75 V DC, 60 V AC)	Yes (75 V DC, 60 V AC)
• between the backplane bus and the digital & sensor I/O & 1L & 2L & 3L	Yes (75 V DC, 60 V AC)	Yes (75 V DC, 60 V AC)
Digital input functions		
- Electrical isolation, digital input functions	Yes; Yes CPU, I/O and encoder units are separate	Yes; Yes CPU, I/O and encoder units are separate

FM 352-5 High-Speed Boolean Processor

Technical specifications (continued)

	6ES7 352-5AH00-0AE0	6ES7 352-5AH10-0AE0
Dimensions and weight		
•Weight, approx.	434 g; Module weight, approx. 434 g (with 1L connection & without I/O connection or MMC); shipping weight, approx. 500 g (with bus and 1L connection & without I/O connection or MMC)	434 g; Module weight, approx. 434 g (with 1L connection & without I/O connection or MMC); shipping weight, approx. 500 g (with bus and 1L connection & without I/O connection or MMC)
•Width	80 mm	80 mm
•Height	125 mm	125 mm
•Depth	120 mm	120 mm

Ordering data

Order No.

FM 352-5 High-speed Boolean processor	
with M-switching digital outputs ^{A)}	6ES7 352-5AH00-0AE0
with P-switching digital outputs ^{A)}	6ES7 352-5AH10-0AE0
Configuration software for FM 352-5 ^{B)}	
in 5 languages Ge, En, Fr, Sp, It; executes under Windows 98/Me/NT 4.0 from SP3 onwards/2000 Professional from SP 1 onwards	6ES7 352-5AH00-7XG0
Micro memory card	
128 KB	6ES7 953-8LG11-0AA0
512 KB	6ES7 953-8LJ11-0AA0
2 MB	6ES7 953-8LL11-0AA0
Front connector	
40-pin, with screw-type terminals	
•1 item	6ES7 392-1AM00-0AA0
•100 items	6ES7 392-1AM00-1AB0
40-pin, with spring-loaded terminals	6ES7 392-1BM01-0AA0

A) Subject to export regulations: AL: N and ECCN: EAR99H

B) Subject to export regulations: AL: N and ECCN: EAR99S

Overview



- Positioning module for stepper motors in machines with high clock pulse rates
- Can be used for point-to-point positioning tasks and for complex traversing patterns

4

Technical specifications

	6ES7 353-1AH01-0AE0
Supply voltages	
Rated value	
- 24 V DC	Yes
- permissible range, lower limit (DC)	20.4 V
- permissible range, upper limit (DC)	28.8 V
Current consumption	
•Current consumption, max.	300 mA
Connection system	
•Requisite front connector	1 x 20-pin
Digital inputs	
•Number of digital inputs	4; (+ 1 input for the message signal)
•Functions	Reference cam, set actual value on-the-fly, inprocess measurement, start/stop positioning motion, external block change
Input voltage	
- Rated value, DC	24 V
- for signal "0"	-3 to 5 V
- for signal "1"	11 to 30 V
Input current	
- for 0 signal, max (permissible closed-circuit current)	2 mA
- for 1 signal, typical	6 mA; 6 to 15 mA
Digital outputs	
•Number of digital outputs	4
•Functions	Position reached: stop, axis travels forward, axis travels back, change M function M97, change M function M98, start enable, direct output via data record
•Short-circuit protection of the output	Yes
Output voltage	
- Rated value (DC)	24 V
- for 1 signal	Up (-3 V)
Output current	
- for 1 signal permissible range for 0 to 55 °C, max.	0.6 A; at UPmax
- for 0 signal residual current, max.	2 mA

	6ES7 353-1AH01-0AE0
Drive interface	
Signal input I	
- Function	"Power section ready"
Signal output I	
- Type	5 V differential signal (phys. RS 422)
- Function	Direction, enable, clock, current control
- Differential output voltage, min.	2 V; RL = 100 Ohm
- Differential output voltage, for 0 signal, max.	1 V; Io = 20 mA
- Differential output voltage, for I signal, min.	3.7 V; Io = -20 mA
- Length of cable, max.	35 m
Potentials/ electrical isolation	
Digital output functions	
- Electrical isolation, digital output functions	No
Digital input functions	
- Electrical isolation, digital input functions	No
Dimensions and weight	
•Weight, approx.	500 g
•Width	80 mm
•Height	125 mm
•Depth	118 mm

SIMATIC S7-300

Function modules

FM 353 positioning module

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Ordering data	Order No.		Order No.
FM 353 positioning module for stepper motors; incl. configuration package on CD-ROM (Ge, En, Fr, It) comprising • FM 353 manual, electronic • Standard function blocks (STEP 7 interface software) • Mask-based configuration software for FM 353 • Standard HMI masks for OP7/OP17	6ES7 353-1AH01-0AE0	Sub-D connector 15-pin, female	6ES5 750-2AB21
		Front connector 20-pin, with screw-type terminals • 1 item • 100 items 20-pin, with spring-loaded terminals	6ES7 392-1AJ00-0AA0 6ES7 392-1AJ00-1AB0 6ES7 392-1BJ00-0AA0
		Bus connector 1 unit (spare part)	6ES7 390-0AA00-0AA0
FM 353 manual German English French Italian	6ES7 353-1AH01-8AG0 6ES7 353-1AH01-8BG0 6ES7 353-1AH01-8CG0 6ES7 353-1AH01-8EG0	Labeling strip 10 units (spare part)	6ES7 392-2XX00-0AA0
Edit FM Program editor for editing, loading and saving NC programs using PG/PC; German/English, on CD-ROM	6FC5 263-0AA03-0AB0	S7-SmartLabel Software for machine labeling of modules directly from the STEP 7 project	2XV9 450-1SL01-0YX0
Connecting cable to stepper motor power section		Labeling sheets for machine labeling	see "Accessories"
1 m	6FX8 002-3AC02-1AB0	Slot number label Spare part	6ES7 912-0AA00-0AA0
2 m	6FX8 002-3AC02-1AC0	Shield connecting element 80 mm wide, with 2 rows for 4 terminal elements each	6ES7 390-5AA00-0AA0
3 m	6FX8 002-3AC02-1AF0	Terminal elements 2 units	6ES7 390-5AB00-0AA0
Connecting cables and encoders	see Catalog NC 60, NC Z, CA 01 or in the A&D Mall	For 2 cables with 2 to 6 mm diameter For 1 cable with 3 to 8 mm diameter For 1 cable with 4 to 13 mm diameter	6ES7 390-5BA00-0AA0 6ES7 390-5CA00-0AA0

Overview



- Positioning module for servo motors in machines with high clock pulse rates
- Can be used for point-to-point positioning tasks and for complex traversing patterns

Note:

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

Additional information is available in the Internet under:

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

Technical specifications

	6ES7 354-1AH01-0AE0
Supply voltages	
Rated value	
- 24 V DC	Yes
Current consumption	
• Current consumption, max.	350 mA
Connection system	
• Requisite front connector	1 x 20-pin
Digital inputs	
• Number of digital inputs	4
• Functions	Reference cam, set actual value on-the-fly, inprocess measurement, start/stop positioning motion, external block change
Input voltage	
- Rated value, DC	24 V
- for signal "0"	-3 to 5 V
- for signal "1"	11 to 30 V
Input current	
- for 0 signal, max (permissible closed-circuit current)	2 mA
- for 1 signal, typical	6 mA; 6 to 15 mA
Digital outputs	
• Number of digital inputs	4
• Functions	Position reached: stop, axis travels forward, axis travels back, change M function M97, change M function M98, start enable, direct output via data record
• Short-circuit protection of the output	Yes
Output voltage	
- Rated value (DC)	24 V
- for 1 signal	UP - 3 V
Output current	
- for 1 signal permissible range for 0 to 55 °C, max.	0.6 A; at UPmax
- for 0 signal residual current, max.	2 mA

	6ES7 354-1AH01-0AE0
Sensor supply	
5 V - sensor supply	
- 5 V	Yes
- Output current, max.	220 mA
- Length of cable, max.	35 m
24 V - sensor supply	
- 24 V	Yes
- Output current, max.	300 mA
- Length of cable, max.	100 m
Sensor	
Connectable encoders	
- Incremental encoder (symmetrical)	Yes
- Absolute encoder (SSI)	Yes
Incremental encoder (symmetrical)	
- Track mark signals	A, notA, B, notB
- Zero mark signal	N, notN
- Input signal	5 V differential signal (phys. RS 422)
- Input frequency, max.	1 MHz
Absolute encoder (SSI)	
- Input signal	5 V differential signal (phys. RS 422)
- Data signal	DATA, notDATA
- Clock signal	CL, notCL
- Frame length	13, 21 or 25 bits
- Clock frequency, max.	1.25 Mbit/s
- Length of cable (shielded), max.	100 m; 10 m at 1.25 Mbit/s, 100 m at max. 125 kBit/s

SIMATIC S7-300

Function modules

FM 354 positioning module

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	6ES7 354-1AH01-0AE0
Drive interface	
Signal input I	
- Type	Controller message input, isolated (optical coupler)
- Function	"Drive ready for operation"
- Input voltage, rated value (DC)	24 V
- Input voltage, for 0 signal	-3 to 5 V
- Input voltage, for 1 signal	15 to 30 V
- Input current, for 1 signal	2 mA to 6 mA
Signal output II	
- Type	Controller enable output (contact)
- Function	Drive isolation for operation via contact relay
- Load	1 A/50 V/30 VA DC
Signal output III	
- Type	Analog output
- Function	Setpoint output for the drive
- Output voltage	-10 to +10 V
- Output current	-3 to +3 mA
- Length of cable, max.	35 m

	6ES7 354-1AH01-0AE0
Potentials/ electrical isolation	
Digital output functions	No
- Electrical isolation, digital output functions	
Digital input functions	No
- Electrical isolation, digital input functions	
Dimensions and weight	
•Weight, approx.	550 g
•Width	80 mm
•Height	125 mm
•Depth	118 mm

Ordering data	Order No.
FM 354 positioning module	6ES7 354-1AH01-0AE0
for servo motors; incl. configuration package on CD-ROM (Ge, En, Fr, It) comprising	
•FM 354 manual, electronic	
•Standard function blocks (STEP 7 interface software)	
•Mask-based configuration software for FM 354	
•Standard HMI masks for OP7/OP17	
FM 354 manual	
German	6ES7 354-1AH01-8AG0
English	6ES7 354-1AH01-8BG0
French	6ES7 354-1AH01-8CG0
Italian	6ES7 354-1AH01-8EG0
Edit FM	6FC5 263-0AA03-0AB0
Program editor for editing, loading and saving NC programs using PG/PC; German/English, on CD-ROM	
Connecting cables and encoders	see Catalog NC 60, NC Z, CA 01 or in the A&D Mall
703 connecting cable	see FM 351
Sub-D connector	
15-pin, male	6ES5 750-2AA21
9-pin, female	6ES5 750-2AB11

Order No.	
Front connector	
20-pin, with screw-type terminals	
•1 item	6ES7 392-1AJ00-0AA0
•100 items	6ES7 392-1AJ00-1AB0
20-pin, with spring-loaded terminals	6ES7 392-1BJ00-0AA0
Bus connector	6ES7 390-0AA00-0AA0
1 unit (spare part)	
Labeling strip	6ES7 392-2XX00-0AA0
10 units (spare part)	
S7-SmartLabel	2XV9 450-1SL01-0YX0
Software for machine labeling of modules directly from the STEP 7 project	
Labeling sheets for machine labeling	see "Accessories"
Slot number label	6ES7 912-0AA00-0AA0
Spare part	
Shield connecting element	6ES7 390-5AA00-0AA0
80 mm wide, with 2 rows for 4 terminal elements each	
Terminal elements	
2 units	
For 2 cables with 2 to 6 mm diameter	6ES7 390-5AB00-0AA0
For 1 cable with 3 to 8 mm diameter	6ES7 390-5BA00-0AA0
For 1 cable with 4 to 13 mm diameter	6ES7 390-5CA00-0AA0

Overview



- Path and positioning control for intelligent motion control of up to 4 axes
- Covers a wide spectrum from independent individual positioning axes through to interpolatory multi-axis continuous-path control
- For the control of stepper motors and controlled servo-drive axes
- User-friendly startup through easy-to-use parameterization tool
- Interface for SIMODRIVE 611U and MASTERDRIVES MC via the isochronous PROFIBUS (not for FM 357-2H in combination with HT6)

Note:

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

Additional information is available in the Internet under:

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

Technical specifications

	6ES7 357-4AH01-0AE0
Supply voltages	
Rated value	
- 24 V DC	Yes
Voltages and currents	
•Power consumption, typical	24 W
Current consumption	
•from backplane bus 5 V DC, max.	100 mA
Memory/backup	
Memory	
- NC-program memory	750 KByte
Connection system	
•Requisite front connector	1 x 40-pin
Digital inputs	
•Number of digital inputs	18
•Functions	4 Bero, 2 touch probes, 12 used as you choose
Input voltage	
- Rated value, DC	24 V
- for signal "0"	-3 to 5 V
- for signal "1"	11 to 30 V
Input current	
- for 0 signal, max (permissible closed-circuit current)	2 mA
- for 1 signal, typical	6 mA; 6 to 30 mA
Digital outputs	
•Number of digital outputs	8
•Functions	8 freely usable
Output voltage	
- Rated value (DC)	24 V
- for 1 signal	UP - 3 V
Output current	
- for 1 signal permissible range for 0 to 55 °C, max.	0.5 A; at UPmax
- for 0 signal residual current, max.	2 mA

	6ES7 357-4AH01-0AE0
Sensor supply	
5 V - sensor supply	
- 5 V	Yes
- Output current, max.	210 mA
- Length of cable, max.	35 m
24 V - sensor supply	
- 24 V	Yes
- Output current, max.	300 mA
- Length of cable, max.	100 m
Sensor	
Connectable encoders	
- Incremental encoder (symmetrical)	Yes
- Absolute encoder (SSI)	Yes
Incremental encoder (symmetrical)	
- Track mark signals	A, notA, B, notB
- Zero mark signal	N, notN
- Input signal	5 V differential signal (phys. RS 422)
- Input frequency, max.	1 MHz
Absolute encoder (SSI)	
- Input signal	5 V differential signal (phys. RS 422)
- Data signal	DATA, notDATA
- Clock signal	CL, notCL
- Frame length	13, 21 or 25 Bit
- Clock frequency, max.	1.5 Mbit/s
- Length of cable (shielded), max.	250 m; at max. 187.5 kBit/s
Positioning	
•Programmable traversing speed, max.	1,000 m/min

SIMATIC S7-300

Function modules

FM 357-2 positioning module

Technical specifications (continued)

	6ES7 357-4AH01-0AE0
Drive interface	
Signal output I	
- Type	5 V differential signal (phys. RS 422)
- Function	Direction, enable, clock
- Differential output voltage, min.	2 V; RL = 100 ohms
- Differential output voltage, for 0 signal, max.	1 V; Io = 20 mA
- Differential output voltage, for I signal, min.	3.7 V; Io = -20 mA
- Pulse frequency	750 kHz
- Length of cable, max.	50 m; 35 m in hybrid operation with servo drives
Signal output II	
- Type	Servo enable (contact), FM-READY output (contact)
- Function	Drive isolation for operation via contact relay, ready to operate for linking with emergency stop
- Load	1 A/50 V/30 VA DC
Signal output III	
- Type	Analog output
- Function	Drive interface for analog drives: setpoint output for the drive
- Output voltage	-10 to +10 V
- Output current	-3 to +3 mA
- Length of cable, max.	35 m
Potentials/ electrical isolation	
Digital output functions	
- Electrical isolation, digital output functions	Yes
Digital input functions	
- Electrical isolation, digital input functions	Yes
Dimensions and weight	
•Weight, approx.	1,200 g
•Width	200 mm
•Height	125 mm
•Depth	118 mm

Ordering data

Order No.

FM 357-2 positioning module ^{F)}	6ES7 357-4AH01-0AE0
Basic device	
System firmware	
incl. configuring package on CD-ROM (Ge, En, Fr, It) comprising manual (electronic), configuring software (parameterization masks, standard blocks, HMI masks for OP17/OP27)	
FM 357-2L system firmware	6ES7 357-4AH03-3AE0
on memory card	
FM 357-2LX system firmware	6ES7 357-4BH03-3AE0
with additional functions; on memory card	
FM 357-H system firmware	6ES7 357-4CH03-3AE0
with additional functions for handling range; on memory card	
FM 357-2 manual	
German	6ES7 357-4AH00-8AG0
English	6ES7 357-4AH00-8BG0
French	6ES7 357-4AH00-8CG0
Italian	6ES7 357-4AH00-8EG0
Edit FM	6FC5 263-0AA03-0AB0
Program editor for editing, loading and saving NC programs using PG/PC;	
German/English, on CD-ROM	
Connecting cables and encoders	See Catalog NC 60, NC Z, CA 01 or in the A&D Mall
Front connector	
40-pin, with screw-type terminals	
•1 item	6ES7 392-1AM00-0AA0
•100 items	6ES7 392-1AM00-1AB0
40-pin, with spring-loaded terminals	6ES7 392-1BM01-0AA0
Battery	6ES7 971-1AA00-0AA0

F) Subject to export regulations: AL: N and ECCN: 4A994

Overview



The FM STEPDRIVE power section controls the motion of the stepper motors in the SIMOSTEP 1FL3 series with the utmost precision. In combination with the SINUMERIK 802S base line control and the FM 353 and FM 357-2 function modules, it performs highly accurate positioning tasks in the lower output range up to 600 W.

The FM STEPDRIVE can be used for stepper motors with torques in the 2 Nm (17.702 lb-in) to 15 Nm (132.762 lb-in) range.

Technical specifications

Supply voltage	115/230 V AC $\pm 20\%$ selectable
Input current, max.	11/5.5 A
Frequency	47 ... 63 Hz
Supply voltage (signals)	24 V DC (20.4 ... 28.8 V)
Input current, max.	1.5 A
DC link voltage	325 V
Pulse interface	5 V signals ¹⁾ 15-pin sub D socket, standard cable
Signal interface	24 V, I/O signals ¹⁾
Motor connection	3 x 325 V (connected to supply system)
Phase current	1.7 ... 6.8 A (adjustable on unit)
Cable length, max.	50 m (164 ft) with 1.5 mm ² 30 m (98 ft 5 in) with 0.75 mm ²
Terminals for max.	2.5 mm ²
Number of steps/revolution	Adjustable to: 500, 1000, 5000, 10000
Degree of protection EN 60529 (IEC 60529)	IP20, must be installed in cabinet
Condensation	not permissible
Permissible ambient temperature	
• Storage and transport	-40 ... +70 °C (-40 ... +158 °F)
• Operation	0 ... +60 °C (32 ... 140 °F) with derating and dependent on mounting position
Weight, approx.	0.85 kg (1.87 lb)
Dimensions (W x H x D)	80 mm x 125 mm x 118 mm (3.15 in x 4.92 in x 4.65 in)

1) Enable signal (enabling of power section), optionally either 5 V via pulse interface or 24 V via signal interface.

Ordering data

Order No.

FM STEPDRIVE ^{A)} Power section for SIMOSTEP stepper motors	6SN1 227-2ED10-0HA0
Sub-D plug (3 units) 15-pin socket (mating connector)	6FC9 348-7HX
Filter ²⁾	
• 115 V single-phase with neutral conductor; type: B84142-B16-R	213-8400
• 230 V single-phase with neutral conductor; type: B84142-B16-R	213-8400
• 115 V three-phase with neutral conductor; type: B84299-K55	213-8090
• 230 V three-phase with neutral conductor; type: B84299-K53	213-8084
• 230 V three-phase without neutral conductor; type: B84143-B8-R	213-8270

A) Subject to export regulations: AL: N and ECCN: EAR99H

2) Order from RS Components GmbH.

SIMATIC S7-300

Function modules

1FL3 stepper motors

Overview



Stepper motors are functionally simple servomotors. In terms of performance and economy, these motors are the ideal supplement to the position controlled motors 1FT and 1FK. The applications in automation systems are varied, and are not restricted to machine tools.

The SIMOSTEP stepper motor can be operated via the FM STEPDRIVE power section. This converts the stepping and direction signals of the upstream controller into exact angular movements by appropriate current feeding to the motor windings.

SIMOSTEP 1FL3 with holding brake (optional)

The holding brake normally fixes the position after the motor current has been switched off. In emergencies, such as after power failure or EMERGENCY STOP, it stops the drive and thus helps to maintain safety. Fixing is mainly required in case of torque load resulting from weight forces, e.g. Z axes in robotics (vertical axis).

Technical specifications

SIMOSTEP 1FL3

Type of motor	3-phase stepper motor
Motor voltage	325 V
Insulation EN 60034-1 (IEC 60034-1)	Temperature class F for a winding overheating of $\Delta T = 100$ K at an ambient temperature of $+40$ °C (104 °F).
Type DIN 42950	IM B5 (IM V1, IM V3)
Degree of protection IEC 60529	IP56; IP41 at shaft outlet
Cooling	Natural cooling
Permissible ambient temperature	
•Storage and transport	$-40 \dots +70$ °C ($-40 \dots +158$ °F)
•Operation	$0 \dots +40$ °C ($32 \dots 104$ °F)
Max. pulse frequency	5.3 kHz (with 1FL3 04.) 4.3 kHz (with 1FL3 06.)
Number of steps/revolution	500/1000/5000/10000 adjustable via FM STEPDRIVE
Max. speed	6000 rpm
Step angle in degrees	$0.72^\circ/0.36^\circ/0.072^\circ/0.036^\circ$
Systematic angle tolerance (measured at 1000 steps/revolution)	± 6 per step
Shaft end	Plain shaft with 1FL304. Fitted key with 1FL306.
Permissible dynamic shaft load	
•Axial, approx.	60 N (13.49 lbf)
•Radial, approx.	(on half-shaft output, engaged from the motor flange) 100 N (22.48 lbf) (with 1FL3041, 1FL3042) 110 N (24.73 lbf) (with 1FL3043) 300 N (67.44 lbf) (with 1FL3061, 1FL3062)
Rotational accuracy, concentricity, and linear movement DIN 42955 (IEC 60072-1)	Tolerance N (Normal)
Vibration severity EN 60034-14 (IEC 60034-14)	Grade N (Normal)
Max. sound pressure level EN ISO 1680	1FL3041: 65 dB(A) 1FL3042: 72 dB(A) 1FL3043: 75 dB(A) 1FL3061: 69 dB(A) 1FL3062: 72 dB(A)
Shock load DIN 40046, T7	1FL304.: 50 g (1.76 oz) 1FL306.: 50 g (1.76 oz)
Paint finish	Black
Type of connection	Terminal box

Holding Brake

Motor type	1FL304.	1FL306.
Rated voltage	24 V	
Minimum holding voltage for released brake	10 V (at the earliest 130 ms after excitation)	
Electrical pickup power	24 W	32 W
Switching times		
•Release brake	35 ms	65 ms
•Close brake	15 ms	15 ms
Type of connection	Connector (mating connector in scope of supply)	

Selection- and Ordering data

Maximum torque	Holding torque		1FL3 stepper motors SIMOSTEP	Rated current Supply cable	Resistance (winding)	Rotor moment of inertia		Weight	
	Motor	Brakes				without	with	without	with
						holding brake		holding brake	
$M_{max.}$	M_H		Order No.	I	R	J	J	m	m
Nm (lb-in)	Nm (lb-in)	Nm (lb-in)		A	W	kgcm ²	kgcm ²	kg (lb)	kg (lb)
2 (17.70)	2.26 (20.00)	-	1FL3041-0AC31-0BK0	1.75	6.5	1.1	-	2.05 (4.52)	-
2 (17.70)	2.26 (20.00)	6 (53.10)	1FL3041-0AC31-0BJ0	1.75	6.5	-	- 1.3	-	3.4 (7.50)
4 (35.40)	4.52 (40.01)	-	1FL3042-0AC31-0BK0	2	5.8	2.2	-	3.1 (6.84)	-
4 (35.40)	4.52 (40.01)	6 (53.10)	1FL3042-0AC31-0BJ0	2	5.8	-	- 2.4	-	4.45 (9.81)
6 (53.10)	6.78 (60.01)	-	1FL3043-0AC31-0BG0	2.25	6.5	3.3	-	4.2 (9.27)	-
6 (53.10)	6.78 (60.01)	6 (53.10)	1FL3043-0AC31-0BH0	2.25	6.5	-	- 3.5	-	5.55 (12.24)
10 (88.51)	11.3 (100.01)	-	1FL3061-0AC31-0BG0	4.1	1.8	10.5	-	8 (17.64)	-
10 (88.51)	11.3 (100.01)	16.95 (150.02)	1FL3061-0AC31-0BH0	4.1	1.8	-	- 10.85	-	10.2 (22.50)
15 (132.76)	16.95	-	1FL3062-0AC31-0BG0	4.75	1.9	16	-	11 (24.26)	-
15 (132.76)	16.95	16 (141.61)	1FL3062-0AC31-0BH0	4.75	1.9	-	- 16.35	-	13.2 (29.11)

For length code as well as power and signal cables, see "MOTION-CONNECT cables and connections".

Ordering data

Order No.

SIMOSTEP stepper motors 1FL3

- 2 Nm, shaft diameter 12 mm
- 4 Nm, shaft diameter 12 mm
- 6 Nm
- 10 Nm
- 15 Nm

1FL3 041-0AC31-0BK0
1FL3 042-0AC31-0BK0
1FL3 043-0AC31-0BG0
1FL3 061-0AC31-0BG0
1FL3 062-0AC31-0BG0

with holding brake

- 2 Nm, shaft diameter 12 mm
- 4 Nm, shaft diameter 12 mm
- 6 Nm
- 10 Nm
- 15 Nm

1FL3 041-0AC31-0BJ0
1FL3 042-0AC31-0BJ0
1FL3 043-0AC31-0BH0
1FL3 061-0AC31-0BH0
1FL3 062-0AC31-0BH0

Motor cable

EMC tested, for connecting to FM STEPDRIVE

- 10 m
- 20 m
- 50 m

6FX5 008-5AA00-1BA0
6FX5 008-5AA00-1CA0
6FX5 008-5AA00-1FA0

SIMATIC S7-300

Function modules

FM 355 closed-loop control modules

Overview



- 4-channel closed-loop control module for universal closed-loop control tasks
- Used for temperature, pressure, flowrate and fill-level control loops
- User-friendly online self-optimization for temperature controls
- Preprogrammed controller structures
- 2 control algorithms
- 2 versions:
 - FM 355 C as continuous-action controller;
 - FM 355 S as step or pulse controller
- With 4 analog outputs (FM 355 C) or 8 digital outputs (FM 355 S) for direct control of the most common types of actuator
- Continued operation of the control loop is possible even after a CPU stop or failure

Technical specifications

	6ES7 355-0VH10-0AE0	6ES7 355-1VH10-0AE0
Voltages and currents		
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+ (no load), max.	310 mA; typ. 260 mA	270 mA; typ. 220 mA
• from backplane bus 5 V DC, max.	75 mA; typ. 50 mA	75 mA; typ. 50 mA
• Power dissipation, max.	7.8 W	6.9 W
• Power dissipation, typical	6.5 W	5.5 W
Connection system		
• Requisite front connector	2 x 20-pin	2 x 20-pin
Digital inputs		
• Number of digital inputs	8	8
Length of cable		
- Length of cable shielded, max.	1,000 m	1,000 m
- Length of cable unshielded, max.	600 m	600 m
• Input characteristic to comply with 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 1 signal, typical	7 mA	7 mA

	6ES7 355-0VH10-0AE0	6ES7 355-1VH10-0AE0
Digital outputs		
• Number of digital outputs		8
• Length of cable shielded, max.		1,000 m
• Length of cable unshielded, max.		600 m
• Short-circuit protection of the output		Yes; electronic
• Limitation of voltage induced on circuit interruption to		L+ (-1.5 V)
• Lamp load, max.		5 W
• Driving a digital input		Yes
Output voltage		
- for 1 signal		L+ (-2.5 V)
Output current		
- for 1 signal rated value		100 mA
- for 1 signal permissible range for 0 to 60 °C, min.		5 mA
- for 1 signal permissible range for 0 to 60 °C, max.		150 mA
- for 0 signal residual current, max.		0.5 mA
Parallel switching of 2 outputs		
- for logical links		Yes
Switching frequency		
- at resistive load, max.		100 Hz
- at inductive load, max.		0.5 Hz
- at lamp load, max.		100 Hz
Summation current of the outputs (per group)		
- up to 60 °C, max.		400 mA
Load impedance range		
- lower limit		240 Ω
- upper limit		4 kΩ

Technical specifications (continued)

	6ES7 355-0VH10-0AE0	6ES7 355-1VH10-0AE0
Analog inputs		
•Number of analog inputs	4	4
•Length of cable shielded, max	200 m; 50m at 80 mV and thermocouples	200 m; 50m at 80 mV and thermocouples
•Permissible input voltage for the voltage input (destruction limit), max.	30 V	30 V
•Permissible input voltage for the current input (destruction limit), max.	40 mA	40 mA
Input ranges (rated values), voltages		
- 0 to +10 V	Yes	Yes
- -1.75 to +11.75 V	Yes	Yes
- -80 mV to +80 mV	Yes	Yes
Input ranges (rated values), currents		
- 0 to 20 mA	Yes	Yes
- 0 to 23.5 mA	Yes	Yes
- -3.5 to +23.5 mA	Yes	Yes
- 4 to 20 mA	Yes	Yes
Input ranges (rated values), resistance thermometers		
- 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 thermometer		
- Pt 100	Yes	Yes
Characteristic curve linearization		
- parameterizable	Yes	Yes
- for thermocouples	Typ B, J, K, R, S	Typ B, J, K, R, S
- for resistance thermometer	Pt 100 (Standard)	Pt 100 (Standard)
Temperature compensation		
- external temperature compensation with Pt100	Yes	Yes
- internal temperature compensation possible	Yes	Yes
Analog outputs		
•Number of analog outputs	4	
•Length of cable 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, open-circuit voltage, max.	18 V	

	6ES7 355-0VH10-0AE0	6ES7 355-1VH10-0AE0
Analog outputs (continued)		
Output ranges, voltage		
- 0 to 10 V	Yes	
- -10 to +10 V	Yes	
Output ranges, current		
- 0 to 20 mA	Yes	
- 4 to 20 mA	Yes	
Actuator connection		
- for voltage output 2-wire connection	Yes	
- for current output 2-wire connection	Yes	
Burden resistance (in the nominal output range)		
- at voltage outputs, min.	1 kΩ	
- at voltage outputs, capacitive load, max.	1 μF	
- at current outputs, max.	500 Ω	
- at current outputs, inductive load, max.	1 mH	
Analog value formation		
•Measuring principle	integrating	integrating
Integration and conversion time/triggering per channel		
- with over-range (bits incl. sign), max.	14 Bit; 12 or 14 bits, parameterizable	14 Bit; 12 or 14 bits, 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	0.1 ms	0.1 ms
- for capacitive load	3.3 ms	3.3 ms
- for inductive load	0.5 ms	0.5 ms
Sensor		
Sensing element connection		
- for voltage measurement	Yes	Yes
- for current measurement, as 4-wire measuring transducer	Yes	Yes
Connectable encoders		
- 2-wire BEROs	Yes	Yes
- permissible closed-circuit current (2-wire BEROs), max.	1.5 mA	1.5 mA

SIMATIC S7-300

Function modules

FM 355 closed-loop control modules

Technical specifications (continued)

	6ES7 355-0VH10-0AE0	6ES7 355-1VH10-0AE0
Error/accuracies		
•Linearity error (relative to the output range)	+/- 0.05 %	
•Linearity error (relative to the input range)	+/- 0.05 %	+/- 0.05 %
•Temperature error (relative to the output range)	+/- 0.02 %/K	
•Temperature error (relative to the input range)	+/- 0.005 %/K	+/- 0.005 %/K
Operational limit in the entire temperature range		
- Relative to the output range, voltage	+/- 0.5 %	
- Relative to the output range, current	+/- 0.6 %	
- relative to the input range, voltage	+/- 0.6 %; +/-0.6 to +/-1%	+/- 0.6 %; +/-0.6 to +/-1%
- relative to the input range, current	+/- 0.6 %; +/-0.6 to +/-1%	+/- 0.6 %; +/-0.6 to +/-1%
- relative to the input range, resistance thermometer	+/- 0.6 %; +/-0.6 to +/-1%	+/- 0.6 %; +/-0.6 to +/-1%
Basic error limit (operational limit at 25 °C)		
- relative to the output range, voltage	+/- 0.2 %	
- relative to the output range, current	+/- 0.3 %	
- relative to the input range, voltage	+/- 0.4 %; 80 mV +/- 0.6% from 250 to 1000 mV +/- 0.4% from 2,5 to 10 V +/- 0.6% from 3,2 to 20 mA +/-0.5%	+/- 0.4 %; 80 mV +/- 0.6% from 250 to 1000 mV +/- 0.4% from 2,5 to 10 V +/- 0.6% from 3,2 to 20 mA +/-0.5%
- relative to the input range, current	+/- 0.4 %; +/-0.4 to +/-0.6%	+/- 0.4 %; +/-0.4 to +/-0.6%
- relative to the input range, resistance thermometer	+/- 0.4 %; +/-0.4 to +/-0.6%	+/- 0.4 %; +/-0.4 to +/-0.6%

	6ES7 355-0VH10-0AE0	6ES7 355-1VH10-0AE0
Error/accuracies (continued)		
Interference voltage suppression for $f = n \times (f_l \pm 1 \%)$		
- Series-mode interference (peak value of interference < rated value input range)	40 dB	40 dB
- Common-mode interference (USS < 2.5 V) , min.	70 dB	70 dB
Control engineering		
•Number of controllers	4	4
Status information/ interrupts/ diagnostics		
•Applying substitute values	Yes; parameterizable	Yes; parameterizable
Insulation		
•Insulation tested with	500 V DC	500 V DC
Potentials/ electrical isolation		
Electrical isolation, controller		
- between the channels	No	No
- between the channels and the backplane bus	Yes; Optocoupler	Yes; Optocoupler
Permissible potential difference		
•between the inputs and MANA (UCM)	2.5 V DC	2.5 V DC
•between Mininternal and the inputs	75 V DC / 60 V AC	75 V DC / 60 V AC
Dimensions and weight		
•Weight, approx.	470 g	470 g
•Width	80 mm	80 mm
•Height	125 mm	125 mm
•Depth	120 mm	120 mm

Ordering data

Ordering data	Order No.
FM 355 C controller module	6ES7 355-0VH10-0AE0
With 4 analog outputs for 4 continuous-action controllers	
FM 355 S controller module	6ES7 355-1VH10-0AE0
With 8 digital outputs for 4 step or pulse controllers	
FM 355 manual	
German	6ES7 355-0VH00-8AA0
English	6ES7 355-0VH00-8BA0
French	6ES7 355-0VH00-8CA0
Italian	6ES7 355-0VH00-8EA0
Front connector	
20-pin, with screw-type terminals	
•1 item	6ES7 392-1AJ00-0AA0
•100 items	6ES7 392-1AJ00-1AB0
20-pin, with spring-loaded terminals	6ES7 392-1BJ00-0AA0
Bus connector	6ES7 390-0AA00-0AA0
1 unit (spare part)	

Ordering data	Order No.
Labeling strip	6ES7 392-2XX00-0AA0
10 units (spare part)	
S7-SmartLabel	2XV9 450-1SL01-0YX0
Software for machine labeling of modules directly from the STEP 7 project	
Labeling sheets for machine labeling	see "Accessories"
Slot number label	6ES7 912-0AA00-0AA0
Spare part	
Shield connecting element	6ES7 390-5AA00-0AA0
80 mm wide, with 2 rows or 4 terminal elements each	
Terminal elements	
2 units	
For 2 cables with 2 to 6 mm diameter	6ES7 390-5AB00-0AA0
For 1 cable with 3 to 8 mm diameter	6ES7 390-5BA00-0AA0
For 1 cable with 4 to 13 mm diameter	6ES7 390-5CA00-0AA0

Overview



- 4-channel closed-loop control module specially for temperature controls
- With convenient, integrated online self-optimization
- Heating and cooling controls as well as combined controls with a heating and active cooling function can be implemented
- Preprogrammed controller structures
- 2 variants:
 - FM 355-2 C as a continuous-action controller;
 - FM 355-2 S as a step-action or pulse controller
- With 4 analog outputs (FM 355-2 C) or 8 digital outputs (FM 355-2 S) for direct control of the most commonly used final control elements
- The controller will continue to operate in the event of a CPU Stop or CPU failure

Technical specifications

	6ES7 355-2CH00-0AE0	6ES7 355-2SH00-0AE0
Voltages and currents		
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+ (no load), max.	310 mA; typ. 260 mA	270 mA; typ. 220 mA
• from backplane bus 5 V DC, max.	75 mA; typ. 50 mA	75 mA; typ. 50 mA
• Power dissipation, max.	7.8 W	6.9 W
• Power dissipation, typical	6.5 W	5.5 W
Connection system		
• Requisite front connector	2 x 20-pin	2 x 20-pin
Digital inputs		
• Number of digital inputs	8	8
Length of cable		
- Length of cable shielded, max.	1,000 m	1,000 m
- Length of cable unshielded, max.	600 m	600 m
• Input characteristic to comply with 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 1 signal, typical	7 mA	7 mA

	6ES7 355-2CH00-0AE0	6ES7 355-2SH00-0AE0
Digital outputs		
• Number of digital outputs		8
• Length of cable shielded, max.		1,000 m
• Length of cable unshielded, max.		600 m
• Short-circuit protection of the output		Yes; electronic L+ (-1.5 V)
• Limitation of voltage induced on circuit interruption to		5 W
• Lamp load, max.		Yes
• Driving a digital input		
Output voltage		
- for 1 signal		L+ (-2.5 V)
Output current		
- for 1 signal rated value		0.1 A
- for 1 signal permissible range for 0 to 60 °C, min.		5 mA
- for 1 signal permissible range for 0 to 60 °C, max.		150 mA
- for 0 signal residual current, max.		0.5 mA
Parallel switching of 2 outputs		
- for logical links		Yes
Switching frequency		
- at resistive load, max.		100 Hz
- at inductive load, max.		0.5 Hz
- at lamp load, max.		100 Hz
Summation current of the outputs (per group)		
- up to 60 °C, max.		400 mA
Load impedance range		
- lower limit		240 Ω
- upper limit		4 kΩ

Technical specifications (continued)

	6ES7 355-2CH00-0AE0	6ES7 355-2SH00-0AE0
Analog inputs		
•Number of analog inputs	4	4
•Length of cable shielded, max.	200 m; 50m at 80 mV and thermo-couples	200 m; 50m at 80 mV and thermo-couples
•Permissible input voltage for the voltage input (destruction limit), max.	20 V	20 V
•Permissible input voltage for the current input (destruction limit), max.	40 mA	40 mA
Input ranges (rated values), voltages		
- 0 to +10 V	Yes	Yes
- -1.75 to +11.75 V	Yes	Yes
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), thermocouples		
- Type B	Yes	Yes
- Type E	Yes	Yes
- Type J	Yes	Yes
- Type K	Yes	Yes
- Type R	Yes	Yes
- Type S	Yes	Yes
Input ranges (rated values), resistance thermometer		
- Pt 100	Yes	Yes
Characteristic curve linearization		
- parameterizable	Yes	Yes
- for thermocouples	Type B, E, J, K, R, S	Type B, E, J, K, R, S
- for resistance thermometer	Pt 100 (standard)	Pt 100 (standard)
Temperature compensation		
- external temperature compensation with Pt100	Yes	Yes
- internal temperature compensation possible	Yes	Yes
Analog outputs		
•Number of analog outputs	4	
•Length of cable shielded, max.	200 m; 50m at 80 mV and thermo-couples	
•Voltage output, short-circuit protection	Yes	
•Voltage output, short-circuit current, max	25 mA	
•Current output, open-circuit voltage, max.	18 V	
Output ranges, voltage		
- 0 to 10 V	Yes	
- -10 to +10 V	Yes	

	6ES7 355-2CH00-0AE0	6ES7 355-2SH00-0AE0
Analog outputs (continued)		
Output ranges, current		
- 0 to 20 mA	Yes	
- 4 to 20 mA	Yes	
Actuator connection		
- for voltage output 2-wire connection	Yes	
- for current output 2-wire connection	Yes	
Burden resistance (in the nominal output range)		
- at voltage outputs, min.	1 k Ω	
- at voltage outputs, capacitive load, max.	1 μ F	
- at current outputs, max.	500 Ω	
- at current outputs, inductive load, max.	1 mH	
Analog value formation		
•Measuring principle	integrating	integrating
Integration and conversion time/triggering per channel		
- with over-range (bits incl. sign), max	14 Bit	14 Bit
- Conversion time (per channel)	100 ms; at 50 and 60 Hz	100 ms; at 50 and 60 Hz
Settling time		
- for resistive load	0.1 ms	0.1 ms
- for capacitive load	3.3 ms	3.3 ms
- for inductive load	0.5 ms	0.5 ms
Sensor		
Sensing element connection		
- for voltage measurement	Yes	Yes
- for current measurement, as 4-wire measuring transducer	Yes	Yes
Connectable encoders		
- 2-wire BEROs	Yes	Yes
- permissible closed-circuit current (2-wire BEROs), max.	1.5 mA	1.5 mA
Error/accuracies		
•Linearity error (relative to the output range)	+/- 0.05 %	
•Linearity error (relative to the input range)	+/- 0.05 %	+/- 0.05 %
•Temperature error (relative to the output range)	+/- 0.02 %/K	
•Temperature error (relative to the input range)	+/- 0.005 %/K	+/- 0.005 %/K
Operational limit in the entire temperature range		
- Relative to the output range, voltage	+/- 0.5 %	
- Relative to the output range, current	+/- 0.6 %	
- relative to the input range, voltage	+/- 0.6 %; +/-0.6 to +/-0.7%	+/- 0.06 %; +/-0.06 to +/-0.7%
- relative to the input range, current	+/- 0.6 %; +/-0.6 to +/-0.7%	+/- 0.06 %; +/-0.06 to +/-0.7%
- relative to the input range, resistance thermometer	+/- 0.6 %; +/-0.6 to +/-0.7%	+/- 0.06 %; +/-0.06 to +/-0.7%

Technical specifications (continued)

	6ES7 355-2CH00-0AE0	6ES7 355-2SH00-0AE0
Error/accuracies (continued)		
Basic error limit (operational limit at 25 °C)		
- relative to the output range, voltage	+/- 0.2 %	
- relative to the output range, current	+/- 0.3 %	
- relative to the input range, voltage	+/- 0.04 %; +/-0.04 to +/-0.5%	+/- 0.04 %; +/-0.04 to +/-0.5%
- relative to the input range, current	+/- 0.04 %; +/-0.04 to +/-0.5%	+/- 0.04 %; +/-0.04 to +/-0.5%
- relative to the input range, resistance thermometer	+/- 0.04 %; +/-0.04 to +/-0.5%	+/- 0.04 %; +/-0.04 to +/-0.5%
Interference voltage suppression for $f = n \times (f_l \pm 1 \%)$		
- Series-mode interference (peak value of interference < rated value input range)	40 dB	40 dB
- Common-mode interference (USS < 2.5 V), min.	70 dB	70 dB
Control engineering		
•Number of controllers	4	4
Status information/ interrupts/ diagnostics		
•Applying substitute values	Yes; parameter-izable	Yes; parameter-izable
Insulation		
•Insulation tested with	DC 500 V	DC 500 V
Potentials/ electrical isolation		
Electrical isolation, controller		
- between the channels	No	No
- between the channels and the backplane bus	Yes; Optocoupler	Yes; Optocoupler
Permissible potential difference		
•between the inputs and MANA (UCM)	2.5 V DC	2.5 V DC
•between Minternal and the inputs	75 V DC / 60 V AC	75 V DC / 60 V AC
Dimensions and weight		
•Weight, approx.	470 g	470 g
•Width	80 mm	80 mm
•Height	125 mm	125 mm
•Depth	120 mm	120 mm

Ordering data

Order No.

FM 355-2 C temperature controller module With 4 analog outputs for 4 continuous-action controllers	6ES7 355-2CH00-0AE0
FM 355-2 S temperature controller module With 8 digital outputs for 4 step or pulse controllers	6ES7 355-2SH00-0AE0
Front connector 20-pin, with screw-type terminals •1 item •100 items 20-pin, with spring-loaded terminals	6ES7 392-1AJ00-0AA0 6ES7 392-1AJ00-1AB0 6ES7 392-1BJ00-0AA0
Bus connector 1 unit (spare part)	6ES7 390-0AA00-0AA0
Labeling strip 10 units (spare part)	6ES7 392-2XX00-0AA0
S7-SmartLabel Software for machine labeling of modules directly from the STEP 7 project	2XV9 450-1SL01-0YX0
Labeling sheets for machine labeling	see "Accessories"
Slot number label Spare part	6ES7 912-0AA00-0AA0
Shield connecting element 80 mm wide, with 2 rows for 4 terminal elements each	6ES7 390-5AA00-0AA0
Terminal elements 2 units For 2 cables with 2 to 6 mm diameter For 1 cable with 3 to 8 mm diameter For 1 cable with 4 to 13 mm diameter	6ES7 390-5AB00-0AA0 6ES7 390-5BA00-0AA0 6ES7 390-5CA00-0AA0

SIMATIC S7-300

Function modules

SM 338 ultrasonic position encoder

Overview



An ultrasonic measuring system comprises:

- SIMATIC S7-300 with CPU and power supply
- The SM 338 ultrasonic position decoding module
- 24 V external supply voltage
- Ultrasonic position sensor(s)

Ultrasonic position sensors with the following characteristics can be used:

- START/STOP interface with RS 422 signals
- One power supply for all sensors that are simultaneously connected to the SM 338 module: ± 15 V / max. 200 mA floating or ± 24 V / max. 300 mA floating.

For a sensor length of less than 3 m, the resolution is 0.05 mm. At the maximum sensor length of 6 m, the resolution is 0.1 mm.

With more than one measuring point on a sensor, the sensor-specific minimum spacing must be complied with. This ensures that there is no mutual interference between the measuring points.

Technical specifications

Position sensors

Number	up to 4
Max no. of measuring points	8, up to 4 per sensor
Measuring range	3 m and 6 m
Resolution	0.05 mm (up to 3 m measuring range) and 0.1 mm
Programmable measuring cycle	0.5 ms ... 16 ms

Supply voltage for sensors

• With galvanic isolation	
- Voltage	± 15 V
- Current	200 mA
• Without galvanic isolation	
- Voltage	24 V DC
- Current, total	300 mA, without galvanic isolation
Total power for supplying the sensors max.	7.2 W

Supply voltage for the module

Current consumption	
• Internal from S7-300 backplane bus	typ. 80 mA; max. 1000 mA
• External voltage	20.4 V ... 28.8 V
• Without sensors max.	0.1 A
• With sensors max.	0.85 A
Fuse	1.0 A slow-acting
Polarity reversal protection	Yes

Operating conditions

Ambient temperature	
• Horizontal mounting position	0 °C ... +60 °C
• for vertical installation	0 °C ... +40 °C
Relative air humidity	5 ... 95% (without condensation)
Atmospheric pressure	860 hPa ... 1080 hPa
Pollutant concentration	
• SO ₂ max.	10 ppm
• H ₂ S max.	1 ppm
Vibration	
• 10 Hz ... 57 Hz	0.075 mm amplitude
• 57 Hz ... 150 Hz	1 g constant acceleration

Conditions for storage and transport (in original packaging)

Free fall (to IEC 1131-2)	< 1 m
Temperature (to IEC 1131-2)	-40 °C ... +70 °C
Atmospheric pressure	< 700 hPa (3000 m above sea level)
Relative air humidity	5% ... 95% (without condensation)

Casing

Dimensions (W x H x D)	80 mm x 125 mm x 120 mm
Weight	500 g
Degree of protection	IP20

Ordering data	Order No.
SM 338 ultrasonic position encoder module for position detection with ultrasonic sensors with start/stop interface	6ES7 338-7UH01-0AC0
Bus connector 1 unit (spare part)	6ES7 390-0AA00-0AA0
Shield connecting element 80 mm wide, with 2 rows for 4 terminal elements each	6ES7 390-5AA00-0AA0
SM 338 ultrasonic position encoder module manual German Englisch	6ES7 338-7UH00-8AC0 6ES7 338-7UH00-8BC0
Configuration package for SM 338^{B)} comprising manual, parameterization forms and example programs (German, English)	6AT1 733-5DA00-2YA0

B) Subject to export regulations: AL: N and ECCN: EAR99S

Overview



- Interface between a maximum of 3 absolute position encoders (SSI) and the CPU.
- To provide the position-encoder values for subsequent processing in the STEP 7 program.
- Enables the programmable controller's direct response to encoder values in moving systems.

Note:

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

Additional information is available in the Internet under:

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

Technical specifications

	6ES7 338-4BC01-0AB0
Voltages and currents	
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 load voltage L+ (no load), max.	10 mA
• from backplane bus 5 V DC, max.	160 mA
• Power dissipation, typical	3 W
Connection system	
• Requisite front connector	20-PIN
Digital inputs	
Length of cable	
- Length of cable shielded, max.	600 m
Input voltage	
- for signal "0"	-3 to 5 V
- for signal "1"	11 to 30,2 V
Input current	
- for 0 signal, max (permissible closed-circuit current)	2 mA
- for 1 signal, typical	9 mA
Input delay (at rated value of the input voltage)	
• For standard inputs	
- at 0 to 1, min.	300 µs

	6ES7 338-4BC01-0AB0
Sensor supply	
24 V - sensor supply	
- 24 V	Yes; L+ (-0,8 V)
- Output current, max.	900 mA
Sensor	
• Number of sensors that can be connected, max.	3
Connectable encoders	
- Absolute encoder (SSI)	Yes
- 2-wire BEROs	Yes
Absolute encoder (SSI)	
- Length of cable (shielded), max.	320 m; 320 m at 125 kHz, 160 m at 250 kHz, 60 m at 500 kHz, 20 m at 1 MHz
Status information/ interrupts/ diagnostics	
Interrupts	
- Diagnostic interrupt	Yes
Potentials/ electrical isolation	
• Description	No
Dimensions and weight	
• Weight, approx.	235 g
• Width	40 mm
• Height	125 mm
• Depth	120 mm

Ordering data	Order No.
SM 338 POS input module for position detection using ultra-sound encoders with start/stop interface	6ES7 338-4BC01-0AB0
Front connector 20-pin, with screw-type terminals • 1 item • 100 items 20-pin, with spring-loaded terminals	6ES7 392-1AJ00-0AA0 6ES7 392-1AJ00-1AB0 6ES7 392-1BJ00-0AA0
Front door, elevated design ^{A)} e.g. for 32-channel modules; permits connection of 1.3 mm ² / 16 AWG conductors	6ES7 328-0AA00-7AA0
SIMATIC Manual Collection ^{B)} Electronic manuals on CD-ROM, multi-language	6ES7 998-8XC01-8YE0
SIMATIC Manual Collection Maintenance service for 1 year ^{B)} Current S7 Manual Collection CD as well as the three following updates	6ES7 998-8XC01-8YE2
S7-300 manual Design, CPU data, module data, operation list German English French Spanish Italian	6ES7 398-8FA10-8AA0 6ES7 398-8FA10-8BA0 6ES7 398-8FA10-8CA0 6ES7 398-8FA10-8DA0 6ES7 398-8FA10-8EA0

A) Subject to export regulations: AL: N and ECCN: EAR99H

B) Subject to export regulations: AL: N and ECCN: EAR99S

SIMATIC S7-300

Function modules

SIWAREX U

Overview



SIWAREX U is the optimum solution wherever strain gauge sensors, such as load cells, force sensors or torque measuring shafts, are used for measuring tasks. The following are typical SIWAREX U applications:

- Fill level monitoring of silos and bunkers
- Monitoring of crane and cable loads
- Measurement of load of conveyor belts
- Overload protection in industrial elevators and rolling mills
- Scales for potentially explosive areas (can be implemented by using an Ex interface)
- Monitoring of belt tension

Technical specifications

Integration in automation systems:

•S5-95U/DP (PROFIBUS master)	Via ET 200M
•S5-115U/-135U/-155U	Via ET 200M
•S7-300	Direct integration
•S7-400	Via ET 200M
•PCS 7	Via ET 200M
•M7-300	Direct integration
•M7-400	Via ET 200M
•C7	Via IM or ET 200M
•Automation systems from other vendors	Via ET 200M

Stand-alone (without SIMATIC CPU)	Possible with IM 153-1
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Communication interfaces	•SIMATIC S7 (P bus) •RS 232 •TTY
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Connection of remote indicators (through TTY serial interface)	Gross, channel 1, 2 or default value 1, 2
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Adjustment of scales settings	Using SIMATIC S5/S7/M7/C7 (P bus) or SIWATOOL U parameterization software (RS232)
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Measuring properties

•Error limit according to DIN 1319-1 of full-scale value at 20 °C ±10K	0.05 %
•nIND according to EN 45501 Minimum measuring signal $\Delta U_{\min}$ per d	3,000 (not legal-for-trade) 1.5 μV
•Internal resolution Data format of weight values	65,535 2 byte (fixed-point)

Number of measurements/second	50
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Digital filter	0.05 - 5 Hz (in 7 steps), mean-value filter
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Weighing functions

•Weight values	Gross
•Limits	2 (min./max.)
•Zero setting function	Per command

Load cells	Strain gauges in 4-wire or 6-wire system
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Load cell powering

•Supply voltage U_s (rated value)	10.3 V DC
•Max. supply current	≤ 240 mA single-channel ≤ 120 mA two-channel
•Permissible load resistance (per weighing channel)	$> 41 \Omega$ single-channel $> 82 \Omega$ two-channel
-RLmin	$< 4010 \Omega$
-RLmax	With Ex(i) interface: $> 87 \Omega$
-RLmin	$< 4010 \Omega$
-RLmax	

Permissible load cell characteristic	Up to 4mV/V
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Permissible range of measuring signal (at greatest set characteristic)	-1.5 to +42.5 mV
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Max. distance of load cells	1000 m (300 m in Ex area (up to 1000 m, depending on the gas group))
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Intrinsically-safe load cell powering	Optional (Ex interface)
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Supply voltage 24 V DC

•Rated voltage	24 V DC
•Max. current consumption	220 mA

Voltage supply from backplane bus	typ. 100 mA
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Certification	UL, CSA, FM
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IP degree of protection to DIN EN 60529; IEC 60529	IP20
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Climatic requirements Tmin (IND) to Tmax (IND) (operating temperature)

•Vertical installation	0 ... +60 °C
•Horizontal installation	0 ... +40 °C

EMC requirements according to	NAMUR NE21, Part 1 89/386/EEC
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Ordering data	Order No.	Order No.
SIWAREX U for SIMATIC S7 and ET 200M, incl. bus connector, weight 0.3 kg • Single-channel version for connecting one scale • Two-channel version for con- necting two scales	7MH4 601-1AA01 7MH4 601-1BA01	6ES7390-5AA00-0AA0 6ES7390-5CA00-0AA0 6ES7 392-2XX00-0AA0
SIWAREX U Manual (the Manual must be ordered separately) • German • English	7MH4 693-3AA11 7MH4 693-3AA21	
SIWAREX U configuration package for SIMATIC S5/S7 version 5.1 or higher on CD-ROM, incl. SIWATOOL U PC parameterization software, Example programs, SIWAREX U manual, Setup for incorporation of SIWAREX U into STEP 7	7MH4 683-3AA63	
SIWATOOL cable from SIWAREXU/CS with serial PC interface, for 9-pin PC interfaces (RS232), 3m long	7MH4 607-8CA	
Installation material (mandatory)		
20-pin front plug with screw contacts (required for each SIWAREX module)	6ES7 392-1AJ00-0AA00	
		Shield contact element Sufficient for two SIWAREX U modules Terminal elements For 1 cable with 4 to 13 mm diameter Labeling strips (10 units, spare part) Accessories (optional) SIWAREX JB junction box, aluminium housing see SIWAREX M SIWAREX JB junction box, stainless steel housing see SIWAREX M Ex interface, type SIWAREX Pi see SIWAREX M Manual for Ex interface type SIWAREX Pi see SIWAREX M SIWAREX IS Ex interface see SIWAREX M Cable (optional) see SIWAREX M Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, orange sheath see SIWAREX M Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, blue sheath see SIWAREX M Cable LiYCY 4 x 2 x 0.25 mm² for TTY (connect 2 pairs of conduc- tors in parallel), for connection of a remote indicator 7MH4 407-8BD0

Overview



SIWAREX M is the optimum solution wherever weighing or proportioning have to be carried out at high accuracy. The following are typical SIWAREX M applications:

- Non-automatic weighing machines
- Exact fill level monitoring of silos and bunkers
- Single-component proportioning weigher
- Multi-component scales (with the SIWAREX Batch software)
- Weighing in potentially explosive areas
 (zone 1 using SIWAREX IS Ex interface)

Technical specifications

SIWAREX M		
Main applications	• Platform scales • Fill level (containers/bins) • Proportioning and batching scales • Scales with verification capability	
Intrinsically-safe load cell powering	Optional (Ex-I)	
	Stand-alone (without SIMATIC) Integration in: • S5-90/-95U/-100U • S5-95U/DP (PROFIBUS master) • S5-115U/-135U/-155U • S7-300 • S7-400 • PCS 7 • C7 • TELEPERMM (AS388/488/TM)	Yes Via RS232/TTY+CP Via RS232/TTY+CP Via ET 200M Direct integration Via ET 200M Via ET 200M Via IM or ET 200M Via ET 200M

SIMATIC S7-300

Function modules

SIWAREX M

Technical specifications (continued)

Communication interfaces	SIMATIC S7 (P bus) RS 232, TTY
Process interfaces	
• Digital inputs	3 (assignable)
• Digital outputs	4 (assignable)
• Analog output/analog input	Yes / No
Remote display connection (via serial interface)	Yes (verification capability) Gross/net/setpoint Remote display with operator control
Printer connection	Yes (verification capability)
Measuring properties	
EU type approval for medium accuracy weighing machines Class III (with verification capability)	6000d
Error limit according to DIN 1319-1 of full-scale value at 20 °C ±10K	0,01 %
n _{ind} in acc. with EN 45501 Min. measuring signal Δu _{min} per d	6000 0.5μV
Internal resolution	± 524.288
Data format for weight values	4 byte (fixed-point)
Number of measurements/second	50
Filter	Exponent filter: 0.05 ... 5 Hz Mean value filter
Weighing functions	
• Weight values	Gross/net/tare
• Limits	4 (min./max./empty/overflow)
• Scale standstill	Yes
• Zero setting function	Via command or automatically
Proportioning functions	• Control of coarse/fine flow valves • Tolerance monitoring • Material flow monitoring • Autom. proportioning optimization • Autom. reproportioning • Inching mode
Module parameterization	Via SIMATIC S5/S7/C7 or SIWATOOL M PC parameterization software
UL/CSA/FM certification	Yes
IP degree of protection to DIN EN 60529; IEC 60529	In S7 frame: IP20 Stand-alone: IP10
Load cell powering	
• Supply voltage U _s (rated value)	10.2 V DC
• Max. supply current	≤ 180 mA
• Permissible load resistance:	
- RL _{min}	> 60 W
- RL _{max}	<4010W
	<u>With Ex(i) interface:</u>
- RL _{min}	> 87 W
- RL _{min}	<4010W

Permissible load cell characteristic	Up to 4 mV/V
Permissible range of measuring signal (at greatest set characteristic)	-41.5 ... 41.5 mV DC
Max. distance of load cells	1000 m (300 m in Ex area1)
Supply voltage 24 V DC	
• Rated voltage	24 V DC
• Max. current consumption	300 mA
• Voltage supply from backplane bus	typ. 50 mA
Serial port 1	RS 232:
• Baud rate	2400/9600 baud
• Parity	Even/odd
• No. of data bits/stop bits	8/1
• Signal level	In acc. with EIA-RS 232
• Protocols	SIWAREX protocol 3964R XON/XOFF (printer) ²⁾
Serial port 2	TTY:
• Baud rate	9600 baud
• Parity	straight
• No. of data bits/stop bits	8/1
• Signal level	Active/passive (floating)
• Protocols	Remote display protocol SIWAREX protocol 3964R
Binary inputs	Number: 3 Rated voltage: 24 V Switching frequency: 10 Hz
Binary outputs	Number: 4 (digital) Rated voltage: 24 V Rated current: 0.5 A Total max.: 1 A Electrical isolation: 500 V
Analog output	
• Output range	0/4 ... 20 mA
• Total error at 25 °C	0.15 %
• Updating rate	Approx. 350 ms
• Resolution	16 bits (0 ... 20 mA)
• Burden including line resistance	≤ 600 W
Climatic requirements T _{min} (IND) ... T _{max} (IND) (operating temperature)	
• Vertical installation	-10 ... +60 °C
• Horizontal installation/with verification capability	-10 ... +40 °C
MTBF (SN29500)	172,000h at +40 °C

1) Up to 1000 m, depending on the gas group.

2) Serial printer, ANSI-, EPSON-, IBM-compatible

Ordering data	Order No.		Order No.
SIWAREX M Medium accuracy weighing machine Class III, 6000 d, for the SIMATIC S7 and ET 200M, incl. bus connector, weight 0.6 kg	7MH4 553-1AA41	Sub-D connector, 25-pin (male) •Quantity: 1 unit, for printer interface (RS 232)	6ES5 750-2AA31
SIWAREX M Manual (the Manual must be ordered separately.) •German •English	7MH4 593-3AA11 7MH4 593-3AA21	Sub-D connector, 25-pin (female) •Quantity: 1 unit, for PC interface (RS 232)	6ES5 750-2AB31
SIWAREX M configuration package for SIMATIC S7 version 5.1 or higher in German and English on CD-ROM •SIWATOOL PC parameterization software •SIMATIC S7 function blocks •SIMATIC S5 function blocks •SIWAREX M Manual on CD •Setup for incorporation of SIWAREX M into STEP 7	7MH4 583-3FA63	Cable LiYCY 4 x 2 x 0.25 mm² for TTY or RS 232 interface (if the cable is used for the TTY interface, two pairs of conductors must be connected in parallel)	7MH4 407-8BD0
SIWAREX Batch Recipe control for proportioning processes with SIWAREX M modules •STEP 7 program for SIMATIC S7 (CPU 314 or better) •Example programs for GUI for OP7 and OP27 (configuration with ProTool) •Documentation in German and English	7MH4 553-4GS01	Accessories for SIWAREX U/M	
SIWAREX Batch secondary license	7MH4 583-4KL01	SIWAREX JB junction box, aluminium housing for connecting up to 4 load cells in parallel, and for connecting several junction boxes	7MH4 710-1BA
Connection of SIWAREX M to serial PC interface •for 9-pin PC interface, 2 m long •for 9-pin PC interface, 5 m long	7MH4 702-8CA 7MH4 702-8CB	SIWAREX JB junction box, stainless steel housing for connecting up to 4 load cells in parallel	7MH4 710-1EA
Installation material (mandatory)		Ex interface, type SIWAREX Pi With UL and FM approvals, but without ATEX approval, for intrinsically-safe connection of load cells, suitable for the SIWAREX U, M, FTA, FTC, CS and P weigh modules. Use in the EC is not possible.	7MH4 710-5AA
Front connector for SIWAREX M 20-pin, with screw contacts (required for each SIWAREX module)	6ES7 392-1AJ00-0AA00	Manual for Ex interface type SIWAREX Pi	C71000-T5974-C29
Shield contact element A shield contact element is sufficient for one SIWAREX M module	6ES7 390-5AA00-0AA0	SIWAREX IS Ex interface With ATEX approval, but without UL and FM approvals, for intrinsically-safe connection of load cells, including Manual, suitable for the SIWAREX U, M, FTA, FTC, CS and P weigh modules. Use in the EC is possible. •With short-circuit current < 199 mA DC •With short-circuit current < 137 mA DC	7MH4 710-5BA 7MH4 710-5CA
Terminal elements For 1 cable with 4 to 13 mm diameter	6ES7 390-5CA00-0AA0	Cable (optional)	
Accessories (optional)		Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, orange sheath to connect SIWAREX U, M, P, FTA, FTC and CS to the junction box (JB), extension box (EB) or Ex interface (Ex-I) or between two JBs, for fixed laying, occasional bending is possible, 10.8 mm outer diameter, for ambient temperature -40 to +80 °C	7MH4 702-8AG
Labeling strips (10 units, spare part)	6ES7 392-2XX00-0AA0	Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, blue sheath to connect the junction box (JB) or extension box (EB) in a potentially explosive atmosphere to the Ex interface (Ex-I), for fixed laying, occasional bending is possible, blue PVC insulating sheath, approx. 10.8 mm outer diameter, for ambient temperature -40 to +80 °C	7MH4 702-8AF
Cables and connectors (optional)		Cable LiYCY 4 x 2 x 0.25 mm² for TTY (connect 2 pairs of conductors in parallel), for connection of a remote indicator	7MH4 407-8BD0
Sub-D connector, 9-pin (female) •Quantity: 1 unit, for PC interface (RS 232)	6ES5 750-2AB11		
Sub-D connector, 9-pin (male) •Quantity: 1 unit, for RS 232 interface of SIWAREX M	6ES5 750-2AA11		
Sub-D connector, 15-pin (male) •Quantity: 1 unit, for TTY interface of SIWAREX M	6ES5 750-2AA21		

SIMATIC S7-300

IQ-Sense modules and sensors

IQ-Sense sensor modules

Overview



- Intelligent 8-channel electronics module for S7-300/ET 200M
- For the connection of up to 8 IQ-Sense sensors:
 - Optoelectronic sensors
 - Ultrasound sensors
- With standard function blocks for the various sensor technologies for simplified handling on a SIMATIC S7
- Conventional sensors cannot be operated.

Technical specifications

	6ES7 338-7XF00-0AB0
Voltages and currents	
Load voltage L+	
- Rated value (DC)	24 V
Current consumption	
• from load voltage L+ (no load), max.	1 A
• from backplane bus 5 V DC, max.	150 mA; typ.
Connection system	
• Requisite front connector	20-pin
Digital inputs	
• Number of digital inputs	8
Length of cable	
- Length of cable unshielded, max.	50 m
Sensor	
Connectable encoders	
- Description	photoelectric proximity switches and ultrasonic sensors with IQ-Sense, cycle time 2.88 - 6 ms
Status information/ interrupts/ diagnostics	
Diagnostic display LED	
- Status display digital input (green)	Yes
Insulation	
• Insulation tested with	500 V DC
Potentials/ electrical isolation	
Digital input functions	
- between the channels	No
- between the channels and the backplane bus	Yes
Dimensions and weight	
• Weight, approx.	250 g
• Width	40 mm
• Height	125 mm
• Depth	120 mm

Ordering data

Order No.

8x IQ-Sense sensor module

6ES7 338-7XF00-0AB0

Sensors for connecting to the sensor module

Diffuse sensors

Model C40 IQ-Sense

3SF7 240-3JQ00

Model K80 IQ-Sense

3SF7 210-3JQ00

with background fading, model K80 IQ-Sense

3SF7 214-3JQ00

Diffuse barrier

Model C40 IQ-Sense

3SF7 241-3JQ00

Model K80 IQ-Sense

3SF7 211-3JQ00

Ultrasound sensor

Model M18 IQ-Sense; Range 6-30 cm

3SF6 232-3JA00

Model M18 IQ-Sense; Range 15-100 cm ^{G)}

3SF6 233-3JA00

G) Subject to export regulations: AL: N and ECCN: EAR99

Overview



Opto BERO with IQ Sense, C 40 form



Opto BERO with IQ Sense, K 80 form

The photoelectric proximity switches react to changes in the received quantity of light. The light beam emitted from the emitter diode is interrupted or reflected by the object to be detected.

These sensors detect all objects regardless of their composition, whether metal, wood or plastic.

Depending on the type of BERO, the interruption or reflection of the light beam is evaluated. The following operating modes are possible with IQ Sense:

- Diffuse sensors (energetic)
- Diffuse sensors with background suppression
- Retroreflective sensors.

Features:

- C 40 IQ Sense and K 80 IQ Sense forms
- IntelliTeach functionality
- Integral anti-interference function
- Advanced failure signal (contamination/maladjustment)

Technical specifications

Form	C40 IQ Sense	K80 IQ Sense
Diffuse sensor (energetic sensor)		
Sensing range	m 0.7	2
Standard target	mm 200 x200 (white)	
Emitter (type of light)	nm 660 (red LED)	880 (IR LED)
Current input	mA 50	
Response time	ms 1	
LEDs	Switching display (yellow), surplus light (green)	
Enclosure material	ABS + PBTP	PBTP
Degree of protection	IP67	
Dimensions	mm 40 x40 x53	83 x65 x25
Diffuse sensor with background suppression		
Sensing range	m –	0.2 ... 1
Standard target	mm –	200 x200 (white)
Emitter (type of light)	nm –	880 (IR LED)
Current input	mA –	50
Response time	ms –	2
LEDs	–	Switching display (yellow), surplus light (green)
Enclosure material	–	PBTP
Degree of protection	–	IP67
Dimensions	mm –	83 x65 x25

SIMATIC S7-300

IQ-Sense modules and sensors

IQ-Sense photoelectric sensors

Technical specifications (continued)

Retroreflective sensor

Sensing range	m	6	8
Reflector		Type D84, 3RX7916	
Emitter (type of light)	nm	660 (red LED, polarized)	
Current input	mA	50	
Response time	ms	1	
LEDs		Switching display (yellow), surplus light (green)	
Enclosure material		ABS + PBTP	PBTP
Degree of protection		IP67	
Dimensions	mm	40 x40 x53	83 x65 x25

Ordering data

Photoelectric sensors
for connection to the 4 IQ Sense
sensor module

C40 IQ Sense

- Diffuse sensor
- Retroreflective sensor

Order No.

3SF7 240-3JQ00
3SF7 241-3JQ00

Photoelectric sensors
for connection to the 4 IQ Sense
sensor module

K80 IQ Sense

- Diffuse sensor
- Diffuse sensor with background
suppression
- Retroreflective sensor

Order No.

3SF7 210-3JQ00
3SF7 214-3JQ00
3SF7 211-3JQ00

Overview



The Sonar BEROs of the M18 IQ compact range are all-in-one units ready for connection, and have a cylindrical M 18 enclosure for connection to the S7-300/ET 200M IQ Sense module SM338, 8xIQ Sense

- 5 operating modes
 - Operation as a measuring sensor ("Analog signal"),
 - Diffuse sensor with background suppression,
 - Diffuse sensor with large differential travel,
 - Diffuse sensor with foreground and background suppression,
 - Retroreflective sensor.
- Static setting of parameters using STEP 7
- Dynamic setting of parameters using an S7 function block
- Measured distance from object is always transmitted
- Synchronization capability, multiplex operation
- Temperature compensation
- Connection through M12 connector
- Non-polarized two-wire system (protected against polarity reversal)
- Channel-specific system diagnostics (e.g. wire break, short-circuit, parameterization faults).

Technical specifications

Type		3SF62 32-3JA00	3SF62 33-3JA00
Sensing range			
• Rated value	cm	5 ... 30	15 ... 100
• Maximum value	cm	5 ... 50	15 ... 150
Standard target	mm	10 x10	20 x20
Differential travel <i>H</i> (adjustable)	mm	3 ... 30	10 ... 100
Repeat accuracy <i>R</i>	mm	1	2
Operational voltage (DC)		From IQ Sense	
Rated operating current <i>I_e</i>		From IQ Sense	
No-load supply current <i>I₀</i>		From IQ Sense	
Adjustment/parameterization		Start and end of the switching range using IQ Sense (IntelliTeach) or local teach-in using potentiometer	
Ultrasonic frequency	kHz	400	200
Switching frequency <i>f</i>	Hz	8	4
Response time	ms	54	110
Measuring time	ms	13.44	26.88
Status display		Yellow LED	
Enclosure material		Brass, nickel-plated, CRASTIN converter cover; epoxy resin converter surface	
Degree of protection		IP67	
Ambient temperature			
• Operation	°C	-25 ... +70	
• Storage	°C	-40 ... +85	

Ordering data

Order No.

Ultrasonic sensors

for connection to IQ Sense

M 18 IQ Sense

- Sensing range 5 ... 30 cm
- Sensing range 15 ... 100 cm

3SF6 232-3JA00
3SF6 233-3JA00

SM 374 simulator

Overview



- Simulator module for testing programs during startup and operation
- For simulation of sensors or signals using switches
- For indicating signal statuses at the output using LEDs

Technical specifications

6ES7 374-2XH01-0AA0	
Current consumption	
• from backplane bus 5 V DC, max.	80 mA
• Power dissipation, typical	0.35 W
• Number of digital inputs	16; Switches
• Number of digital outputs	16; LEDs
Potentials/ electrical isolation	
Digital output functions - between the channels and the backplane bus	No
Digital input functions - between the channels and the backplane bus	No
Dimensions and weight	
• Weight, approx.	190 g
• Width	40 mm
• Height	125 mm
• Depth	120 mm

Ordering data

Ordering data	Order No.
SM 374 simulator module ^{A)}	6ES7 374-2XH01-0AA0
Including bus connector and labeling strip	
Bus connector	6ES7 390-0AA00-0AA0
1 unit (spare part)	
Labeling strip	6ES7 392-2XX00-0AA0
10 units (spare part)	
S7-SmartLabel	2XV9 450-1SL01-0YX0
Software for machine labeling of modules directly from the STEP 7 project	
Labeling sheets for machine labeling	
for 16-channel signal modules, DIN A4, for printing using laser printer; 10 units	
• Petrol	6ES7 392-2AX00-0AA0
• Light beige	6ES7 392-2BX00-0AA0
• Yellow	6ES7 392-2CX00-0AA0
• Red	6ES7 392-2DX00-0AA0
Label cover	6ES7 392-2XY00-0AA0
10 units (spare part)	

A) Subject to export regulations: AL: N and ECCN: EAR99H

Overview



- Dummy module for reserving slots for non-parameterized signal modules
- Structure and address allocation is retained when replaced with a signal module

Technical specifications

	6ES7 370-0AA01-0AA0
Current consumption	
•from backplane bus 5 V DC, max.	5 mA
•Power dissipation, max.	0.03 W
Dimensions and weight	
•Weight, approx.	180 g
•Width	40 mm
•Height	125 mm
•Depth	120 mm

Ordering data

	Order No.
DM 370 dummy module	6ES7 370-0AA01-0AA0
Including bus connector and labeling strip	
Bus connector	6ES7 390-0AA00-0AA0
1 unit (spare part)	
Labeling strip	6ES7 392-2XX00-0AA0
10 units (spare part)	
S7-SmartLabel	2XV9 450-1SL01-0YX0
Software for machine labeling of modules directly from the STEP 7 project	
Labeling sheets for machine labeling	
for 16-channel signal modules, DIN A4, for printing using laser printer; 10 units	
Petrol	6ES7 392-2AX00-0AA0
Light beige	6ES7 392-2BX00-0AA0
Yellow	6ES7 392-2CX00-0AA0
Red	6ES7 392-2DX00-0AA0
Label cover	6ES7 392-2XY00-0AA0
10 units (spare part)	

SIMATIC S7-300

Communication

CP 340

Overview



- The economical complete solution for serial communication via point-to-point links.
- 3 versions with different transmission interfaces:
 - RS 232C (V.24)
 - 20 mA (TTY)
 - RS 422/RS 485 (X.27)
- Implemented protocols:
 - ASCII
 - 3964 (R) (not for RS 485)
 - Printer driver
- Simple parameterization via a parameterization tool integrated into STEP 7

Technical specifications

	6ES7 340-1AH01-0AE0	6ES7 340-1BH00-0AE0	6ES7 340-1CH00-0AE0
Current consumption			
• from backplane bus 5 V DC, max.	165 mA	220 mA	165 mA
• Power dissipation, max.	0.85 W	0.85 W	0.85 W
Interfaces			
• Number	1; electrically isolated	1; electrically isolated	1; electrically isolated
• Physical interface, 20mA (TTY)	Yes	Yes	
• Physical interface, RS 232C (V.24)			Yes
• Physical interface, RS422/RS485 (X.27)			
• Transmission rate, max.	19.2 kBit/s	9.6 kBit/s	19.2 kBit/s
• Transmission rate, min.	2.4 kBit/s	2.4 kBit/s	2.4 kBit/s
Point-to-point			
• Length of cable, max.	15 m	1,000 m; (100 m active, 1000 m passive)	1,200 m
• Supported printers	HP-Deskjet, HP-Laserjet, IBM-Proprietary, user-defined	HP-Deskjet, HP-Laserjet, IBM-Proprietary, user-defined	HP-Deskjet, HP-Laserjet IBM-Proprietary, user-defined
Frame length, max.			
- 3964 (R)	1,024 Byte	1,024 Byte	1,024 Byte
- ASCII	1,024 Byte	1,024 Byte	1,024 Byte
Transmission rate, 20 mA (TTY)			
- with 3964 (R) protocol, max.		19.2 kBit/s	
- with ASCII protocol, max.		9.6 kBit/s	
- with printer driver, max.		9.6 kBit/s	
Transmission rate, RS 422/485			
- with 3964 (R) protocol, max.			19.2 kBit/s
- with ASCII protocol, max.			9.6 kBit/s
- with printer driver, max.			9.6 kBit/s
Transmission rate, RS232			
- with 3964 (R) protocol, max.	19.2 kBit/s		
- with ASCII protocol, max.	9.6 kBit/s		
- with printer driver, max.	9.6 kBit/s		

Technical specifications (continued)

	6ES7 340-1AH01-0AE0	6ES7 340-1BH00-0AE0	6ES7 340-1CH00-0AE0
Dimensions and weight			
•Weight, approx.	300 g	300 g	300 g
•Width	40 mm	40 mm	40 mm
•Height	125 mm	125 mm	125 mm
•Depth	120 mm	120 mm	120 mm
Software			
Block			
- FB length in working memory, max.	2,700 Byte; Data communication, sending und receiving	2,700 Byte; Data communication, sending und receiving	2,700 Byte; Data communication, sending und receiving

Ordering data

Order No.	Order No.
CP 340 communications processor with one RS 232 C (V.24) interface	6ES7 340-1AH01-0AE0
RS 232 connecting cable for linking to SIMATIC S7	
5 m	6ES7 902-1AB00-0AA0
10 m	6ES7 902-1AC00-0AA0
15 m	6ES7 902-1AD00-0AA0
CP 340 communications processor with one 20 mA (TTY) interface	6ES7 340-1BH00-0AE0
20 mA (TTY) connecting cable for linking to SIMATIC S7	
5 m	6ES7 902-2AB00-0AA0
10 m	6ES7 902-2AC00-0AA0
50 m	6ES7 902-2AG00-0AA0
CP 340 communications processor with one RS 422/485 (X.27) interface	6ES7 340-1CH00-0AE0
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

SIMATIC S7-300

Communication

SIPLUS CP 340

Overview



- The economical complete solution for serial communication via point-to-point links.
- RS 232C (V.24)
- Implemented protocols:
 - ASCII
 - 3964 (R)
 - Printer driver
- Simple parameterization via a parameterization tool integrated into STEP 7

This module is designed for

- an ambient range of $-25\text{ }^{\circ}\text{C}$ to $+70\text{ }^{\circ}\text{C}$, condensation permissible.
- extraordinary medial load (for example by chloric and sulphuric atmospheres).

Technical specifications

6AG1 340-1AH01-2AE0

see 6ES7 340-1AH01-0AE0

Ordering data

Order No.

SIPLUS S7-300 CP 340

6AG1 340-1AH01-2AE0

(extended temperature range
and extraordinary medial load)
with one RS 232 C (V.24) interface

Accessories

see Ordering data for CP 340

Overview



- For powerful, high-speed serial communication via point-to-point links
- 3 versions with different physical properties:
 - RS 232C (V.24)
 - 20 mA (TTY),
 - RS 422/RS 485 (X.27)
- Implemented protocols: ASCII, 3964 (R), RK 512, customer-specific protocols (reloadable)
- Simple parameterization via a parameterization tool integrated into STEP 7

Technical specifications

	6ES7 341-1AH01-0AE0	6ES7 341-1BH01-0AE0	6ES7 341-1CH01-0AE0
Supply voltages			
Rated value			
- 24 V DC	Yes	Yes	Yes
Current consumption			
• from backplane bus 5 V DC, max.	70 mA	70 mA	70 mA
• from supply voltage L+, max.	200 mA	200 mA	240 mA
• Power dissipation, max.	4.8 W	4.8 W	5.8 W
Interfaces			
• Number	1; electrically isolated	1; electrically isolated	1; electrically isolated
• Physical interface, 20mA (TTY)	Yes	Yes	
• Physical interface, RS 232C (V.24)	Yes		Yes
• Physical interface, RS422/RS485 (X.27)			
• Transmission rate, max.	76.8 kBit/s	19.2 kBit/s	76.8 kBit/s
• Transmission rate, min.	0.3 kBit/s	0.3 kBit/s	0.3 kBit/s
Connection system			
• PtP	9-pin sub-D male connector	9-pin sub-D male connector	15-pin sub-D male connector
• Power supply	3 screw terminals: L+, M, GND	3 screw terminals: L+, M, GND	3 screw terminals: L+, M, GND
Point-to-point			
• Length of cable, max.	15 m	1,000 m	1,200 m
Integral protocol driver			
- 3964 (R)	Yes	Yes	Yes; not with RS 485
- ASCII	Yes	Yes	Yes
- Customer-specific drivers for later loading	Yes	Yes	Yes
- RK512	Yes	Yes	Yes; not with RS 485
Frame length, max.			
- 3964 (R)	1,024 Byte	1,024 Byte	1,024 Byte
- ASCII	1,024 Byte	1,024 Byte	1,024 Byte
- RK512	1,024 Byte	1,024 Byte	1,024 Byte

SIMATIC S7-300

Communication

CP 341

Technical specifications (continued)

	6ES7 341-1AH01-0AE0	6ES7 341-1BH01-0AE0	6ES7 341-1CH01-0AE0
Point-to-point (continued)			
Transmission rate, 20 mA (TTY) - with 3964 (R) protocol, max. - with ASCII protocol, max. - with RK 512 protocol, max.		76.8 kBit/s 76.8 kBit/s; 0.3; 0.6; 1.2; 2.4; 4.8; 9.6; 19.2; 38.4; 57.6 and 76.8 kBit/s (76.8 kBit/s only possible with half duplex) 76.8 kBit/s	
Transmission rate, RS 422/485 - with 3964 (R) protocol, max. - with ASCII protocol, max. - with RK 512 protocol, max.			76.8 kBit/s 76.8 kBit/s; 0.3; 0.6; 1.2; 2.4; 4.8; 9.6; 19.2; 38.4; 57.6 and 76.8 kBit/s (76.8 kBit/s only possible with half duplex) 76.8 kBit/s
Transmission rate, RS232 - with 3964 (R) protocol, max. - with ASCII protocol, max. - with RK 512 protocol, max.	76.8 kBit/s 76.8 kBit/s; 0.3; 0.6; 1.2; 2.4; 4.8; 9.6; 19.2; 38.4; 57.6 and 76.8 kBit/s (76.8 kBit/s only possible with half duplex) 76.8 kBit/s		
Dimensions and weight			
•Weight, approx.	300 g	300 g	300 g
•Width	40 mm	40 mm	40 mm
•Height	125 mm	125 mm	125 mm
•Depth	120 mm	120 mm	120 mm
Software			
Block - FB length in working memory, max.	5,500 Byte; Data communication, sending und receiving	5,500 Byte; Data communication, sending und receiving	5,500 Byte; Data communication, sending und receiving

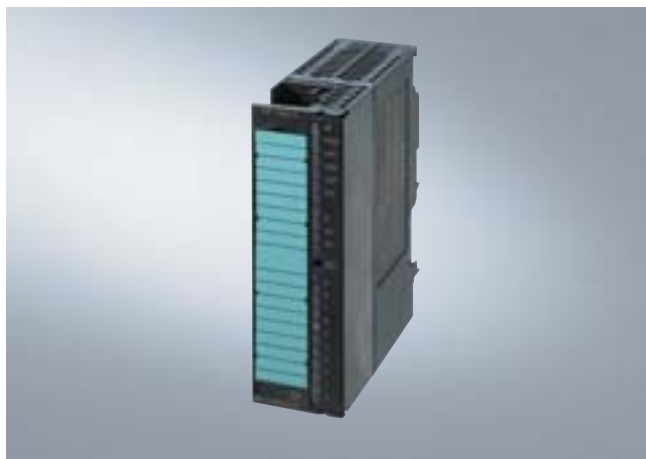
Ordering data	Order No.		Order No.
CP 341 communications processor with one RS 232 C (V.24) interface	6ES7 341-1AH01-0AE0	CP 341 manual German English French Italian	6ES7 341-1AH00-8AA0 6ES7 341-1AH00-8BA0 6ES7 341-1AH00-8CA0 6ES7 341-1AH00-8EA0
RS 232 connecting cable for linking to SIMATIC S7 5 m 10 m 15 m	6ES7 902-1AB00-0AA0 6ES7 902-1AC00-0AA0 6ES7 902-1AD00-0AA0	Loadable drivers for CP 341 MODBUS Master (RTU format) •Single license •Single license, without software or documentation MODBUS Slave (RTU format) •Single license •Single license, without software or documentation Data Highway (DF1 protocol) •Single license •Single license, without software or documentation	6ES7 870-1AA01-0YA0 6ES7 870-1AA01-0YA1 6ES7 870-1AB01-0YA0 6ES7 870-1AB01-0YA1 6ES7 870-1AE00-0YA0 6ES7 870-1AE00-0YA1
CP 341 communications processor with one 20 mA (TTY) interface	6ES7 341-1BH01-0AE0		
20 mA (TTY) connecting cable for linking to SIMATIC S7 5 m 10 m 50 m	6ES7 902-2AB00-0AA0 6ES7 902-2AC00-0AA0 6ES7 902-2AG00-0AA0		
CP 341 communications processor with one RS 422/485 (X.27) interface	6ES7 341-1CH01-0AE0		
RS 422/485 connecting cable for linking to SIMATIC S7 5 m 10 m 50 m	6ES7 902-3AB00-0AA0 6ES7 902-3AC00-0AA0 6ES7 902-3AG00-0AA0		

SIMATIC S7-300

Communication

CP 343-2

Overview



The CP 343-2 is the AS-Interface master for the SIMATIC S7-300 programmable controller and the ET 200 M distributed I/O station. The functions of the communications processor are as follows:

- Up to 62 AS-Interface slaves can be connected and integrated analog value transfer (according to the extended AS-Interface specification V2.1)
- Supports all AS-Interface master functions in accordance with the extended AS-Interface specification V2.1
- Status displays for operating states and display of the functional readiness of connected slaves with LEDs in the front panel
- Indication of errors (incl. AS-Interface voltage errors, configuration errors) with LEDs in the front panel
- Compact enclosure designed to match the SIMATIC S7-300

Technical specifications

AS-Interface Specification	V 2.1
Bus cycle time	5 ms for 31 slaves 10 ms for 62 slaves
Interfaces	16 byte I/O and P-bus S7-300
• Assignment of analog address space in the PLC	
• AS-Interface connection	S7-300 front connector with terminal
Supply voltage	+5 V DC through backplane bus
Current consumption	
• Through backplane bus	Typ. 200 mA at 5 V DC
• Through AS-Interface from the AS-Interface shaped cables	Max. 100 mA
Power loss	2 W
Perm. environmental conditions	
• Operating temperature	0°C to +60°C
• Transport/storage temperature	-40 °C to +70 °C
• Relative humidity, max.	95% at +25 °C
Design	
• Module format	S7-300 design
• Dimensions (W x H x D) in mm	40 x 125 x 120
• Weight	Approx. 190 g
• Space required	1 slot

Ordering data

Order No.

CP 343-2 communications processor

6GK7 343-2AH00-0XA0

For connection of SIMATIC S7-300 and ET 200M to the AS-Interface; without front connector

Front connector

6ES7 392-1AJ00-0AA0

20-pin, with screw contacts

CP 343-2 and CP 343-2 P manual

including software (FC) and examples
paper version

• German

6GK7 343-2AH00-8AA0

• English

6GK7 343-2AH00-8BA0

• French

6GK7 343-2AH00-8CA0

• Spanish

6GK7 343-2AH00-8DA0

• Italian

6GK7 343-2AH00-8EA0

Electronic manuals

6GK1 975-1AA00-3AA0

Communication systems, logs, products

on CD-ROM
German/English

Overview



The CP 343-2 is the AS-Interface master for the SIMATIC S7-300 programmable controller and the ET 200 M distributed I/O station. The functions of the communications processor are as follows:

- **It supports configuration of the AS-Interface network with STEP 7 V5.2 and higher**
- Up to 62 AS-Interface slaves can be connected and integrated analog value transfer (according to the extended AS-Interface specification V2.1)
- Supports all AS-Interface master functions in accordance with the extended AS-Interface specification V2.1
- Indication of errors (incl. AS-Interface voltage errors, configuration errors) with LEDs in the front panel
- Compact enclosure designed to match the SIMATIC S7-300

Technical specifications

AS-Interface Specification	V 2.1
Bus cycle time	5 ms for 31 slaves 10 ms for 62 slaves
Interfaces	• Assignment of analog address space in the PLC • AS-Interface connection
Supply voltage	+5 V DC through backplane bus
Current consumption	• Through backplane bus • Through AS-Interface from the AS-Interface shaped cables
Power loss	2 W
Perm. environmental conditions	• Operating temperature • Transport/storage temperature • Relative humidity, max.
Design	• Module format • Dimensions (W x H x D) in mm • Weight • Space required
Configuration software	Optional: STEP 7 V5.2 or higher

Ordering data

Order No.

CP 343-2 communications processor	6GK7 343-2AH10-0XA0
For connection of SIMATIC S7-300 and ET 200M to the AS-Interface; without front connector	
Front connector	6ES7 392-1AJ00-0AA0
20-pin, with screw contacts	
CP 343-2 and CP 343-2 P manual	
including software (FC) and examples paper version	
• German	6GK7 343-2AH00-8AA0
• English	6GK7 343-2AH00-8BA0
• French	6GK7 343-2AH00-8CA0
• Spanish	6GK7 343-2AH00-8DA0
• Italian	6GK7 343-2AH00-8EA0
Electronic manuals	6GK1 975-1AA00-3AA0
Communication systems, logs, products on CD-ROM German/English	

SIMATIC S7-300

Communication

CP 342-5

Overview



- PROFIBUS DP master or slave with electrical interface for connecting the SIMATIC S7-300 and the SIMATIC C7 to PROFIBUS at up to 12 Mbit/s (including 45.45 kbit/s)
- Communication services:
 - PROFIBUS DP-V0
 - PG/OP communication
 - S7 communication (client, server, multiplexing)
 - S5-compatible communication (SEND/RECEIVE)
- Easy configuration and programming over PROFIBUS
- Cross-network programming device communication through S7 routing
- Modules can be replaced without the need for a PG

Technical specifications

Data transmission rate	9.6 Kbit/s to 12 Mbit/s
Interfaces	
• Connection to PROFIBUS	9-pin Sub-D connector (RS485)
• Connection to supply voltage	4-pin terminal block
Supply voltage	24 V DC
Current consumption	
• From backplane bus	150 mA
• From 24 V DC	250 mA
Power loss	6.75 W
Perm. environmental conditions	
• Operating temperature	0 °C to +60 °C
• Transport/storage temperature	-40 °C to +70 °C
• Relative humidity	Max. 95% at +25 °C
Design	
• Module format	Compact assembly
• Dimensions (W x H x D) in mm	40 x 125 x 120
• Weight	Approx. 300 g
Number of CPs per S7-300	4

S7 communication performance data

- | | |
|--------------------------------|---------|
| • Number of usable connections | Max. 16 |
|--------------------------------|---------|

S5-compatible interface (SEND/RECEIVE)

- | | |
|--------------------------------|--------------------------------------|
| • Number of usable connections | Max. 16 |
| • Useful data/connection | Max. 240 byte (transmit and receive) |

Multi-protocol operation

- | | |
|--|---|
| • Number of usable connections | Max. 32 (without DP); max. 28 (with DP) |
| • Size of the DP diagnostic data per connected slave | max. 240 byte |

DP master function

- | | |
|--|-----------|
| • DP master | DP V0 |
| • Number of DP slaves | 124 |
| • Total size of DP data ranges | |
| - DP input range | 2160 byte |
| - DP output range | 2160 byte |
| • Size of the DP data ranges per connected slave | |
| - DP input range | 244 byte |
| - DP output range | 244 byte |

DP slave function

- | | |
|------------------------|----------|
| • DP slave | DP V0 |
| Size of DP data ranges | |
| • DP input range | 240 byte |
| • DP output range | 240 byte |

PG/OP communication

- | | |
|--|----|
| • Number of operable OP connections (acyclic services) | 16 |
|--|----|

Ordering data	Order No.	Order No.
CP 342-5 communications processor Communications processor for electrical connection of SIMATIC S7-300 to PROFIBUS to 12 Mbit/s with electronic manual on CD-ROM	6GK7 342-5DA02-0XE0	PROFIBUS FastConnect RS 485 bus connector With 90° cable outlet; With insulation displacement method, max. data transmission rate 12 Mbit/s •without PG interface •with PG interface
NCM S7 configuration software for PROFIBUS Configuration software for PROFIBUS CPs for SIMATIC S7 •V5.1 and newer executable under STEP 7 V5.1; with electronic manual on CD-ROM English, French, German, Italian and Spanish	Delivered with STEP 7 Version 5	PROFIBUS bus connector IP20 For connection to PPI, MPI, PROFIBUS •without PG interface •with PG interface
"NCM S7 for PROFIBUS" manual Paper version for V5.x (STEP 7 V5.x) •German •English •French •Spanish •Italian	6GK7 080-5AA04-8AA0 6GK7 080-5AA04-8BA0 6GK7 080-5AA04-8CA0 6GK7 080-5AA04-8DA0 6GK7 080-5AA04-8EA0	PROFIBUS 12M bus terminal Bus terminal for connecting PROFIBUS stations up to 12 Mbit/s with connecting cable SIMATIC S7-300 DM 370 Dummy module; used during module replacement "Communication with SIMATIC" manual •German •English •French •Spanish •Italian
		6ES7 972-0BA50-0XA0 6ES7 972-0BB50-0XA0 6ES7 972-0BA12-0XA0 6ES7 972-0BB12-0XA0 6GK1 500-0AA10 6ES7 370-0AA01-0AA0 6ES7 398-8EA00-8AA0 6ES7 398-8EA00-8BA0 6ES7 398-8EA00-8CA0 6ES7 398-8EA00-8DA0 6ES7 398-8EA00-8EA0

SIMATIC S7-300

Communication

CP 342-5 FO

Overview



- PROFIBUS DP master or slave with optical interface for connecting the SIMATIC S7-300 and the SIMATIC C7 to PROFIBUS at up to 12 Mbit/s (including 45.45 kbit/s)
- Direct connection to the optical PROFIBUS network over the integrated fiber-optic interface for plastic and PCF fiber-optic cables
- Communication services:
 - PROFIBUS DP-V0
 - PG/OP communication
 - S7 communication (client, server, multiplexing)
 - S5-compatible communication (SEND/RECEIVE)
- Easy configuration and programming over PROFIBUS
- Cross-network programming device communication through S7 routing
- Modules can be replaced without the need for a PG

Technical specifications

Data transmission rates	9.6 Kbit/s to 12 Mbit/s (exception: 3 and 6 Mbit/s)
Interfaces	
•Connection to PROFIBUS	2 x duplex sockets
•Connection to supply voltage	4-pin terminal block
Supply voltage	24 V DC
Current consumption	
•From backplane bus	150 mA
•From 24 V DC	250 mA
Power loss	6.75 W
Maximum distance between 2 adjacent network stations	
•Plastic FOC	Max. 50 m
•PCF FOC	Max. 300 m
Perm. environmental conditions	
•Operating temperature	0°C to +60°C
•Transport/storage temperature	-40 °C to +70 °C
•Relative humidity	Max. 95% at +25 °C
Design	
•Module format	Compact assembly
•Dimensions (W x H x D) in mm	40 x 125 x 120
•Weight	Approx. 300 g
•Number of CPs per S7-300	4

Performance data	
S7 communication	
•Number of usable connections	Max. 16
S5-compatible communication (SEND/RECEIVE)	
•Number of usable connections	Max. 16
•Useful data/connection	Max. 240 byte (transmit and receive)
Multi-protocol operation	
•Number of usable connections	32 (without DP); max. 28 (with DP)
DP master function	
•DP master	DP-V0
•Number of DP slaves	124
•Total size of DP data ranges	
- DP input range	2160 Byte
- DP output range	2160 Byte
•Size of the DP data ranges per connected slave	
- DP input range	244 Byte
- DP output range	244 Byte
•Size of the DP diagnostic data per connected slave	max. 240 Byte
DP slave function	
•DP slave	DP-V0
•Size of DP data ranges	
- DP input range	240 Byte
- DP output range	240 Byte
PG/OP communication	
•Number of operable OP connections (acyclic services)	16

Ordering data	Order No.		Order No.
CP 342-5 FO communications processor Communications processor for optical connection of SIMATIC S7-300 to PROFIBUS up to 12 Mbit/s with electronic manual on CD-ROM	6GK7 342-5DF00-0XE0	Manual for PROFIBUS networks Paper version Network architecture, components (OLM (V3), OBT, ILM), configuration and assembly •German •English	6GK1 970-5CA20-0AA0 6GK1 970-5CA20-0AA1
NCM S7 configuration software for PROFIBUS Configuration software for PROFIBUS CPs for SIMATIC S7 V5.1 and newer executable under STEP 7 V5.1; including Service Pack 3; with electronic manual on CD-ROM English, French, German, Italian and Spanish	Delivered with STEP 7 Version 5	PROFIBUS plastic fiber-optic, simplex plug/polishing set ^{A)} 100 simplex plugs and 5 polishing kits for assembling PROFIBUS plastic fiber-optic cables for the optical PROFIBUS DP	6GK1 901-0FB00-0AA0
"NCM S7 for PROFIBUS" manual Paper version for V5.x (STEP 7 V5.x) •German •English •French •Spanish •Italian	6GK7 080-5AA04-8AA0 6GK7 080-5AA04-8BA0 6GK7 080-5AA04-8CA0 6GK7 080-5AA04-8DA0 6GK7 080-5AA04-8EA0	PROFIBUS plastic fiber-optic, stripping tool set ^{A)} Tools for stripping the outer casing and core casing of PROFIBUS plastic fiber-optic cables Connection adapters For installation of the plastic simplex plug in connection with CP 342-5 FO, IM 467 FO, IM 153-2 FO and IM 151 FO 50 pcs.	6GK1 905-6PA10 6ES7 195-1BE00-0XA0

A) Subject to export regulations: AL: N and ECCN: EAR99H

SIMATIC S7-300

Communication

CP 343-5

Overview



Master connection of SIMATIC S7-300 and SIMATIC C7 to PROFIBUS up to 12 Mbit/s (incl. 45.45 Kbit/s)

- Communication services:
 - PG/OP communication
 - S7 communication
 - S5-compatible communication (SEND/RECEIVE)
 - PROFIBUS FMS
- Simple configuration and programming using PROFIBUS
- Easily integrated into the S7-300 system
- PG communication between networks through S7 routing
- Module changeover without PG

Technical specifications

Data transmission rate	9.6 kbit/s to 12 Mbit/s
Interfaces	
• Connection to PROFIBUS	9-pin Sub-D socket (RS 485)
• Connection to supply voltage	4-pin terminal block
Power supply	24 V DC
Current consumption	
• From backplane bus	150 mA
• from 24 V	250 mA
Power loss	6.75 W
Perm. ambient conditions	
• Operating temperature	0 °C to +60 °C
• Transport/storage temperature	-40 °C to +70 °C
• Relative humidity	Max. 95% at +25°C
Construction	
• Module format	Compact module
• Dimensions (WxHxD) in mm	40 x 125 x 120
• Weight	Approx. 300 g
Number of CPs per S7-300	4

1) Dependent on the CPU used

Performance data for S7 communication

- Number of connections that can be used

max. 16 ¹⁾

Performance data for S5-compatible interface (SEND/RECEIVE)

- Number of connections that can be used
- Useful data / connection

max. 16

max. 240 bytes
(SEND and RECEIVE)

Performance data for FMS function

- Number of connections that can be used

Max. 16

Variable length for READ

237 bytes

Variable length for WRITE and REPORT

233 bytes

Configurable server variables

256

Variables that can be loaded from partners

256

Multi-protocol operation

- Number of connections that can be used

Max. 48

Ordering data	Order No.		Order No.
CP 343-5 communications processor Communication processor for connecting S7-300 to PROFIBUS, FMS, S5-compatible communication, PG/OP and S7 communication; with electronic manual on CD-ROM	6GK7 343-5FA01-0XE0	PROFIBUS FastConnect RS 485 bus connector With 90° cable outlet; With insulation displacement method, max. data transmission rate 12 Mbit/s •without PG interface •with PG interface	6ES7 972-0BA50-0XA0 6ES7 972-0BB50-0XA0
NCM S7 configuration software for PROFIBUS Configuration software for PROFIBUS CPs for SIMATIC S7 V5.x, executable under STEP 7 V5.x; with electronic manual on CD-ROM English, French, German, Italian and Spanish	Delivered with STEP 7 Version 5	PROFIBUS bus connector IP20 For connection to PPI, MPI, PROFIBUS •without PG interface •with PG interface	6ES7 972-0BA12-0XA0 6ES7 972-0BB12-0XA0
"NCM S7 for PROFIBUS" manual Paper version for V5.x (STEP 7 V5.x)		PROFIBUS 12M bus terminal Bus terminal for connecting PROFIBUS stations up to 12 Mbit/s with connecting cable	6GK1 500-0AA10
•German •English •French •Spanish •Italian	6GK7 080-5AA04-8AA0 6GK7 080-5AA04-8BA0 6GK7 080-5AA04-8CA0 6GK7 080-5AA04-8DA0 6GK7 080-5AA04-8EA0	"Communication with SIMATIC" manual •German •English •French •Spanish •Italian	6ES7 398-8EA00-8AA0 6ES7 398-8EA00-8BA0 6ES7 398-8EA00-8CA0 6ES7 398-8EA00-8DA0 6ES7 398-8EA00-8EA0
		SIMATIC S7-300 DM 370 Dummy module; used during module replacement	6ES7 370-0AA01-0AA0

SIMATIC S7-300

Communication

CP 343-1 Lean

Overview



- Interface for the SIMATIC S7-300 to Industrial Ethernet
 - 10/100 Mbit/s full/half duplex connection with Autosensing for automatic switchover
 - RJ45 connection
 - Multi-protocol operation with TCP and UDP transport protocol
 - Keep Alive function
- Communication services:
 - TCP/IP und UDP transport protocol
 - PG/OP communication
 - S7 communication (server)
 - S5-compatible communication
- Multicast for UDP
- Remote programming and initial start-up is possible exclusively over Industrial Ethernet
- Integration into network management through SNMP
- Configuration of CP 343-1 Lean with NCM S7 for Industrial Ethernet (integrated into STEP 7)
- Cross-network programming device/operator panel communication through S7 routing

Technical specifications

Data transmission rate	10/100 Mbit/s autosensing
Interfaces	
• 10BaseT, 100BaseTX	RJ45
• Connection for power supply	2-pin plug-in terminal strip
Power supply	+5 V DC (±5%) and +24 V DC (±5%)
Current consumption	
• From backplane bus	200 mA
• From 24 V DC external	Typ. 160 mA Max. 200 mA
Power loss	5.8 W
Perm. ambient conditions	
• Operating temperature	0 °C to +60 °C
• Transport/storage temperature	-40 °C to +70 °C
• Relative humidity	Max. 95% at +25 °C
Construction	
• Module format	Compact module S7-300, single width
• Dimensions (W x H x D) in mm	40 x 125 x 120
• Weight	Approx. 200 g
Configuring software	NCM S7 for Industrial Ethernet (supplied with STEP 7 V5.2)

Performance data

S5-compatible communication (SEND/RECEIVE)

• Sum of all simultaneously operable TCP/UDP connections	Max. 8
• Useful data	
- TCP	8 KB
- UDP	2 KB

S7 communication

• Number of connections	Max. 4
-------------------------	--------

PG/OP communication

• Number of operable OP connections (non-isochrone services)	Max. 4
--	--------

Multi-protocol operation

• Sum of all simultaneously operable connections	Max. 12
--	---------

Multicast

8

Ordering data	Order No.	Order No.
CP 343-1 Lean communications processor ^{H)} For connecting SIMATIC S7-300 to Industrial Ethernet through TCP/IP and UDP, S7 communication, S5-compatible communication (SEND/RECEIVE), FETCH/WRITE, diagnostic expansions, Multicast, SNMP, initial start-up over LAN 10/100 Mbit/s; with electronic manual on CD-ROM	6GK7 343-1CX00-0XE0	IE FC RJ45 Plug 180 RJ45 plug-in 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/CPU with Industrial Ethernet interface • 1 pack = 1 items • 1 pack = 10 items • 1 pack = 50 items
NCM S7 configuration software for Industrial Ethernet NCM S7 configuration software for Industrial Ethernet CPs for SIMATIC S7 V5.2, for execution under STEP 7 V5.2; on CD-ROM, with electronic manual in English, German, French, Spanish and Italian	Included in the scope of supply of STEP 7 V5.2 and higher	Documentation S7-CPs/NCM S7 for Industrial Ethernet and PROFIBUS; manual package for configuring S7-CPs, IE/PB Link and PC-Stations (STEP 7 V5.3) • German • English

6GK1 901-1BB10-2AA0
6GK1 901-1BB10-2AB0
6GK1 901-1BB10-2AE0

6GK7 080-0AA01-8AA0
6GK7 080-0AA01-8BA0

H) Subject to export regulations: AL: N and ECCN: 5A991

SIMATIC S7-300

Communication

CP 343-1

Overview



- Connection of SIMATIC S7-300 to Industrial Ethernet
 - 10/100 Mbit/s full/half duplex connection with Autosensing for automatic switchover
 - Connection for RJ45
 - Multi-protocol operation with TCP and UDP transport protocol
 - Adjustable Keep Alive function
- Communication services:
 - TCP/IP und UDP transport protocol
 - PG/OP communication
 - S7 communication (client, server, multiplexing)
 - S5-compatible communication
- Multicast for UDP
- Remote programming and initial startup via the network
- SNMP-supported diagnostics
- Configuration of CP 343-1 with the NCM S7 options package for Industrial Ethernet (integrated into STEP 7)
- Cross-network programming device/operator panel communication through S7 routing

Technical specifications

Data transmission rate	10/100 Mbit/s autosensing
Interfaces	
• 10BaseT, 100BaseTX	RJ45
• Connection for power supply	2-pin plug-in terminals
Supply voltage	+5 V DC (±5%) and +24 V DC (±5%)
Current consumption	
• From backplane bus	200 mA
• From external 24 V DC	Typ. 160 mA Max. 200 mA
Power loss	5.8 W
Perm. environmental conditions	
• Operating temperature	0 °C to +60 °C
• Transport/storage temperature	-40 °C to +70 °C
• Relative humidity	Max. 95% at +25 °C
Design	
• Module format	Compact module S7-300, double width
• Dimensions (W x H x D) in mm	80 x 125 x 120
• Weight	Approx. 600 g
Configuration software	NCM S7 for Industrial Ethernet (supplied with STEP 7 V5.2)

Performance data	
S5-compatible communication (SEND/RECEIVE)	
• Sum of all simultaneously operable TCP/UDP connections	Max. 16
• Useful data	
- TCP	8 KB
- UDP	2 KB
S7 communication	
• Number of connections	Max. 16
PG/OP communication	
• Number of operable OP connections (acyclic services)	16
Multi-protocol operation	
• Sum of all simultaneously operable connections	Max. 48
Multicast	16

Ordering data	Order No.	Order No.
CP 343-1 communications processor For connecting SIMATIC S7-300 to Industrial Ethernet through TCP/IP and UDP, S7 communication, S5-compatible communication (SEND/RECEIVE), FETCH/WRITE, with and without RFC 1006, diagnostic expansions, Multicast, PBK, SNMP, initial start-up over LAN 10/100 Mbit/s; with electronic manual on CD-ROM	6GK7 343-1EX20-0XE0	IE FC RJ45 Plug 180 RJ45 plug-in 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/CPU with Industrial Ethernet interface • 1 pack = 1 items • 1 pack = 10 items • 1 pack = 50 items
CP 343-1 communications processor For the connection of SIMATIC S7-300 to Industrial Ethernet, PROFINET IO-Controller, PROFINET CBA, ISO, TCP/IP and UDP, S7 communication, S5-compatible communication (SEND/RECEIVE), FETCH/WRITE, with and without RFC 1006, diagnostic expansions, multicast, clock synchronization via SIMATIC procedure and NTP, access protection through IP access list, PBK, SNMP, DHCP, shaft for C-Plug, initialization over LAN 10/100 Mbit/s; with electronic manual on CD-ROM	Available soon	6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0 NCM S7 configuration software for Industrial Ethernet NCM S7 configuration software for Industrial Ethernet CPs for SIMATIC S7 V5.2, for execution under STEP 7 V5.2; on CD-ROM, with electronic manual in English, German, French, Spanish and Italian Documentation S7-CPs/NCM S7 for Industrial Ethernet and PROFIBUS; manual package for configuring S7-CPs, IE/PB Link and PC-Stations (STEP 7 V5.3) • German • English

SIMATIC S7-300

Communication

CP 343-1 IT

Overview



- Connection of SIMATIC S7-300 to Industrial Ethernet
 - 10/100 Mbit/s full/half duplex connection with autosensing
 - Connection via RJ45
 - Multi-protocol operation for TCP/IP and UDP
 - Adjustable Keep Alive function
- Communication services:
 - TCP/IP und UDP transport protocol
 - Multicast for UDP
 - Programming device/operator panel communication:
 - Network-wide PG/OP communication through S7 Routing
 - S7 communication
 - S5-compatible communication
 - IT communication:
 - HTTP communication supports access to process data through Web browsers;
 - FTP communication supports program-controlled FTP client communication,
 - Access to data blocks through FTP server,
 - Data handling for own file system through FTP,
 - E-mail
- IP address assignment via DHCP, simple PC tool or via program block per HMI (in exclusive server mode)
- IP address-based access protection
- Remote programming and initial startup via the network
- Clock synchronization of the CPU via NTP or SIMATIC procedure
- Integration into network management systems through the support of SNMP V1 MIB-II

Technical specifications

Data transmission rate	10/100 Mbit/s autosensing
Interfaces	
• 10BaseT, 100BaseTX	RJ45
• Connection for power supply	2-pin terminal block
Power supply	+5 V DC (±5%) and +24 V DC (±5%)
Current consumption	
• From backplane bus	200 mA
• From 24 V DC external	Max. 200 mA
Power loss	6 W
Perm. ambient conditions	
• Operating temperature	0 °C to +60 °C
• Transport/storage temperature	-40 °C to +70 °C
• Relative humidity	Max. 95% at +25 °C
Construction	
• Module format	Compact module S7-300, double width
• Dimensions (WxHxD) in mm	80 x 125 x 120
• Weight	Approx. 600 g
Configuring software	NCM S7 for Industrial Ethernet (supplied with STEP 7 V5.x)

Performance data	
IT communication	
Number of connections to an e-mail server	Max. 1
Memory capacity	
• Flash Memory file system	30 MB
• RAM memory	30 MB
Service life of the Flash Memory cells	70.000 write cycles
S5-compatible communication (SEND/RECEIVE)	
• Sum of all simultaneously operable TCP/UDP connections	Max. 16
• Useful data	
- TCP	Max. 8 KB
- UDP	Max. 2 KB
- E-mail:	Max. 2 KB
S7 communication	
• Number of connections ¹⁾	Max. 16
Programming device/operator panel communication	
• Number of operable OP connections (non-isochrone services)	Max. 16
FTP communication	
• Number of client connections	Max. 10
• Number of server connections	Max. 2
HTTP communication	
• Number of connections	Max. 4
Multi-protocol operation	
• Sum of all simultaneously operable connections	Max. 48

1) Use depends on performance of S7-CPU used.

Ordering data	Order No.	Order No.
CP 343-1 IT Communication processor for connecting SIMATIC S7-300 to Industrial Ethernet, for S5-compatible communication (SEND/RECEIVE), S7 communication, FTP communication, e-mail and WWW server, 10/100 Mbit/s with electronic manual on CD-ROM	6GK7 343-1GX20-0XE0	NCM S7 configuration software for Industrial Ethernet Configuration software for Industrial Ethernet CPs for SIMATIC S7; with electronic manual on CD-ROM V5.x, runs under STEP 7 V5.x German, English, French, Spanish, Italian Included in the STEP 7 V5.x package
CP 343-1 Advanced Communications processor for connecting SIMATIC S7-300 to Industrial Ethernet, PROFINET IO-Controller, PROFINET CBA, S5-compatible communication (SEND/RECEIVE), S7 communication, FTP communication, e-mail and WWW server, 10/100 Mbit/s with electronic manual on CD-ROM	Available soon	IE FC RJ45 Plug 180 RJ45 plug-in 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 items • 1 pack = 10 items • 1 pack = 50 items 6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0
		Documentation S7-CPs/NCM S7 for Industrial Ethernet and PROFIBUS; manual package for configuring S7-CPs, IE/PB Link and PC-Station (STEP 7 V5.3) • German • English 6GK7 080-0AA01-8AA0 6GK7 080-0AA01-8BA0

SIMATIC S7-300

Communication

CP 343-1 PN

Overview



- The CP 343-1 PN enables connection of SIMATIC S7-300 to Industrial Ethernet
 - 10/100 Mbit/s full/half duplex connection with autosensing for automatic switching
 - Universal connection options for ITP, RJ45 and AUI
 - Adjustable Keep Alive function
 - TCP/UDP transport protocol
- PROFINET communications standards: PROFINET, the Ethernet-based communications standard, defines an engineering model for distributed automation solutions and a model for system-wide communication through PROFIBUS and Industrial Ethernet. This standard is implemented by Siemens as Component based Automation.
- Additional communication services:
 - PG/OP communication
 - S7 communication
 - S5-compatible communication
- Multicast at UDP
- Remote programming and commissioning through the network

Technical specifications

Data transmission rate	10/100 Mbit/s autosensing
Interfaces	
•Connection to Industrial Ethernet	15-pin Sub-D connector
- AUI (10 Mbit/s)	
- ITP (10/100 Mbit/s)	
•10Base/100BaseT	RJ45
•Connection for power supply	4-pin terminal block
Supply voltage	+5 V DC ($\pm 5\%$) and +24 V DC ($\pm 5\%$)
Current consumption	
•From backplane bus	70 mA
•From external 24 V DC	Typ. 400 mA Max. 580 mA (depending on the interface used)
Power loss, approx.	10 W
Perm. environmental conditions	
•Operating temperature	0°C to +60°C
•Transport/storage temperature	-40 °C to +70 °C
•Relative humidity	Max. 95% at +25 °C
Design	
•Module format	Compact module S7-300, double width
•Dimensions (W x H x D) in mm	80 x 125 x 120
•Weight	Approx. 600 g
Degree of protection	IP20
Configuration	
•Configuring software for PROFINET	Option package SIMATIC iMAP
•Configuring software for additional services	NCM S7 for Industrial Ethernet (supplied with STEP 7 V5.x)

Performance data	
PROFINET communication	
•No. of communications partners	Max. 64
•Number of connections	Max. 256
S5-compatible communication	
•Sum of all simultaneously operable TCP/UDP connections	Max. 16
•Useful data	
•TCP	Max. 8 Kbytes
•UDP	Max. 2 Kbytes
S7 and PG/OP communication	
•Number of connections ¹⁾	Max. 16
Multi-protocol operation	
•Sum of all simultaneously operable connections	Max. 32

1) Use depends on performance of S7-CPU used.

Ordering data	Order No.	Order No.
CP 343-1 PN communications processor For connecting SIMATIC S7-300 to Industrial Ethernet with PROFINET function, TCP/IP, S7 communication, FETCH/WRITE, SEND/RECEIVE, with/without RFC 1006, 10/100 Mbit/s with electronic manual on CD-ROM	6GK7 343-1HX00-0XE0	Software iMap V1.2 For configuring SIMATIC WinAC PN, SIMATIC NET IE/PB Link, SIMATIC NET CP 343-1 PN, distributed I/O stations with a separate CPU, PN OPC server, SIMATIC ProTool/Pro Requirement: Windows 2000 SP3; on programming devices or PC with Pentium processor, 500 MHz or faster; STEP 7 V5.1 SP 2 incl. NCM, SIMATIC NET IE SOFTNET-PG V6.0 and higher Type of supply: German, English, with electronic documentation Single license Software update service Upgrade iMap V1.2 single license
NCM S7 configuration software for Industrial Ethernet Supplied with STEP 7 Version V5.1 SP 2 and higher		
NCM S7 manual for Industrial Ethernet Paper version for V5.x (STEP 7 V5.x)		
•German	6GK7 080-1AA03-8AA0	
•English	6GK7 080-1AA03-8BA0	
•French	6GK7 080-1AA03-8CA0	
•Spanish	6GK7 080-1AA03-8DA0	
•Italian	6GK7 080-1AA03-8EA0	
		6ES7 820-0CC02-0YX0 6ES7 820-0CC01-0YX2 6ES7 820-0CC02-0YX4

SIMATIC S7-300

Connection methods

Front connector

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 connector

20-pin, with screw-type terminals

- 1 item
- 100 items

6ES7 392-1AJ00-0AA0

6ES7 392-1AJ00-1AB0

20-pin, with spring-loaded terminals;
1 item

6ES7 392-1BJ00-0AA0

40-pin, with screw-type terminals

- 1 item
- 100 items

6ES7 392-1AM00-0AA0

6ES7 392-1AM00-1AB0

40-pin, with spring-loaded terminals;
1 item

6ES7 392-1BM01-0AA0

Front door, elevated design ^{A)}

e.g. for 32-channel modules;
permits connection of
1.3 mm²/16 AWG conductors

6ES7 328-0AA00-7AA0

A) Subject to export regulations: AL: N and ECCN: EAR99H

Benefit



- Simple plug connections for front connector module, cable and terminal block
- Fast, low-cost wiring
- Power supply for digital and analog signals can be connected to the front connector module or terminal block
- Preliminary detent position of front connector modules for activation (only with 20-pole front connector modules)
- Reduction in wiring faults, clear control cabinet wiring
- Byte-oriented distribution of digital signals
- Each component can be replaced individually
- Any cable length can be configured without waste

Technical specifications

Technical specifications for front connector module

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

Technical specifications for 16-pin and 2 x 16-pin SIMATIC S7 round-sheath ribbon cable on terminal block

Operating voltage	DC 60 V
Continuous current per signal lead	1 A
Max. aggregate current	4 A/byte
Operating temperature	0 to + 60 °C
External diameter in mm for 16-pin/2 x 16-pin	approx. 9.5/11.5

Terminal blocks for 1-wire connection and 3-wire initiators

Max. operating voltage	DC 60 V
Continuous current per signal	1 A
Max. aggregate current (power supply)	4 A/byte
Operating temperature	0 to + 60 °C
Mounting position	any
Air and creepage distances	IEC Report 664, IEC 664 A, IEC 1131 T2, CSA C22.2 No 142 UL 508, VDE 0160 (12.90), overvoltage class II, pollution degree 3
Dimensions (W x H x D) in mm	
•1-wire connection 6ES7924-0AA00-_A_0	approx. 51 x 41 x 55
•for 3-wire initiators 6ES7924-0CA00-_A_0	approx. 60 x 41 x 70

Terminal blocks with relay 8S

Energizing side	
Operating voltage for coil	DC 24 V
Input circuit	none
Contact side	
Number of relay outputs	8 (NO contact)
Contact design	Single contact, 1 NO contact
Breaking capacity (resistance load)	max. 2 A/250 V AC, max. 2 A/30 V DC max. 0.2 A/60 V DC recommended minimum load ≥ 100 mA
Switching frequency	6 cycles/minute
Service life	
•mechanical	10×10^6 make-break operations
•electrical	600×10^3 make-break operations at 230 V AC/2 A/ $\cos \phi = 1$
Operating temperature	0 to +60 °C
Mounting position	horizontal, ventilation slots at the top and bottom. A space of at least 30 mm must be left above and below the relay terminal block for cooling.
Air and creepage distances	IEC 1131-2 (1992), EN 50 178 (4/98) overvoltage category III, pollution degree 2 between control circuit and relay contact: 5.5 mm between contact groups K0-K3 and K4-K7: 5.5 mm within a contact group : 3.2 mm UL and CSA in preparation
Connection blocks removable for permanent wiring	
•for 24 V infeed for supply of digital modules	4-pin connection block
•for relay outputs	two 8-pin connection blocks
Dimensions (W x H x D) in mm 6ES7924-0CD00-_A_0	approx. 60 x 68 x 78

Technical specifications (continued)

Terminal blocks for 2 A SIMATIC S7 modules

Max. operating voltage	DC 60 V
Continuous current per signal lead	2 A
Operating temperature	0 to + 60 °C
Mounting position	any
Air and creepage distances	IEC Report 664, IEC 664 A, IEC 1131 T2, CSA C22.2 No 142 UL 508, VDE 0160 (12.90), overvoltage class II, pollution degree 3
Dimensions (W x H x D) in mm 6ES7924-0BB00-_A_0	approx. 60 x 41 x 70

Terminal blocks for SIMATIC S7 analog modules

Max. operating voltage	DC 60 V
Continuous current per signal lead	1 A
Operating temperature	0 to + 60 °C
Mounting position	any
Air and creepage distances	IEC Report 664, IEC 664 A, IEC 1131 T2, CSA C22.2 No 142 UL 508, VDE 0160 (12.90), overvoltage class II, pollution degree 3
Dimensions (W x H x D) in mm 6ES7924-0CC00-_A_0	approx. 60 x 41 x 70

Ordering data

Order No.

Front connector module
(compact CPU 312C)

Power supply via:

- Spring-loaded terminals
- Screw-type terminals

6ES7 921-3AJ20-0AA0

6ES7 921-3AK20-0AA0

Front connector module
(compact CPU 313C/
314C-2PTP/314C-2DP)

Power supply via:

- Spring-loaded terminals
- Screw-type terminals

6ES7 921-3AL20-0AA0

6ES7 921-3AM20-0AA0

Front connector module
(digital 2 x 8 I/O)

Power supply via:

- Spring-loaded terminals
- Screw-type terminals

6ES7 921-3AA00-0AA0

6ES7 921-3AB00-0AA0

Front connector module
(digital 4 x 8 I/O)

Power supply via:

- Spring-loaded terminals
- Screw-type terminals ^{A)}

6ES7 921-3AA20-0AA0

6ES7 921-3AB20-0AA0

Front connector module
(1 x 8 outputs) for 2 A digital
outputs

Power supply via:

- Spring-loaded terminals
- Screw-type terminals

6ES7 921-3AC00-0AA0

6ES7 921-3AD00-0AA0

Front connector module,
20-pole (analog)

Power supply via:

- Spring-loaded terminals
- Screw-type terminals

6ES7 921-3AF00-0AA0

6ES7 921-3AG00-0AA0

Front connector module,
40-pole (analog)

Power supply via:

- Spring-loaded terminals
- Screw-type terminals

6ES7 921-3AF20-0AA0

6ES7 921-3AG20-0AA0

Flat round cable 16-core,
0.14 mm²

Unshielded

- 30 m
- 60 m ^{A)}

6ES7 923-0CD00-0AA0

6ES7 923-0CG00-0AA0

Shielded

- 30 m
- 60 m

6ES7 923-0CD00-0BA0

6ES7 923-0CG00-0BA0

Order No.

Flat round cable 2 x 16-core,
0.14 mm²

Unshielded

- 30 m
- 60 m

6ES7 923-2CD00-0AA0

6ES7 923-2CG00-0AA0

8 connectors (16-pin)

Insulation displacement system
with 8 strain reliefs

6ES7 921-3BE10-0AA0

Accessories

Crimping tool

For preparing the connectors
(female ribbon cable connectors)

6ES7 928-0AA00-0AA0

Terminal block TP1

For 1-wire initiators

Package size 1 unit

- Spring-loaded terminals
- Screw-type terminals

6ES7 924-0AA00-0AB0

6ES7 924-0AA00-0AA0

Package size 10 units

- Spring-loaded terminals
- Screw-type terminals

6ES7 924-0AA00-1AB0

6ES7 924-0AA00-1AA0

Terminal block TP3

For 3-wire initiators

Package size 1 unit

- Spring-loaded terminals
- Screw-type terminals

6ES7 924-0CA00-0AB0

6ES7 924-0CA00-0AA0

Package size 10 units

- Spring-loaded terminals
- Screw-type terminals

6ES7 924-0CA00-1AB0

6ES7 924-0CA00-1AA0

Terminal block TPR with relays

For 2-wire connection

Package size 1 unit

- Spring-loaded terminals
- Screw-type terminals

6ES7 924-0CD00-0AB0

6ES7 924-0CD00-0AA0

Terminal block TP2
for 2 A modules

For 2-wire initiators

Package size 1 unit

- Spring-loaded terminals
- Screw-type terminals

6ES7 924-0BB00-0AB0

6ES7 924-0BB00-0AA0

Package size 10 units

- Spring-loaded terminals
- Screw-type terminals

6ES7 924-0BB00-1AB0

6ES7 924-0BB00-1AA0

A) Subject to export regulations: AL: N and ECCN: EAR99H

Ordering data (continued)

Order No.

Terminal block TPA

For analog signals

Package size 1 unit

- Spring-loaded terminals

6ES7 924-0CC00-0AB0

- Screw-type terminals

6ES7 924-0CC00-0AA0

Package size 10 units

- Spring-loaded terminals

6ES7 924-0CC00-1AB0

- Screw-type terminals

6ES7 924-0CC00-1AA0

Accessories

Shield panel

6ES7 928-1BA00-0AA0

for analog terminal block
(4 units)

Terminal elements

for shield panel, 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

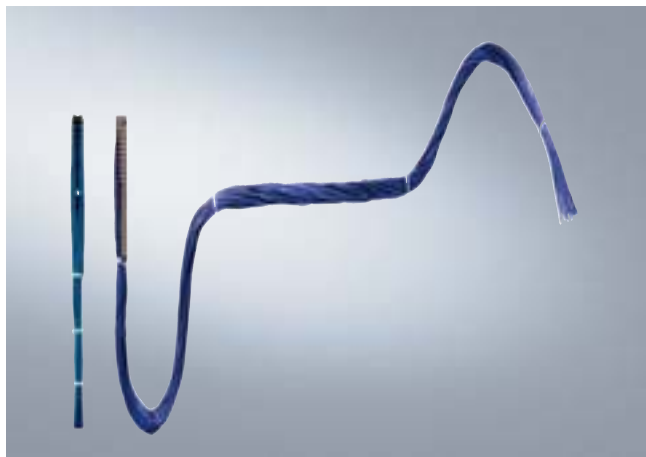
6ES7 390-5CA00-0AA0

SIMATIC S7-300

Connection methods

Flexible connection

Benefit



The flexible connection ensures that there is a fast and direct connection between the input/output modules of the SIMATIC S7-300 and the individual elements in the switchgear cabinet.

Single cores already attached reduce wiring overheads.

- Individual cores can be routed directly to each element in the control cabinet.
- Higher currents are possible using a larger cross-section, with a smaller voltage drop.
- Reduction in the wiring overhead through simple plugging-on of the preassembled cable onto the I/O module
- Simple wiring. The number printed on the core corresponds to the connection point on the I/O connector
- Clear control cabinet wiring thanks to bundled individual cores

Technical specifications

Front connector with single cores, 16 channels

Rated operating voltage	DC 24 V
Permissible continuous current if all cores carry load simultaneously, max.	1.5 A
Permissible ambient air temperature	0 to 60 °C
Number of single cores	20
Core type	H05V-K or with UL 1007/1569; CSA TR64
Conductor cross-section	0.5 mm ² ; Cu
Bundle diameter in mm	approx. 15
Color of core	blue, RAL 5010
Designation of the cores	numbered consecutively from 1 to 20 (front connector contact = number of core)
Assembly	Screw or crimp contacts

Front connector with single cores, 32 channels

Rated operating voltage	DC 24 V
Permissible continuous current if all cores carry load simultaneously, max.	1.5 A
Permissible ambient air temperature	0 to 60 °C
Number of single cores	40
Core type	H05V-K or with UL 1007/1569; CSA TR64
Conductor cross-section	0.5 mm ² ; Cu
Bundle diameter in mm	approx. 17
Color of core	blue, RAL 5010
Designation of the cores	numbered consecutively from 1 to 40 (front connector contact = core number)
Assembly	Screw or crimp contacts

Ordering data	Order No.	Ordering data	Order No.
Front connector with single cores Core type H05V-K 20 x 0.5 mm² for SIMATIC S7-300, 16-channel modules Screw version Package size 1 unit • 2.5 m • 3.2 m • 5 m • Special lengths Package size 5 units • 2.5 m • 3.2 m • 5 m Crimp version Package size 1 unit • 2.5 m • 3.2 m • 5 m • Special lengths	6ES7 922-3BC50-0AB0 6ES7 922-3BD20-0AB0 6ES7 922-3BF00-0AB0 On request 6ES7 922-3BC50-5AB0 6ES7 922-3BD20-5AB0 6ES7 922-3BF00-5AB0 6ES7 922-3BC50-0AF0 6ES7 922-3BD20-0AF0 6ES7 922-3BF00-0AF0 On request	Front connector with single cores Core type H05V-K 40 x 0.5 mm² for SIMATIC S7-300, 32-channel modules Screw version Package size 1 unit • 2.5 m • 3.2 m • 5 m • Special lengths Package size 5 units • 2.5 m • 3.2 m • 5 m Crimp version Package size 1 unit • 2.5 m • 3.2 m • 5 m • Special lengths	6ES7 922-3BC50-0AC0 6ES7 922-3BD20-0AC0 6ES7 922-3BF00-0AC0 On request 6ES7 922-3BC50-5AC0 6ES7 922-3BD20-5AC0 6ES7 922-3BF00-5AC0 6ES7 922-3BC50-0AG0 6ES7 922-3BD20-0AG0 6ES7 922-3BF00-0AG0 On request
Front connector with single cores Core type UL/CSA certified 20 x 0.5 mm² for SIMATIC S7-300 16-channel modules Screw version Package size 1 unit • 3.2 m • 5 m	6ES7 922-3BD20-0UB0 6ES7 922-3BF00-0UB0	Front connector with single cores Core type UL/CSA certified 40 x 0.5 mm² for SIMATIC S7-300 32-channel modules Screw version Package size 1 unit • 3.2 m • 5 m	6ES7 922-3BD20-0UC0 6ES7 922-3BF00-0UC0

SIMATIC S7-300

Interface modules

IM 360/-361/-365 interface modules

Overview



- For connecting the racks in multitier SIMATIC S7-300 configurations
- IM 365: For configuring a central controller and up to one expansion rack
- IM 360/IM 361: For configuring a central controller and up to three expansion racks

Technical specifications

	6ES7 360-3AA01-0AA0	6ES7 361-3CA01-0AA0	6ES7 365-0BA01-0AA0
Supply voltages			
Rated value			
- 24 V DC		Yes	
Current consumption			
•from backplane bus 5 V DC, max.	350 mA		100 mA
•from supply voltage L+, max.		500 mA	
•Power dissipation, typical	2 W	5 W	0.5 W
Configuration			
•Number of interface modules per CPU, max.	1	3	1; 1 pair
Dimensions and weight			
•Weight, approx.	225 g	505 g	580 g
•Width	40 mm	80 mm	40 mm
•Height	125 mm	125 mm	125 mm
•Depth	120 mm	120 mm	120 mm

Ordering data

Order No.	Order No.
IM 360 interface module to expand the S7-300 by max. 3 EUs; can be plugged into central controller	6ES7 360-3AA01-0AA0
IM 361 interface module to expand the S7-300 by max. 3 EUs; can be plugged into expansion unit	6ES7 361-3CA01-0AA0
Connecting cable between IM 360 and IM 361 or IM 361 and IM 361	
1 m	6ES7 368-3BB01-0AA0
2.5 m	6ES7 368-3BC51-0AA0
5 m	6ES7 368-3BF01-0AA0
10 m	6ES7 368-3CB01-0AA0
IM 365 interface module to expand the S7-300 by max. 1 EU; 2 modules with fixed connecting cable (1 m)	6ES7 365-0BA01-0AA0
SIMATIC Manual Collection ^{B)}	6ES7 998-8XC01-8YE0
SIMATIC Manual Collection Maintenance service for 1 year ^{B)}	6ES7 998-8XC01-8YE2
S7-300 manual Design, CPU data, module data, operation list German English French Spanish Italian	6ES7 398-8FA10-8AA0 6ES7 398-8FA10-8BA0 6ES7 398-8FA10-8CA0 6ES7 398-8FA10-8DA0 6ES7 398-8FA10-8EA0

B) Subject to export regulations: AL: N and ECCN: EAR99S

Overview



- SIPLUS IM 365: for configuring a central controller and no more than one expansion rack

This module is designed for

- an ambient range of -25 °C to $+70\text{ °C}$, condensation permissible.
- extraordinary medial load (for example by chloric and sulphuric atmospheres).

Technical specifications

6AG1 365-0BA01-2AA0

see 6ES7 365-0BA01-0AA0

Ordering data

Order No.

SIPLUS IM 365 interface module
(extended temperature range and extraordinary medial load)
to expand the S7-300
by max. 1 EU; 2 modules with
fixed connecting cable (1 m)

6AG1 365-0BA01-2AA0

SIMATIC S7-300

Power supplies

Power supplies

Overview



- Load power supplies for S7-300/ET 200M
- For conversion of the line voltage to the required operating voltage of 24 V DC

Technical specifications

Power supply, type	2 A	2 A	5 A	5 A	10 A
Order No.	6ES7 307-1BA00-0AA0	6ES7 305-1BA80-0AA0	6ES7 307-1EA00-0AA0	6ES7 307-1EA80-0AA0	6ES7 307-1KA01-0AA0
SIPLUS Order No.		6AG1 305-1BA80-2AA0 ¹⁾		6AG1 307-1EA80-2AA0 ¹⁾	
Input	Single-phase AC	Direct voltage	Single-phase AC	Single-phase AC	Single-phase AC
Rated voltage $U_{e \text{ rated}}$	120/230 V AC Set with a selector switch on the device	24-110 V DC Wide input range	120/230 V AC Set with a selector switch on the device	120/230 V AC Set with a selector switch on the device	120/230 V AC Set with a selector switch on the device
Voltage range	85 to 132 V/170 to 264 V AC	16.8 to 138 V DC	85 to 132 V/170 to 264 V AC	93 to 132 V/187 to 264 V AC	93 to 132 V/187 to 264 V AC
Overvoltage resistance	$2.3 \times U_{e \text{ rated}}, 1.3 \text{ ms}$	154 V; 0.1 s	$2.3 \times U_{e \text{ rated}}, 1.3 \text{ ms}$	$2.3 \times U_{e \text{ rated}}, 1.3 \text{ ms}$	$2.3 \times U_{e \text{ rated}}, 1.3 \text{ ms}$
Mains buffering at $I_{e \text{ rated}}$	> 20 ms at $U_e = 93/187 \text{ V}$	> 10 ms at $U_{e \text{ rated}}$	> 20 ms at $U_e = 93/187 \text{ V}$	> 20 ms at $U_e = 93/187 \text{ V}$	> 20 ms at $U_e = 93/187 \text{ V}$
Mains frequency rated value; range	50/60 Hz, 47 to 63 Hz	-	50/60 Hz, 47 to 63 Hz	50/60 Hz, 47 to 63 Hz	50/60 Hz, 47 to 63 Hz
Rated current $I_{e \text{ rated}}$	0.9/0.6 A	2.7-0.6 A (4-0.9 A)	2.1/1.3 A	2.1/1.2 A	2.1/1.2 A
Inrush current limiting (+25 °C)	< 20 A, < 3 ms	< 20 A, < 10 ms	< 45 A, < 3 ms	< 45 A, < 3 ms	< 45 A, < 3 ms
i^2t	< 1.0 A ² s	< 5 A ² s	< 1.2 A ² s	< 1.8 A ² s (typ. 1.2 A ² s)	< 1.8 A ² s (typ. 1.2 A ² s)
Installed input fuse	T 1.6 A/250 V (not accessible)	T 6.3 A/250 V (not accessible)	F 4 A/250 V (not accessible)	T 3.15 A/250 V (not accessible)	T 3.15 A/250 V (not accessible)
Recommended miniature circuit-breaker (IEC 898) in the main supply conductor	3A, characteristic C	10A and above, characteristic C DC-compatible	6 A and above, characteristic C	10 A and above, characteristic C or 6 A and above, characteristic D	10 A and above, characteristic C or 6 A and above, characteristic D

¹⁾ SIPLUS module for extended temperature range -25 to +60 °C and for use under medium loading (e.g. atmospheres containing a high concentration of chlorine and sulphur). Currently being prepared for conformity with EN 50155 (for electrical equipment on railway vehicles).

Technical specifications (continued)

Power supply, type	2 A	2 A	5 A	5 A	10 A
Order No.	6ES7 307-1BA00-0AA0	6ES7 305-1BA80-0AA0	6ES7 307-1EA00-0AA0	6ES7 307-1EA80-0AA0	6ES7 307-1KA01-0AA0
SIPLUS Order No.		6AG1 305-1BA80-2AA0 ¹⁾		6AG1 307-1EA80-2AA0 ¹⁾	
Output	Stabilized, floating direct voltage	Stabilized, floating direct voltage	Stabilized, floating direct voltage	Stabilized, floating direct voltage	Stabilized, floating direct voltage
Rated voltage U_e rated	24 V DC	24 V DC	24 V DC	24 V DC	24 V DC
Overall tolerance	± 3 %	± 3 %	± 3 %	± 3 %	± 3 %
• Stat. mains compensation	approx. 0.1 %	approx. 0.2 %	approx. 0.1 %	approx. ± 0.2 %	approx. ± 0.2 %
• Stat. load compensation	approx. 0.2 %	approx. 0.4 %	approx. 0.2 %	approx. ± 0.4 %	approx. ± 0.4 %
Residual ripple (pulse frequency: approx. 50 kHz)	< 150 mV _{pp} (typ. < 20 mV _{pp})	< 150 mV _{pp} (typ. < 30 mV _{pp})	< 150 mV _{pp} (typ. 40 mV _{pp})	< 150 mV _{pp} (typ. 40 mV _{pp})	< 150 mV _{pp} (typ. 40 mV _{pp})
Spikes (bandwidth: 20 MHz)	< 240 mV _{pp} (typ. < 150 mV _{pp})	< 240 mV _{pp} (typ. < 150 mV _{pp})	< 240 mV _{pp} (typ. 90 mV _{pp})	< 240 mV _{pp} (typ. 90 mV _{pp})	< 240 mV _{pp} (typ. 90 mV _{pp})
Adjustment range	-	-	-	-	-
Status display	Green LED for 24 V O.K.	Green LED for 24 V O.K.	Green LED for 24 V O.K.	Green LED for 24 V O.K.	Green LED for 24 V O.K.
On/Off response	No overshoot of U_a (soft start)	No overshoot of U_a (soft start)	No overshoot of U_a (soft start)	No overshoot of U_a (soft start)	No overshoot of U_a (soft start)
Startup delay/voltage rise	< 3 s / typ. 60 ms	< 3 s (typ. 7 ms)/typ. 5 ms	< 2 s (typ. 60 ms)	< 3 s/typ. 100 ms	< 3 s/typ. 100 ms
Rated current I_a rated	2 A	2 A (3 A at $U_e > 24$ V)	5 A	5 A	5 A
Current range					
• Up to +45 °C	0 to 2 A	0 to 2 A (3 A)	0 to 5 A	0 to 5 A	0 to 5 A
• Up to +60 °C	0 to 2 A	0 to 3 A (3 A)	0 to 5 A	0 to 5 A	0 to 5 A
Dyn. U/I at					
• Starting on short-circuit	typ. 10 A for 90 ms	typ. 9 A for 270 ms	typ. 20 A for 75 ms	typ. 20 A for 180 ms	typ. 20 A for 180 ms
• Short-circuit during operation	typ. 10 A for 90 ms	typ. 9 A for 270 ms	typ. 20 A for 75 ms	typ. 20 A for 80 ms	typ. 20 A for 80 ms
Connection in parallel for increasing performance	Not permissible	Yes, 2 units	Not permissible	Not permissible	Not permissible
Efficiency					
Efficiency at U_a rated, I_a rated	approx. 83 %	approx. 75 %	approx. 87 %	approx. 84 %	approx. 84 %
Power loss at U_a rated, I_a rated	approx. 10 W	approx. 16 W (24 W)	approx. 18 W	approx. 23 W	approx. 23 W
Control					
Dynamic mains compensation (U_a rated ± 15 %)	± 0.3 % U_a	± 0.3 % U_a	± 0.3 % U_a	± 0.3 % U_a	± 0.3 % U_a
Dynamic load compensation (I_a : 50/100/50 %)	± 0.8 % U_a	± 2.5 % U_a	± 2.5 % U_a	± 3 % U_a	± 3 % U_a
Load step settling time					
• 50 to 100 %	< 5 ms (typ. 2.5 ms)	< 5 ms (typ. 2.5 ms)	typ. 0.1 ms	< 5 ms (typ. 0.2 ms)	< 5 ms (typ. 0.2 ms)
• 100 to 50 %	< 5 ms (typ. 2.5 ms)	< 5 ms (typ. 2.5 ms)	typ. 0.1 ms	< 5 ms (typ. 0.2 ms)	< 5 ms (typ. 0.2 ms)
Protection and monitoring					
Output overvoltage protection	Additional control loop, shutdown at approx. 30V, automatic cold restart	Additional control loop, shutdown at approx. 30V, automatic cold restart	Additional control loop, shutdown at approx. 30V, automatic cold restart	Additional control loop, shutdown at approx. 30V, automatic cold restart	Additional control loop, shutdown at approx. 30V, automatic cold restart
Current limit	2.2 to 2.6 A	3.3 to 3.9 A	5.5 to 6.5 A	5.5 to 6.5 A	5.5 to 6.5 A
Short-circuit protection	Electronic shut-down, automatic cold restart	Electronic shut-down, automatic cold restart	Electronic shut-down, automatic cold restart	Electronic shut-down, automatic cold restart	Electronic shut-down, automatic cold restart
Continuous r.m.s. short-circuit current	< 4 A	< 2 A	< 9 A	< 5 A	< 5 A
Overload/short-circuit indication	-	-	-	-	-

1) SIPLUS module for extended temperature range -25 to + 60 °C and for use under medium loading (e.g. atmospheres containing a high concentration of chlorine and sulphur). Currently being prepared for conformity with EN 50155 (for electrical equipment on railway vehicles).

Technical specifications (continued)

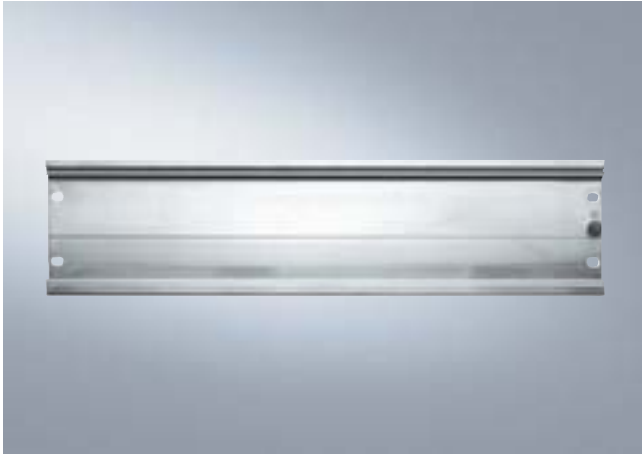
Power supply, type	2 A	2 A	5 A	5 A	10 A
Order No.	6ES7 307-1BA00-0AA0	6ES7 305-1BA80-0AA0	6ES7 307-1EA00-0AA0	6ES7 307-1EA80-0AA0	6ES7 307-1KA01-0AA0
SIPLUS Order No.		6AG1 305-1BA80-2AA0 ¹⁾		6AG1 307-1EA80-2AA0 ¹⁾	
Safety Electrical isolation primary/secondary	Yes, SELV output voltage U_a acc. to EN 60950 and EN 50178	Yes, SELV output voltage U_a acc. to EN 60950 and EN 50178, air-gap and creepage distance >5mm	Yes, SELV output voltage U_a acc. to EN 60950 and EN 50178	Yes, SELV output voltage U_a acc. to EN 60950 and EN 50178, air-gap and creepage distance >8 mm	Yes, SELV output voltage U_a acc. to EN 60950 and EN 50178, air-gap and creepage distance >8 mm
Class of protection	Class I	Class I	Class I	Class I	Class
Leakage current	< 3.5 mA (typ. 0.7 mA)	< 3.5 mA (typ. 0.7 mA)	< 3.5 mA (typ. 0.3 mA)	< 3.5 mA (typ. 0.3 mA)	< 3.5 mA (typ. 0.3 mA)
Testing by German Technical Inspectorate (TÜV)	Yes	Yes	Yes	Yes	Yes
CE marking	Yes	Yes	Yes	Yes	Yes
UL/cUL (CSA) approval	Yes, UL listed (UL 508) File E143289, CSA (CSA22.2 No. 14-95)	Yes, UL listed (UL 508) File E143289, CSA (CSA22.2 No. 14-95)	Yes, UL listed (UL 508) File E143289, CSA (CSA 22.2 No. 14-95)	Yes, UL listed (UL 508) File E143289, CSA (CSA22.2 No. 14-95)	Yes, UL listed (UL 508) File E143289, CSA (CSA22.2 No. 14-95)
FM certification	Yes, Class I Div. 2 Group A, B, C, D T4	-	Yes, Class I Div. 2 Group A, B, C, D, T4	-	-
Marine approvals	In the S7-300 system	Yes, GL, LRS	In the S7-300 system	Yes, GL, LRS	Yes, GL, LRS
Degree of protection (EN 60529)	IP20	IP20	IP20	IP20	IP20
EMC					
Emitted interference	EN 55022 Class B	EN 55011 Class A	EN 55022 Class B	EN 55011 Class A	EN 55011 Class A
Limiting of mains harmonics	Not applicable	Not applicable	EN 61000-3-2	-	-
Immunity to interference	EN 61000-6-2	EN 61000-6-2	EN 61000-6-2	EN 61000-6-2	EN 61000-6-2
Operating data					
Ambient temperature range	0 to +60 °C with natural convection	- 25 to + 70 °C with natural convection	0 to +60 °C with natural convection	- 25 to + 70 °C with natural convection	- 25 to + 70 °C with natural convection
Transport and storage temperature range	-40 to +85 °C	-40 to +85 °C	-40 to +85 °C	-40 to +85 °C	-40 to +85 °C
Humidity class	Climate Class 3K3 acc. to EN60721, without condensation	Climate Class 3K5 acc. to EN60721, short-term condensation permissible	Climate Class 3K3 acc. to EN60721, without condensation	Climate Class 3K5 acc. to EN60721, short-term condensation permissible	Climate Class 3K5 acc. to EN60721, short-term condensation permissible
Mechanical system					
Connections					
• Mains input L, N, PE (DC input: L+1, M1, PE)	One screw-type terminal each for 0.5 to 2.5 mm ² solid/stranded	One screw-type terminal each for 0.5 to 2.5 mm ² solid/stranded	One screw-type terminal each for 0.5 to 2.5 mm ² solid/stranded	One screw-type terminal each for 0.5 to 2.5 mm ² solid/stranded	One screw-type terminal each for 0.5 to 2.5 mm ² solid/stranded
• Output L+	2 screw-type terminals for 0.5 to 2.5 mm ²	3 screw-type terminals for 0.5 to 2.5 mm ²	3 screw-type terminals for 0.5 to 2.5 mm ²	3 screw-type terminals for 0.5 to 2.5 mm ²	3 screw-type terminals for 0.5 to 2.5 mm ²
• Output M	2 screw-type terminals for 0.5 to 2.5 mm ²	3 screw-type terminals for 0.5 to 2.5 mm ²	3 screw-type terminals for 0.5 to 2.5 mm ²	3 screw-type terminals for 0.5 to 2.5 mm ²	3 screw-type terminals for 0.5 to 2.5 mm ²
Dimensions (W x H x D) in mm	50 x 125 x 120	80 x 125 x 120	80 x 125 x 120	80 x 125 x 120	80 x 125 x 120
Weight, approx.	0.42 kg	0.75 kg	0.74 kg	0.57 kg	0.57 kg
Mounting	For snapping on to S7 rails	For snapping on to S7 rails	For snapping on to S7 rails	For snapping on to S7 rails	For snapping on to S7 rails
Accessories	Mounting adapter for standard rails and power connector PS-CPU	Mounting adapter for standard rails and power connector PS-CPU	Mounting adapter for standard rails and power connector	Mounting adapter for standard rails and power connector	Mounting adapter for standard rails and power connector

¹⁾ SIPLUS module for extended temperature range -25 to + 60 °C and for use under medium loading (e.g. atmospheres containing a high concentration of chlorine and sulphur). Currently being prepared for conformity with EN 50155 (for electrical equipment on railway vehicles).

Ordering data	Order No.
Load power supply PS 307	
incl. power connector	
120/230 V AC /24 V DC; 2 A	6ES7 307-1BA00-0AA0
24-110 V DC /24 V DC; 2 A, for extended temperature range	6ES7 305-1BA80-0AA0
24-110 V DC /24 V DC; 2 A, for extended temperature range and medium loading, conforms to EN50155	6AG1 305-1BA80-2AA0
120/230 V AC /24 V DC; 5 A	6ES7 307-1EA00-0AA0
120/230 V AC /24 V DC; 5 A, for extended temperature range	6ES7 307-1EA80-0AA0
120/230 V AC /24 V DC; 5 A, for extended temperature range and medium loading, conforms to EN50155	6AG1 307-1EA80-2AA0
10 A	6ES7 307-1KA01-0AA0
Mounting adapter	6ES7 390-6BA00-0AA0
For snapping the PS307 onto a 35 mm standard rail (EN 50022)	
Power connector PS-CPU	6ES7 390-7BA00-0AA0
Spare part	

DIN rail

Overview



- The mechanical mounting rack of the SIMATIC S7-300
- For accommodating the modules
- Can be screwed onto the wall

Ordering data

Order No.

DIN rail

- 160 mm
- 482 mm
- 530 mm
- 830 mm
- 2000 mm

6ES7 390-1AB60-0AA0

6ES7 390-1AE80-0AA0

6ES7 390-1AF30-0AA0

6ES7 390-1AJ30-0AA0

6ES7 390-1BC00-0AA0

Overview

Labeling sheets

- Film sheets for application- specific labeling of SIMATIC S7-300 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.

Additional information is available in the internet under:

<http://www.s7-smartlabel.com>

Labeling strips.

- Teal-colored writable plastic strips
- For insertion in the front connector
- Spare part, 10 items

Label cover

- Teal-colored film
- To cover and hold user-made labeling strips on normal paper
- Accessories, 10 items

Ordering data

Order No.

Labeling sheets

for 16-channel signal modules, DIN A4, for printing using laser printer; 10 units

Petrol

6ES7 392-2AX00-0AA0

Light beige

6ES7 392-2BX00-0AA0

Yellow

6ES7 392-2CX00-0AA0

Red

6ES7 392-2DX00-0AA0

for 32-channel signal modules, DIN A4, for printing using laser printer; 10 units

Petrol

6ES7 392-2AX10-0AA0

Light beige

6ES7 392-2BX10-0AA0

Yellow

6ES7 392-2CX10-0AA0

Red

6ES7 392-2DX10-0AA0

Labeling strip

10 units (spare part)

6ES7 392-2XX00-0AA0

for signal modules (not 32-channel modules), function modules

for 32-channel signal modules

6ES7 392-2XX10-0AA0

Label cover

10 units (spare part)

6ES7 392-2XY00-0AA0

for signal modules (not 32-channel modules), function modules

for 32-channel signal modules

6ES7 392-2XY10-0AA0





5/2 Introduction

5/4 Central processing units

5/4 CPU 412-1 to CPU 417-4
5/19 CPU 414-4H, CPU 417-4H
5/24 CPU 416F-2
5/29 Sync. modules for
interfacing CPU 41x-4H
5/30 PROFIBUS module IF-964 DP

5/31 Digital modules

5/31 SM 421 digital input
5/34 SM 422 digital output

5/37 Analog modules

5/37 SM 431 analog input
5/44 SM 432 analog output

5/46 Function modules

5/46 FM 450-1 counter modules
5/48 FM 451 positioning modules
5/50 FM 452 cam control unit
5/52 FM 453 positioning modules
5/54 FM 455 closed-loop control
modules
5/57 FM 458-1 DP application module
5/58 FM 458-1 DP basic modules
5/60 EXM 438-1
input/output extension
5/62 EXM 448/448-1 universal
communication expansion
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communication expansion
5/64 Accessories for FM 458-1 DP

5/68 SIMATIC S5 intelligent input/output modules

5/68 IP 242B counter module
5/69 IP 244 temperature control module

5/70 Communication

5/70 CP 440
5/71 CP 441-1, CP 441-2
5/73 CP 443-5 Basic
5/75 CP 443-5 Extended
5/77 CP 443-1
5/79 CP 443-1 Advanced
5/81 CP 443-1 IT
5/83 CP 444

5/84 Modules for SIMATIC S7-400H

5/84 Y-link for S7-400H

5/85 Modules for SIMATIC S7-400F/FH

5/85 IM 153-2 FO
5/87 Isolating module
5/88 SIPLUS isolating module

5/89 Connection methods

5/89 Front connector
5/90 Fully modular connection
5/92 Front connector with single cores

5/93 Racks

5/93 Racks
5/95 Fan subassembly
5/96 Expansion racks

5/97 Interface modules

5/97 IM 460-0
5/98 IM 461-0
5/99 IM 460-1
5/100 IM 461-1
5/101 IM 460-3
5/102 IM 461-3
5/103 IM 463-2
5/104 IM 467, IM 467 FO

5/106 Power supplies

5/106 PS 405/407 power supplies

5/108 Accessories

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5/109 Replacement parts



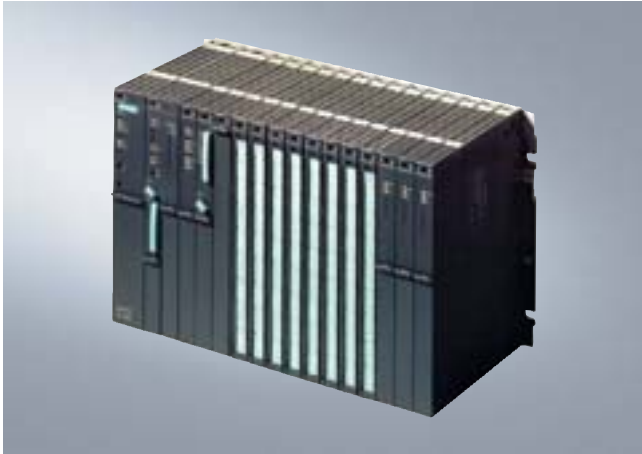
SIMATIC S7-400

Introduction

S7-400

Overview

5



- The power PLC for medium to upper 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; convenient connection method
- Ideal communication and networking options
- Convenient system as result of user-friendly handling and uncomplicated, fan-free configuration
- Can be expanded without problems when the tasks increase
- Multicomputing:
Simultaneous operation of a number of CPUs in a single S7-400 central controller.
Multicomputing segments the overall power of an S7-400. For example, complex tasks can be divided according to technology (open-loop control, closed-loop control or communication) and assigned to different CPUs, thereby allocating each CPU its own local I/O.
- Modularity:
The high-performance backplane bus on the S7-400 and the communication interfaces, which can be inserted directly into the CPU, provide the conditions for numerous communication lines to function efficiently. This enables a separate communication line to be set up for HMI and programming tasks, one for high-performance equidistant motion-control components and one "standard" I/O fieldbus. Additional connections to MES/ERP systems or the Internet that might be required can also be set up.
- Engineering and diagnostics:
In particular in complex automation solutions with an increased engineering component, the S7-400 can be programmed and configured very efficiently in conjunction with the SIMATIC engineering tools. Available features include high-level languages such as SCL and graphics-based engineering tools for sequence control systems, state graphs and function charts.

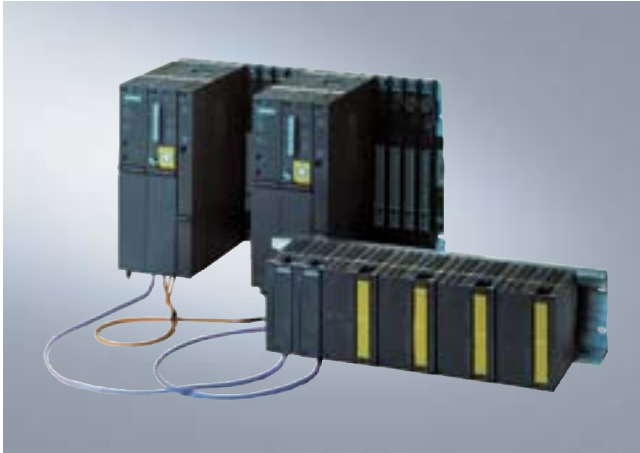
SIMATIC S7-400H



- 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)

SIMATIC 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 *PROFISafe* 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

General technical specifications

Degree of protection	IP20
Ambient temperature	0°C to +60 °C
Relative humidity	5 to 95%, no condensation
Atmospheric pressure	860 to 1080 hPa
Electromagnetic compatibility	EU Directive 89/336/EEG; • 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

SIMATIC S7-400

Central processing units

CPU 412-1 to CPU 417-4

Overview CPU 412-1, CPU 412-2



- 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

Overview CPU 416-2, CPU 416-3



- The powerful CPU for the high-end performance range
- For installations with the demanding requirements of the high-end performance range
- With one slot for IF module

Overview CPU 414-2, CPU 414-3



- The CPUs for special demands in the mid performance range
- Can be used in systems with additional requirements with respect to program scope and command processing rate

Overview CPU 417-4



- 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 412-1XF04-0AB0	6ES7 412-2XG04-0AB0	6ES7 414-2XG04-0AB0	6ES7 414-3XJ04-0AB0
Product version				
•Firmware version	V4.0	V4.0	V4.0	V4.0
•Associated programming package	as of STEP7 V 5.2 SP1 HF3 with HW-Update	as of STEP7 V 5.2 SP1 HF3 with HW-Update	as of STEP7 V 5.2 SP1 HF3 with HW-Update	as of STEP7 V 5.2 SP1 HF3 with HW-Update
Supply voltages				
Rated value				
- 24 V DC	Yes	Yes	Yes	Yes
Voltages and currents				
•Incoming supply of external backup voltage to the CPU	5 to 15 V DC	5 to 15 V DC	5 to 15 V DC	5 to 15 V DC
Current consumption				
•from backplane bus 5 V DC, max.	0.7 A	1.2 A	1.2 A	1.2 A
•Power dissipation, typical	3 W	4.5 W	4.5 W	4.5 W
Back-up battery				
- Backup current, max.	890 µA	890 µA	550 µA	1,530 µA
- Backup current, typical	350 µA	350 µA	1,530 µA	550 µA
Memory/backup				
Memory				
•Working memory				
- integrated (for program)	72 KByte	128 KByte	256 KByte	700 KByte
- integrated (for data)	72 KByte	128 KByte	256 KByte	700 KByte
- expandable	No	No	No	No
•Load memory				
- expandable FEPRM	Yes; with Memory Card (FLASH)	Yes; with Memory Card (FLASH)	Yes; with Memory Card (FLASH)	Yes; with Memory Card (FLASH)
- expandable FEPRM, max.	64 MByte	64 MByte	64 MByte	64 MByte
- integral RAM, max.	256 KByte	256 KByte	256 KByte	256 KByte
- expandable RAM	Yes; with Memory Card (RAM)	Yes; with Memory Card (RAM)	Yes; with Memory Card (RAM)	Yes; with Memory Card (RAM)
- expandable RAM, max	16 MByte	16 MByte	16 MByte	16 MByte
Backup				
- available	Yes	Yes	Yes	Yes
- with battery	Yes; all data	Yes; all data	Yes; all data	Yes; all data
- without battery	No	No	No	No
CPU/blocks				
DB				
- Number, max.	512; DB 0 reserved	512; DB 0 reserved	4,095; DB 0 reserved	4,095; DB 0 reserved
- Size, max.	64 KByte	64 KByte	64 KByte	64 KByte
FB				
- Number, max.	256	256	2,048	2,048
- Size, max.	64 KByte	64 KByte	64 KByte	64 KByte
FC				
- Number, max.	256	256	2,048	2,048
- Size, max.	64 KByte	64 KByte	64 KByte	64 KByte
OB				
- Number, max.	see instruction list	see instruction list	see instruction list	see instruction list
- Size, max.	64 KByte	64 KByte	64 KByte	64 KByte
Nesting depth				
- per priority class	24	24	24	24
- additional levels within an error OB	1	1	1	1
CPU/processing times				
•for bit instruction, min.	0.1 µs	0.1 µs	0.06 µs	0.06 µs
•for word instruction, min.	0.1 µs	0.1 µs	0.06 µs	0.06 µs
•for integer math, min.	0.1 µs	0.1 µs	0.06 µs	0.06 µs
•for floating-point math, min.	0.3 µs	0.3 µs	0.18 µs	0.18 µs

SIMATIC S7-400

Central processing units

CPU 412-1 to CPU 417-4

Technical specifications (continued)

	6ES7 412-1XF04-0AB0	6ES7 412-2XG04-0AB0	6ES7 414-2XG04-0AB0	6ES7 414-3XJ04-0AB0
Timers/counters and their retentive characteristics				
S7 counter				
- Number	2,048	2,048	2,048	2,048
•Retentivity				
- adjustable	Yes	Yes	Yes	Yes
- lower limit	0	0	0	0
- upper limit	2,047	2,047	2,047	2,047
- preset	Z 0 to Z 7	Z 0 to Z 7	from Z 0 to Z 7	from Z 0 to Z 7
•Counting range				
- lower limit	0	0	0	0
- upper limit	999	999	999	999
IEC counter				
- available	Yes	Yes	Yes	Yes
- Type	SFB, unlimited quantity (only limited by working memory)	SFB, unlimited quantity (only limited by working memory)	SFB, unlimited quantity (only limited by working memory)	SFB, unlimited quantity (only limited by working memory)
S7 times				
- Number	2,048	2,048	2,048	2,048
•Retentivity				
- adjustable	Yes	Yes	Yes	Yes
- lower limit	0	0	0	0
- upper limit	2,047	2,047	2,047	2,047
- preset	no timers retentive	no timers retentive	no timers retentive	no timers retentive
•Timing range				
- lower limit	10 ms	10 ms	10 ms	10 ms
- upper limit	9,990 s	9,990 s	9,990 s	9,990 s
IEC timer				
- available	Yes	Yes	Yes	Yes
- Type	SFB, unlimited quantity (only limited by working memory)	SFB, unlimited quantity (only limited by working memory)	SFB, unlimited quantity (only limited by working memory)	SFB, unlimited quantity (only limited by working memory)
Data areas and their retentive characteristics				
•Retentive data area as a whole	total working and load memory (with backup battery)	total working and load memory (with backup battery)	total working and load memory (with backup battery)	total working and load memory (with backup battery)
Flags				
- Number	4 KByte	4 KByte	8 KByte	8 KByte
- adjustable retentivity	Yes; from MB 0 to MB 4095	Yes; from MB 0 to MB 4095	Yes; from MB 0 to MB 8191	Yes; from MB 0 to MB 8191
- Number of clock memories	8; (1 memory byte)	8; (1 memory byte)	8; (1 memory byte)	8; (1 memory byte)
Address area				
I/O address area				
- Inputs	4 KByte	4 KByte	8 KByte	8 KByte
- Outputs	4 KByte	4 KByte	8 KByte	8 KByte
•of which distributed				
- MPI/DP interface, inputs	2 KByte	2 KByte	2 KByte	2 KByte
- MPI/DP interface, outputs	2 KByte	2 KByte	2 KByte	2 KByte
- DP interface, inputs		4 KByte	6 KByte	6 KByte
- DP interface, outputs		4 KByte	6 KByte	6 KByte
Process image				
- Inputs, adjustable	4 KByte	4 KByte	8 KByte	8 KByte
- Outputs, adjustable	4 KByte	4 KByte	8 KByte	8 KByte
- Inputs, preset	128 Byte	128 Byte	256 Byte	256 Byte
- Outputs, preset	128 Byte	128 Byte	256 Byte	256 Byte
- Number of component process images, max.	15	15	15	15
- Access to consistent data in the process image	Yes	Yes	Yes	Yes
- Consistent data, max.	244 Byte	244 Byte	244 Byte	244 Byte

Technical specifications (continued)

	6ES7 412-1XF04-0AB0	6ES7 412-2XG04-0AB0	6ES7 414-2XG04-0AB0	6ES7 414-3XJ04-0AB0
Digital channels				
- Inputs	32,768	32,768	65,536	65,536
- Outputs	32,768	32,768	65,536	65,536
- Inputs, of which central	32,768	32,768	65,536	65,536
- Outputs, of which central	32,768	32,768	65,536	65,536
Analog channels				
- Inputs	2,048	2,048	4,096	4,096
- Outputs	2,048	2,048	4,096	4,096
- Inputs, of which central	2,048	2,048	4,096	4,096
- Outputs, of which central	2,048	2,048	4,096	4,096
Configuration				
•connectable OP	15 without message processing, 8 with message processing	15 without message processing, 8 with message processing	31 without event processing, 8 with event processing	31 without event processing, 8 with event processing
•Central units, max.	1	1	1	1
•Expansion units, max.	21	21	21	21
•Multi-computing	Yes; maximum 4 CPUs (with UR1 or UR2)	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 pluggable IMs (overall), max.	6	6	6	6
- Number of pluggable IM 460s, max.	6	6	6	6
- Number of pluggable IM 463s, max.	4; IM 463-2	4; IM 463-2	4; IM 463-2	4; IM 463-2
Number of DP masters				
- integral	1	2	2	2
- via IM 467	4	4	4	4
- via CP	10; CP 443-5 Ext.	10; CP 443-5 Ext.	10; CP 443-5 Ext.	10; CP 443-5 Ext.
- Mixed mode of IM + CP permitted	No; IM467 cannot be used externally together with CP443-5!	No; IM467 cannot be used externally together with CP443-5!	No; IM467 cannot be used externally together with CP443-5!	No; IM467 cannot be used externally together with CP443-5
- via interface module	0	0	0	1; IF 964-DP
- No. pluggable S5 modules (via adapter casing in centr. unit) max	6	6	6	6
Number of FMs and CPs that can be operated (recommendation)				
- FM	limited by the number of slots and by the number of connections	limited by the number of slots and by the number of connections	limited by the number of slots and by the number of connections	limited by the number of slots and by the number of connections
- CP, point-to-point	CP 440: limited by the number of slots CP 441: limited by the number of connections	CP 440: limited by the number of slots CP 441: limited by the number of connections	CP 440: limited by the number of slots CP 441: limited by the number of connections	CP 440: limited by the number of slots CP 441: limited by the number of connections
- CP, LAN	limited by the number of slots and by the number of connections	limited by the number of slots and by the number of connections	limited by the number of slots and by the number of connections	limited by the number of slots and by the number of connections
- PROFIBUS and Ethernet CPs	14; incl. CP 443-5 Extended and IM 467	14; incl. CP443-5 ext. and IM467	14; incl. CP 443-5 ext. and IM 467	14; incl. CP 443-5 Ext. and IM 467
Time				
Clock				
- Hardware clock (realtime clock)	Yes	Yes	Yes	Yes
- buffered	Yes	Yes	Yes	Yes
- Triggering	1 ms	1 ms	1 ms	1 ms
Run-time meter				
- Quantity	8	8	8	8
Time synchronization				
- supported	Yes	Yes	Yes	Yes
- on MPI, master	Yes	Yes	Yes	Yes
- on MPI, slave	Yes	Yes	Yes	Yes
- on DP, master	Yes	Yes	Yes	Yes
- on DP, slave	Yes	Yes	Yes	Yes
- in AS, master	Yes	Yes	Yes	Yes
- in AS, slave	Yes	Yes	Yes	Yes
- on IF 964 DP				Yes; as Master or Slave

SIMATIC S7-400

Central processing units

CPU 412-1 to CPU 417-4

Technical specifications (continued)

	6ES7 412-1XF04-0AB0	6ES7 412-2XG04-0AB0	6ES7 414-2XG04-0AB0	6ES7 414-3XJ04-0AB0
S7 message functions				
•Number of stations that can log on for message functions, max.	8	8	8	8
•Symbol-related messages	Yes	Yes	Yes	Yes
Number of messages				
- total, max.	512	512	512	512
•Block-related messages	Yes	Yes	Yes	Yes
•Alarm 8 blocks	Yes	Yes	Yes	Yes
•Statuses	Yes	Yes	Yes	Yes
Test and startup functions				
Status/modify				
- Variable	Yes	Yes	Yes	Yes
Forcing				
- Forcing	Yes	Yes	Yes	Yes
•Status block	Yes	Yes	Yes	Yes
•Single step	Yes	Yes	Yes	Yes
•Number of breakpoints	4	4	4	4
Diagnostic buffer				
- available	Yes	Yes	Yes	Yes
- Number of inputs, max.	200	400	400	3,200
- adjustable	Yes	Yes	Yes	Yes
- preset	120	120	120	120
Communication functions				
•PG/OP communication	Yes	Yes	Yes	Yes
•Routing	Yes	Yes	Yes	Yes
Global data communication				
- supported	Yes	Yes	Yes	Yes
- Size of GD packets, max.	64 Byte	64 Byte	64 Byte	64 Byte
S7 basic communication				
- supported	Yes; in MPI mode: via SFC X_SEND, X_RCV, X_GET and X_PUT in DP master mode: via SFC I_GET and I_PUT	Yes; in MPI mode: via SFC X_SEND, X_RCV, X_GET and X_PUT in DP master mode: via SFC I_GET and I_PUT	Yes; in MPI mode: via SFC X_SEND, X_RCV, X_GET and X_PUT in DP master mode: via SFC I_GET and I_PUT	Yes; in MPI mode: via SFC X_SEND, X_RCV, X_GET and X_PUT in DP master mode: via SFC I_GET and I_PUT
- User data per job	76 Byte	76 Byte	76 Byte	76 Byte
S7 communication				
- supported	Yes	Yes	Yes	Yes
- as server	Yes	Yes	Yes	Yes
- as client	Yes	Yes	Yes	Yes
- User data per job, max.	64 KByte	64 KByte	64 KByte	64 KByte
S5 compatible communication				
- supported	Yes; via FC AG_SEND and AG_RECV, via a maximum of 10 CP 443-1 or 443-5	Yes; via FC AG_SEND and AG_RECV, via a maximum of 10 CP 443-1 or 443-5	Yes; via FC AG_SEND and AG_RECV, via a maximum of 10 CP 443-1 or 443-5	Yes; via FC AG_SEND and AG_RECV, via a maximum of 10 CP 443-1 or 443-5
- User data per job, max.	8 KByte	8 KByte	8 KByte	8 KByte
Standard communication (FMS)				
- Supported	Yes; via CP and loadable FB	Yes; via CP and loadable FB	Yes; via CP and loadable FB	Yes; via CP and loadable FB
Number of connections				
- overall	16	16	32	32

Technical specifications (continued)

	6ES7 412-1XF04-0AB0	6ES7 412-2XG04-0AB0	6ES7 414-2XG04-0AB0	6ES7 414-3XJ04-0AB0
1st interface				
•Physical	RS 485 / PROFIBUS	RS 485 / PROFIBUS	RS 485 / PROFIBUS	RS 485 / PROFIBUS
•Isolated	Yes	Yes	Yes	Yes
Functionality				
- MPI	Yes	Yes	Yes	Yes
- DP master	Yes	Yes	Yes	Yes
- DP slave	Yes	Yes	Yes	Yes
MPI				
- Number of connections	16	16	32	32
•Services				
- PG/OP communication	Yes	Yes	Yes	Yes
- Routing	Yes	Yes	Yes	Yes
- Global data communication	Yes	Yes	Yes	Yes
- S7 basic communication	Yes	Yes	Yes	Yes
- S7 communication	Yes	Yes	Yes	Yes
- Transmission rates, max.	12 Mbit/s	12 Mbit/s	12 Mbit/s	12 Mbit/s
DP master				
- Number of connections, max.	16	16	16	16
•Services				
- PG/OP communication	Yes	Yes	Yes	Yes
- Routing	Yes	Yes	Yes	Yes
- S7 basic communication	Yes	Yes	Yes	Yes
- S7 communication	Yes	Yes	Yes	Yes
- Equidistance support	Yes	Yes	Yes	Yes
- Activate/deactivate DP slaves	Yes	Yes	Yes	Yes
- Direct data exchange (lateral communication)	Yes	Yes	Yes	Yes
- Transmission rates, max.	12 Mbit/s	12 Mbit/s	12 Mbit/s	12 Mbit/s
- Number of DP slaves, max.	32	32	32	32
•Address area				
- Inputs, max.	2 KByte	2 KByte	2 KByte	2 KByte
- Outputs, max.	2 KByte	2 KByte	2 KByte	2 KByte
•User data per DP Slave				
- Inputs, max.	244 Byte	244 Byte	244 Byte	244 Byte
- Outputs, max.	244 Byte	244 Byte	244 Byte	244 Byte
DP slave				
- Number of connections	16	16	16	16
•Services				
- Routing	Yes	Yes	Yes	Yes
- Status/modify	Yes	Yes	Yes	Yes
- Programming	Yes	Yes	Yes	Yes
- Transmission rates, max.	12 Mbit/s	12 Mbit/s	12 Mbit/s	12 Mbit/s
•Intermediate memory				
- Inputs	244 Byte	244 Byte	244 Byte	244 Byte
- Outputs	244 Byte	244 Byte	244 Byte	244 Byte
- Address areas, max.	32	32	32	32
- User data per address area, max.	32 Byte	32 Byte	32 Byte	32 Byte
- User data per address area, of which consistent, max.	32 Byte	32 Byte	32 Byte	32 Byte

SIMATIC S7-400

Central processing units

CPU 412-1 to CPU 417-4

Technical specifications (continued)

	6ES7 412-1XF04-0AB0	6ES7 412-2XG04-0AB0	6ES7 414-2XG04-0AB0	6ES7 414-3XJ04-0AB0
2nd interface				
•Physical		RS 485 / PROFIBUS	RS 485 / PROFIBUS	RS 485 / PROFIBUS
•Isolated		Yes	Yes	Yes
Functionality				
- DP master		Yes	Yes	Yes
- DP slave		Yes	Yes	Yes
DP master				
- Number of connections, max.		16	16	16
•Services				
- PG/OP communication		Yes	Yes	Yes
- Routing		Yes	Yes	Yes
- S7 basic communication		Yes	Yes	Yes
- S7 communication		Yes	Yes	Yes
- Equidistance support		Yes	Yes	Yes
- Activate/deactivate DP slaves		Yes	Yes	Yes
- Direct data exchange (lateral communication)		Yes	Yes	Yes
- Transmission rates, max.		12 Mbit/s	12 Mbit/s	12 Mbit/s
- Number of DP slaves, max.		64	96	96
•Address area				
- Inputs, max.		4 KByte	6 KByte	6 KByte
- Outputs, max.		4 KByte	6 KByte	6 KByte
•User data per DP Slave				
- Inputs, max.		244 Byte	244 Byte	244 Byte
- Outputs, max.		244 Byte	244 Byte	244 Byte
DP slave				
•Services				
- Routing		Yes	Yes	Yes
- Status/modify		Yes	Yes	Yes
- Programming		Yes	Yes	Yes
- Transmission rates, max.		12 Mbit/s	12 Mbit/s	12 Mbit/s
•Intermediate memory				
- Inputs		244 Byte	244 Byte	244 Byte
- Outputs		244 Byte	244 Byte	244 Byte
- Address areas, max.		32	32	32
- User data per address area, max.		32 Byte	32 Byte	32 Byte
- User data per address area, of which consistent, max.		32 Byte	32 Byte	32 Byte
3rd interface				
•Type of interface				Pluggable interface module (IF), Technical specifications as for 2nd interface
•Pluggable interface modules				IF 964-DP
Clock synchronism				
•User data per clock synchronous slave, max.	244 Byte	244 Byte	244 Byte	244 Byte
•Equidistance	Yes	Yes	Yes	Yes
•Shortest clock pulse	1 ms	1 ms	1 ms	1 ms
CiR configuration in RUN				
•CiR synchronization time, base load	100 ms	100 ms	100 ms	100 ms
•CiR synchronization time, time per I/O slave	200 µs	200 µs	80 µs	80 µs

Technical specifications (continued)

	6ES7 412-1XF04-0AB0	6ES7 412-2XG04-0AB0	6ES7 414-2XG04-0AB0	6ES7 414-3XJ04-0AB0
CPU/ programming				
Programming language				
- STEP 7	Yes	Yes	Yes	Yes
- LAD	Yes	Yes	Yes	Yes
- FBD	Yes	Yes	Yes	Yes
- STL	Yes	Yes	Yes	Yes
- SCL	Yes	Yes	Yes	Yes
- CFC	Yes	Yes	Yes	Yes
- GRAPH	Yes	Yes		Yes
- HiGraph®	Yes	Yes	Yes	Yes
•Bracket levels	8	8	8	8
•User program protection/ password protection	Yes	Yes	Yes	Yes
Dimensions and weight				
•Weight, approx.	720 g	720 g	720 g	1,070 g
•Width	25 mm	25 mm	25 mm	50 mm
•Height	290 mm	290 mm	290 mm	290 mm
•Depth	219 mm	219 mm	219 mm	219 mm
•Required slots	1	1	1	2

	6ES7 416-2XK04-0AB0	6ES7 416-3XL04-0AB0	6ES7 417-4XL04-0AB0
Product version			
•Firmware version	V4.0	V4.0	V4.0
•Associated programming package	as of STEP7 V 5.2 SP1 HF3 with HW-Update	as of STEP7 V 5.2 SP1 HF3 with HW-Update	as of STEP7 V 5.2 SP1 HF3 with HW-Update
Supply voltages			
Rated value			
- 24 V DC	Yes	Yes	Yes
Voltages and currents			
•Incoming supply of external backup voltage to the CPU	5 to 15 V DC	5 to 15 V DC	5 to 15 V DC
Current consumption			
•from backplane bus 5 V DC, max.	1.2 A	1.4 A	1.7 A
•Power dissipation, typical	4.5 W	5 W	6 W
Back-up battery			
- Backup current, max.	1,539 µA	1,530 µA	1,810 µA
- Backup current, typical	550 µA	550 µA	600 µA
Memory/backup			
Memory			
•Working memory			
- integrated (for program)	1,400 KByte	2,800 KByte	10 MByte
- integrated (for data)	1,400 KByte	2,800 KByte	10 MByte
- expandable	No	No	No
•Load memory			
- expandable FEPRM	Yes; with Memory Card (FLASH)	Yes; with Memory Card (FLASH)	Yes; with Memory Card (FLASH)
- expandable FEPRM, max.	64 MByte	16 MByte	64 MByte
- integral RAM, max.	256 KByte	256 KByte	256 KByte
- expandable RAM	Yes; with Memory Card (RAM)	Yes; with Memory Card (RAM)	Yes; with Memory Card (RAM)
- expandable RAM, max	16 MByte	64 MByte	16 MByte
Backup			
- available	Yes	Yes	Yes
- with battery	Yes; all data	Yes; all data	Yes; all data
- without battery	No	No	No

SIMATIC S7-400

Central processing units

CPU 412-1 to CPU 417-4

Technical specifications (continued)

	6ES7 416-2XK04-0AB0	6ES7 416-3XL04-0AB0	6ES7 417-4XL04-0AB0
CPU/blocks			
DB			
- Number, max.	4,095; DB 0 reserved	4,095; DB 0 reserved	8,192; DB 0 reserved
- Size, max.	64 KByte	64 KByte	64 KByte
FB			
- Number, max.	2,048	2,048	6,144
- Size, max.	64 KByte	64 KByte	64 KByte
FC			
- Number, max.	2,048	2,048	6,144
- Size, max.	64 KByte	64 KByte	64 KByte
OB			
- Number, max.	See instruction list	See instruction list	See instruction list
- Size, max.	64 KByte	64 KByte	64 KByte
Nesting depth			
- per priority class	24	24	24
- additional levels within an error OB	2	2	2
CPU/processing times			
•for bit instruction, min.	0.04 µs	0.04 µs	0.03 µs
•for word instruction, min.	0.04 µs	0.04 µs	0.03 µs
•for integer math, min.	0.04 µs	0.04 µs	0.03 µs
•for floating-point math, min.	0.12 µs	0.12 µs	0.09 µs
Timers/counters and their retentive characteristics			
S7 counter			
- Number	2,048	2,048	2,048
•Retentivity			
- 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			
- available	Yes	Yes	Yes
- Type	SFB, unlimited quantity (only limited by working memory)	SFB, unlimited quantity (only limited by working memory)	SFB, unlimited quantity (only limited by working memory)
S7 times			
- Number	2,048	2,048	2,048
•Retentivity			
- 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
•Timing range			
- lower limit	10 ms	10 ms	10 ms
- upper limit	9,990 s	9,990 s	9,990 s
IEC timer			
- available	Yes	Yes	Yes
- Type	SFB, unlimited quantity (only limited by working memory)	SFB, unlimited quantity (only limited by working memory)	SFB, unlimited quantity (only limited by working memory)
Data areas and their retentive characteristics			
•Retentive data area as a whole	total working and load memory (with backup battery)	total working and load memory (with backup battery)	total working and load memory (with backup battery)
Flags			
- Number	16 KByte	16 KByte	16 KByte
- adjustable retentivity	Yes; MB 0 to MB 16383	Yes; MB 0 to MB 16383	Yes; MB 0 to MB 16383
- Number of clock memories	8; (1 memory byte)	8; (1 memory byte)	8; (1 memory byte)

Technical specifications (continued)

	6ES7 416-2XK04-0AB0	6ES7 416-3XL04-0AB0	6ES7 417-4XL04-0AB0
Address area			
I/O address area			
- Inputs	16 KByte	16 KByte	16 KByte
- Outputs	16 KByte	16 KByte	16 KByte
•of which distributed			
- MPI/DP interface, inputs	2 KByte	2 KByte	2 KByte
- MPI/DP interface, outputs	2 KByte	2 KByte	2 KByte
- DP interface, inputs	8 KByte	8 KByte	8 KByte
- DP interface, outputs	8 KByte	8 KByte	8 KByte
Process image			
- Inputs, adjustable	16 KByte	16 KByte	16 KByte
- Outputs, adjustable	16 KByte	16 KByte	16 KByte
- Inputs, preset	512 Byte	512 Byte	1,024 Byte
- Outputs, preset	512 Byte	512 Byte	1,024 Byte
- Number of component process images, max.	15	15	15
- Access to consistent data in the process image	Yes	Yes	Yes
- Consistent data, max.	244 Byte	244 Byte	244 Byte
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
Configuration			
•connectable OP	63 without event processing, 12 with event processing	63 without event processing, 12 with event processing	63 without event processing, 16 with event processing
•Central units, max.	1	1	1
•Expansion units, max.	21	21	21
•Multi-computing	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 pluggable IMs (overall), max.	6	6	6
- Number of pluggable IM 460s, max.	6	6	6
- Number of pluggable IM 463s, max.	4; IM 463-2	4; IM 463-2	4; IM 463-2
Number of DP masters			
- integral	2	2	2
- via IM 467	4	4	4
- via CP	10; CP 443-5 Ext.	10; CP 443-5 Ext.	10; via CP 443-5 Ext.
- Mixed mode of IM + CP permitted	No; IM 467 cannot be used externally together with CP443-5!	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		1; IF 964-DP	2; IF 964-DP
- No. pluggable S5 modules (via adapter casing in centr. unit) max	6	6	6
Number of FMs and CPs that can be operated (recommendation)			
- FM	limited by the number of slots and by the number of connections CP 440: limited by the number of slots CP 441: limited by the number of connections	limited by the number of slots and by the number of connections CP 440: limited by the number of slots CP 441: limited by the number of connections	limited by the number of slots and by the number of connections CP 440: limited by the number of slots CP 441: limited by the number of connections
- CP, point-to-point			
- CP, LAN	limited by the number of slots and by the number of connections	limited by the number of slots and by the number of connections	limited by the number of slots and by the number of connections
- PROFIBUS and Ethernet CPs	14; incl. CP 443-5 Ext. and IM 467	14; incl. CP 443-5 ext. and IM 467	14; incl. CP 443-5 Ext. and IM 467

SIMATIC S7-400

Central processing units

CPU 412-1 to CPU 417-4

Technical specifications (continued)

	6ES7 416-2XK04-0AB0	6ES7 416-3XL04-0AB0	6ES7 417-4XL04-0AB0
Time			
Clock			
- Hardware clock (realtime clock)	Yes	Yes	Yes
- buffered	Yes	Yes	Yes
- Triggering	1 ms	1 ms	1 ms
Run-time meter			
- Quantity	8	8	8
Time synchronization			
- supported	Yes	Yes	Yes
- on MPI, master	Yes	Yes	Yes
- on MPI, slave	Yes	Yes	Yes
- on DP, master	Yes	Yes	Yes
- on DP, slave	Yes	Yes	Yes
- in AS, master	Yes	Yes	Yes
- in AS, slave	Yes	Yes	Yes
- on IF 964 DP		Yes; as Master or Slave	Yes; as Master or Slave
S7 message functions			
•Number of stations that can log on for message functions, max.	12	12	16
•Symbol-related messages	Yes	Yes	Yes
Number of messages			
- total, max.	1,024	1,024	1,024
•Block-related messages	Yes	Yes	Yes
•Alarm 8 blocks	Yes	Yes	Yes
•Statuses	Yes	Yes	Yes
Test and startup functions			
Status/modify			
- 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			
- available	Yes	Yes	Yes
- Number of inputs, 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
Global data communication			
- supported	Yes	Yes	Yes
- Size of GD packets, max.	64 Byte	64 Byte	64 Byte
S7 basic communication			
- supported	Yes; in MPI mode: via SFC X_SEND, X_RCV, X_GET and X_PUT in DP master mode: via SFC I_GET and I_PUT	Yes; in MPI mode: via SFC X_SEND, X_RCV, X_GET and X_PUT in DP master mode: via SFC I_GET and I_PUT	Yes; in MPI mode: via SFC X_SEND, X_RCV, X_GET and X_PUT in DP master mode: via SFC I_GET and I_PUT
- User data per job	76 Byte	76 Byte	76 Byte
S7 communication			
- supported	Yes	Yes	Yes
- as server	Yes	Yes	Yes
- as client	Yes	Yes	Yes
- User data per job, max.	64 KByte	64 KByte	64 KByte

Technical specifications (continued)

	6ES7 416-2XK04-0AB0	6ES7 416-3XL04-0AB0	6ES7 417-4XL04-0AB0
S5 compatible communication			
- supported	Yes; via FC AG_SEND and AG_RECV, via a maximum of 10 CP 443-1 or 443-5	Yes; via FC AG_SEND and AG_RECV, via a maximum of 10 CP 443-1 or 443-5	Yes; via FC AG_SEND and AG_RECV, via a maximum of 10 CP 443-1 or 443-5
- User data per job, max.	8 KByte	8 KByte	8 KByte
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	64	64	64
1st interface			
•Physical	RS 485 / PROFIBUS	RS 485 / PROFIBUS	RS 485 / PROFIBUS
•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 rates, max.	12 Mbit/s	12 Mbit/s	12 Mbit/s
DP master			
- Number of connections, max.	32; if a diagnostic repeater is used in the chain, this reduces the number of connection resources in the chain by 1	32; if a diagnostic repeater is used in the chain, this reduces the number of connection resources in the chain by 1	32; if a diagnostic repeater is used in the chain, this reduces the number of connection resources in the chain by 1
•Services			
- PG/OP communication	Yes	Yes	Yes
- Routing	Yes	Yes	Yes
- S7 basic communication	Yes	Yes	Yes
- S7 communication	Yes	Yes	Yes
- Equidistance support	Yes	Yes	Yes
- Activate/deactivate DP slaves	Yes	Yes	Yes
- Direct data exchange (lateral communication)	Yes	Yes	Yes
- Transmission rates, max.	12 Mbit/s	12 Mbit/s	12 Mbit/s
- Number of DP slaves, max.	32	32	32
•Address area			
- Inputs, max.	2 KByte	2 KByte	2 KByte
- Outputs, max.	2 KByte	2 KByte	2 KByte
•User data per DP Slave			
- Inputs, max.	244 Byte	244 Byte	244 Byte
- Outputs, max.	244 Byte	244 Byte	244 Byte

SIMATIC S7-400

Central processing units

CPU 412-1 to CPU 417-4

Technical specifications (continued)

	6ES7 416-2XK04-0AB0	6ES7 416-3XL04-0AB0	6ES7 417-4XL04-0AB0
DP slave			
•Services			
- Routing	Yes	Yes	Yes
- Status/modify	Yes	Yes	Yes
- Programming	Yes	Yes	Yes
- Transmission rates, max.	12 Mbit/s	12 Mbit/s	12 Mbit/s
•Intermediate memory			
- Inputs	244 Byte	244 Byte	244 Byte
- Outputs	244 Byte	244 Byte	244 Byte
- Address areas, max.	32	32	32
- User data per address area, max.	32 Byte	32 Byte	32 Byte
- User data per address area, of which consistent, max.	32 Byte	32 Byte	32 Byte
2nd interface			
•Physical	RS 485 / PROFIBUS	RS 485 / PROFIBUS	RS 485 / PROFIBUS
•Isolated	Yes	Yes	Yes
Functionality			
- DP master	Yes	Yes	Yes
- DP slave	Yes	Yes	Yes
DP master			
- Number of connections, max.	32; if a diagnostic repeater is used in the chain, this reduces the number of connection resources in the chain by 1	32; if a diagnostic repeater is used in the chain, this reduces the number of connection resources in the chain by 1	32; if a diagnostic repeater is used in the chain, this reduces the number of connection resources in the chain by 1
•Services			
- PG/OP communication	Yes	Yes	Yes
- Routing	Yes	Yes	Yes
- S7 basic communication	Yes	Yes	Yes
- S7 communication	Yes	Yes	Yes
- Equidistance support	Yes	Yes	Yes
- Activate/deactivate DP slaves	Yes	Yes	Yes
- Direct data exchange (lateral communication)	Yes	Yes	Yes
- Transmission rates, max.	12 Mbit/s	12 Mbit/s	12 Mbit/s
- Number of DP slaves, max.	125	125	125
•Address area			
- Inputs, max.	8 KByte	8 KByte	8 KByte
- Outputs, max.	8 KByte	8 KByte	8 KByte
•User data per DP Slave			
- Inputs, max.	244 Byte	244 Byte	244 Byte
- Outputs, max.	244 Byte	244 Byte	244 Byte
DP slave			
•Services			
- Routing	Yes	Yes	Yes
- Status/modify	Yes	Yes	Yes
- Programming	Yes	Yes	Yes
- Transmission rates, max.	12 Mbit/s	12 Mbit/s	12 Mbit/s
•Intermediate memory			
- Inputs	244 Byte	244 Byte	244 Byte
- Outputs	244 Byte	244 Byte	244 Byte
- Address areas, max.	32	32	32
- User data per address area, max.	32 Byte	32 Byte	32 Byte
- User data per address area, of which consistent, max.	32 Byte	32 Byte	32 Byte

Technical specifications (continued)

	6ES7 416-2XK04-0AB0	6ES7 416-3XL04-0AB0	6ES7 417-4XL04-0AB0
3rd interface			
•Type of interface		Pluggable interface module (IF), Technical specifications as for 2nd interface	Pluggable interface module (IF), Technical specifications as for 2nd interface
•Pluggable interface modules		IF 964-DP	IF 964-DP
4th interface			
•Type of interface			Pluggable interface module (IF), Technical specifications as for 2nd interface
•Pluggable interface modules			IF 964-DP
Clock synchronism			
•User data per clock synchronous slave, max.	244 Byte	244 Byte	244 Byte
•Equidistance	Yes	Yes	Yes
•Shortest clock pulse	1 ms	1 ms	1 ms
CiR configuration in RUN			
•CiR synchronization time, base load	100 ms	100 ms	100 ms
•CiR synchronization time, time per I/O slave	40 µs	40 µs	40 µs
CPU/ programming			
Programming language			
- STEP 7	Yes	Yes	Yes
- LAD	Yes	Yes	Yes
- FBD	Yes	Yes	Yes
- STL	Yes	Yes	Yes
- SCL	Yes	Yes	Yes
- CFC	Yes	Yes	Yes
- GRAPH	Yes	Yes	Yes
- HiGraph®	Yes	Yes	Yes
•Bracket levels	8	8	8
•User program protection/ password protection	Yes	Yes	Yes
Dimensions and weight			
•Weight, approx.	720 g	1,070 g	1,070 g
•Width	25 mm	50 mm	50 mm
•Height	290 mm	290 mm	290 mm
•Depth	219 mm	219 mm	219 mm
•Required slots	1	2	2

Ordering data

Ordering data	Order No.	Order No.
CPU 412-1 144 KB RAM, 24 V DC supply voltage, MPI/PROFIBUS DP master interface, slot for memory card, incl. slot number labels	6ES7 412-1XF04-0AB0	CPU 414-3 1.4 MB RAM, 24 V DC supply voltage, MPI/PROFIBUS DP-master interface, PROFIBUS DP master interface, slot for memory card, module slots for 3 IF modules, incl. slot number labels
CPU 412-2 256 KB RAM, 24 V DC supply voltage, MPI/PROFIBUS DP master interface, slot for memory card, incl. slot number labels	6ES7 412-2XG04-0AB0	6ES7 414-3XJ04-0AB0
CPU 414-2 512 KB RAM, 24 V DC supply voltage, MPI/PROFIBUS DP master interface, slot for memory card, incl. slot number labels	6ES7 414-2XG04-0AB0	CPU 416-2 2.8 MB RAM, 24 V DC supply voltage, MPI/PROFIBUS DP-master interface, PROFIBUS DP master interface, slot for memory card, incl. slot number labels
		6ES7 416-2XK04-0AB0

SIMATIC S7-400

Central processing units

CPU 412-1 to CPU 417-4

5

Ordering data (continued)

CPU 416-3

5.6 MB RAM, 24 V DC supply voltage, MPI/PROFIBUS DP-master interface, PROFIBUS DP master interface, slot for memory card, module slots for 3 IF modules, incl. slot number labels

6ES7 416-3XL04-0AB0

CPU 417-4

20 MB RAM, 24 V DC supply voltage, MPI/PROFIBUS DP-master interface, PROFIBUS DP master interface, slot for memory card, module slots for 3/4 IF modules, incl. slot number labels

6ES7 417-4XL04-0AB0

RAM memory

for CPU 417-4

2 x 2 MB

6ES7 955-2AL00-0AA0

2 x 4 MB

6ES7 955-2AM00-0AA0

RAM memory card

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 ^{A)}

6ES7 952-1AS00-0AA0

FEPRAM 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 ^{A)}

6ES7 952-1KT00-0AA0

64 MB ^{A)}

6ES7 952-1KY00-0AA0

MPI cable

For connecting SIMATIC S7 and the PG through MPI; length 5 m

6ES7 901-0BF00-0AA0

Interface module IF 964-DP

for connecting an additional DP line; for CPU 414-3, CPU 416-3, CPU 417-4

6ES7 964-2AA01-0AB0

Spare key for CPU

2 items (spare part)

6ES7 911-0AA00-0AA0

Mounting location number plates

1 set (spare part)

6ES7 912-0AA00-0AA0

"SIMATIC S7-400 program-mable controller" manual

incl. list of operations

German

6ES7 498-8AA03-8AA0

English

6ES7 498-8AA03-8BA0

French

6ES7 498-8AA03-8CA0

Spanish

6ES7 498-8AA03-8DA0

Italian

6ES7 498-8AA03-8EA0

S7-400 operations list

German

6ES7 498-8AA03-8AN0

English

6ES7 498-8AA03-8BN0

French

6ES7 498-8AA03-8CN0

Spanish

6ES7 498-8AA03-8DN0

Italian

6ES7 498-8AA03-8EN0

"Communication for SIMATIC S7-300/400" manual

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 ^{B)}

Electronic manuals on CD-ROM, 5 languages: S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, Engineering Software, Runtime Software, PCS 7, SIMATIC HMI, SIMATIC NET

6ES7 998-8XC01-8YE0

SIMATIC Manual Collection update service for 1 year ^{B)}

Up-to-date Manual Collection CD as well as the three subsequent updates

6ES7 998-8XC01-8YE2

Brochure "S7-400 program-mable controller - Design and implementation"

German

6ES7 498-8AA00-8AB0

English

6ES7 498-8AA00-8BB0

French

6ES7 498-8AA00-8CB0

Spanish

6ES7 498-8AA00-8DB0

Italian

6ES7 498-8AA00-8EB0

RS 485 bus connector with 90° cable feeder

Max. transmission 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 feeder

Max. transmission 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 feeder for Fast Connect connection method

Max. transmission rate 12 Mbit/s

Without PG interface

6ES7 972-0BA50-0XA0

with PG interface

6ES7 972-0BB50-0XA0

RS 485 bus connector with axial cable feeder

for SIMATIC OP, for connecting to PPI, MPI, PROFIBUS

6GK1 500-0EA02

PROFIBUS FastConnect bus cable

Standard type specially designed for quick installation, 2-core, shielded, sold by the meter; Max. length supplied 1000 m, minimum order quantity 20 m

6XV1 830-0EH10

A) Subject to export regulations: AL: N and ECCN: EAR99H

B) Subject to export regulations: AL: N and ECCN: EAR99S

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

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

SIMATIC S7-400

Central processing units

CPU 414-4H, CPU 417-4H

Technical specifications

	6ES7 414-4HJ04-0AB0	6ES7 417-4HL04-0AB0
Supply voltages		
Rated value		
- 24 V DC	Yes	Yes
Voltages and currents		
• Incoming supply of external backup voltage to the CPU	5 to 15 V DC	5 to 15 V DC
Current consumption		
• from backplane bus 5 V DC, max.	2 A	1.7 A
• Power dissipation, typical	4.5 W	6 W
Back-up battery		
- Backup current, max.	1,530 µA	1,810 µA
- Backup current, typical	550 µA	600 µA
Memory/backup		
Memory		
• Working memory		
- integrated (for program)	700 KByte	
- integrated (for data)	700 KByte	
- expandable	No	No
• Load memory		
- expandable FEPRM	Yes; with Memory Card (FLASH)	Yes; with Memory Card (FLASH)
- expandable FEPRM, max.	64 MByte	64 MByte
- integral RAM, max.	256 KByte	256 KByte
- expandable RAM	Yes; with Memory Card (RAM)	Yes; with Memory Card (RAM)
- expandable RAM, max	16 MByte	16 MByte
Backup		
- available	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 KByte	
FB		
- Number, max.	2,048	6,144
- Size, max.	64 KByte	64 KByte
FC		
- Number, max.	2,048	6,144
- Size, max.	64 KByte	64 KByte
OB		
- Number, max.	See instruction list	See instruction list
- Size, max.	64 KByte	64 KByte
Nesting depth		
- per priority class	24	24
- additional levels within an error OB		2
CPU/processing times		
• for bit instruction, min.	0.06 µs	0.03 µs
• for word instruction, min.	0.06 µs	0.03 µs
• for integer math, min.	0.06 µs	0.03 µs
• for floating-point math, min.	0.18 µs	0.09 µs

	6ES7 414-4HJ04-0AB0	6ES7 417-4HL04-0AB0
Timers/counters and their retentive characteristics		
S7 counter		
- Number	2,048	2,048
• Retentivity		
- 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		
- available	Yes	Yes
- Type	SFB, unlimited quantity (only limited by working memory)	SFB, unlimited quantity (only limited by working memory)
S7 times		
- Number	2,048	2,048
• Timing range		
- lower limit	10 ms	10 ms
- upper limit	9,990 s	9,990 s
IEC timer		
- available	Yes	Yes
- Type	SFB, unlimited quantity (only limited by working memory)	SFB, unlimited quantity (only limited by working memory)
Data areas and their retentive characteristics		
Flags		
- Number	8 KByte	16 KByte
- adjustable retentivity	Yes; MB 0 to MB 8191	Yes; MB 0 to MB 16383
Address area		
I/O address area		
- Inputs	8 KByte	16 KByte
- Outputs	8 KByte	16 KByte
• of which distributed		
- MPI/DP interface, inputs	2 KByte	2 KByte
- MPI/DP interface, outputs	2 KByte	2 KByte
- DP interface, inputs	6 KByte	8 KByte
- DP interface, outputs	6 KByte	8 KByte
Process image		
- Inputs, adjustable	8 KByte	16 KByte
- Outputs, adjustable	8 KByte	16 KByte
- Inputs, preset	1,024 Byte	1,024 Byte
- Outputs, preset	1,024 Byte	1,024 Byte
- Number of component process 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

Technical specifications (continued)

	6ES7 414-4HJ04-0AB0	6ES7 417-4HL04-0AB0
Configuration		
• Central units, max.	1	
• Expansion units, max.	21	
• Multi-computing	No	No
IM		
- Number of pluggable IMs (overall), max.	6	6
- Number of pluggable IM 460s, max.	6	6
- Number of pluggable IM 463s, max.	6; IM 463-2	6; IM 463-2
Number of DP masters		
- integral	2	2
- via IM 467	0	0
- via CP	10	10
- Mixed mode of IM + CP permitted	No; IM467 cannot be used externally together with CP443-5	No; IM467 cannot be used externally together with CP443-5!
- via interface module	0	0
Number of FMs and CPs that can be operated (recommendation)		
- FM	32; limited by the number of slots and by the number of connections	64; limited by the number of slots and by the number of connections
- CP, point-to-point	32; limited by the number of slots and by the number of connections	64; limited by the number of slots and by the number of connections
- CP, LAN	32; limited by the number of slots and by the number of connections	64; limited by the number of slots and by the number of connections
Time		
Clock		
- Hardware clock (realtime clock)	Yes	Yes
- buffered	Yes	Yes
Run-time meter		
- Quantity	8	8
Time synchronization		
- supported	Yes	Yes
S7 message functions		
• Number of stations that can log on for message functions, max.	8	16
Test and startup functions		
Diagnostic buffer		
- available	Yes	
- Number of inputs, 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

	6ES7 414-4HJ04-0AB0	6ES7 417-4HL04-0AB0
S7 communication		
- supported	Yes	Yes
- as server	Yes	Yes
- as client	Yes	Yes
- User data per job, max.	64 KByte	64 KByte
S5 compatible communication		
- supported	Yes; via CP and loadable FC	Yes; via CP and loadable FC
- User data per job, max.	8 KByte	8 KByte
Standard communication		
- Supported	Yes; via CP and loadable FB	Yes; via CP and loadable FB
- User data per job, max.	depending on the CP	depending on the CP
Number of connections		
- overall	32	64
1st interface		
• Physical	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 rates, max.	12 Mbit/s	12 Mbit/s
DP master		
- Number of connections, max.	32	32
• 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
- Activate/deactivate DP slaves	Yes	No
- Direct data exchange (lateral communication)	No	No
- Transmission rates, max.	12 Mbit/s	12 Mbit/s
- Number of DP slaves, max.	32; Number of slots, max. 512	32; Number of slots, max. 512
• Address area		
- Inputs, max.		2 KByte
- Outputs, max.		2 KByte
• User data per DP Slave		
- Inputs, max.	244 Byte	244 Byte
- Outputs, max.	244 Byte	244 Byte

SIMATIC S7-400

Central processing units

CPU 414-4H, CPU 417-4H

Technical specifications (continued)

	6ES7 414-4HJ04-0AB0	6ES7 417-4HL04-0AB0
2nd interface		
•Physical	RS 485 / PROFIBUS	RS 485 / PROFIBUS
•Isolated	Yes	Yes
Functionality		
- DP master	Yes; Default setting	Yes
- DP slave	No	No
- Point-to-point connection	No	No
DP master		
- Number of connections, max.	32	16
- 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
- Activate/deactivate DP slaves	No	No
- Direct data exchange (lateral communication)	No	No
- Transmission rates, max.	12 Mbit/s	12 Mbit/s
- Number of DP slaves, max.	96	125; Number of slots, max. 2048
•Address area		
- Inputs, max.	8 KByte	8 KByte
- Outputs, max.	8 KByte	8 KByte
•User data per DP Slave		
- Inputs, max.	244 Byte	244 Byte
- Outputs, max.	244 Byte	244 Byte
CPU/ programming		
Programming language		
- STEP 7	Yes; V5.0 SP2	Yes; V5.0 SP2
- LAD	Yes	Yes
- FBD	Yes	Yes
- STL	Yes	Yes
- SCL	Yes	Yes
- CFC	Yes	Yes
- GRAPH	Yes	Yes
- HiGraph®	Yes	Yes
•User program protection/ password protection	Yes	Yes
Dimensions and weight		
•Weight, approx.	1,070 g	1,070 g
•Width	50 mm	50 mm
•Height	290 mm	290 mm
•Depth	219 mm	219 mm
•Required slots	2	2

Ordering data

Order No.

CPU 414-4H

For S7-400H and S7-400F/FH; MPI/PROFIBUS DP-master interface, 2 slots for Sync modules, slot for memory card, incl. slot number label, 2 keys

768 KB main memory
1.4 MB main memory ^{A)}

6ES7 414-4HJ00-0AB0
6ES7 414-4HJ04-0AB0

CPU 417-4H

For S7-400H and S7-400F/FH; MPI/PROFIBUS DP-master interface, 2 slots for Sync modules, slot for memory card, incl. slot number labels, 2 keys

4 MB main memory
20 MB main memory ^{A)}

6ES7 417-4HL01-0AB0
6ES7 417-4HL04-0AB0

RAM memory

2 x 2 MB

6ES7 955-2AL00-0AA0

2 x 4 MB

6ES7 955-2AM00-0AA0

RAM memory card

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 ^{A)}

6ES7 952-1AS00-0AA0

EEPROM 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 ^{A)}

6ES7 952-1KT00-0AA0

64 MB ^{A)}

6ES7 952-1KY00-0AA0

MPI cable

For connecting SIMATIC S7 and the PG through MPI; length 5 m

6ES7 901-0BF00-0AA0

A) Subject to export regulations: AL: N and ECCN: EAR99H

Ordering data	Order No.		Order No.
Spare key for CPU 2 items (spare part)	6ES7 911-0AA00-0AA0	SIMATIC Manual Collection update service for 1 year^{B)} Up-to-date Manual Collection CD as well as the three subsequent updates	6ES7 998-8XC01-8YE2
Mounting location number plates 1 set (spare part)	6ES7 912-0AA00-0AA0	Brochure “SIMATIC S7-400 programmable controller - Design and implementation” German English French Spanish Italian	 6ES7 498-8AA00-8AB0 6ES7 498-8AA00-8BB0 6ES7 498-8AA00-8CB0 6ES7 498-8AA00-8DB0 6ES7 498-8AA00-8EB0
S7 H Systems options package for configuring an S7-400H system, 5-languages, without documentation, incl. authorization diskette Authorization diskette only	6ES7 833-2AC01-0YA0 6ES7 833-2AC01-0YB0	RS 485 bus connector with 90° cable feeder Max. transmission rate 12 Mbit/s Without PG interface with PG interface	 6ES7 972-0BA12-0XA0 6ES7 972-0BB12-0XA0
S7 F System options package For programming failsafe user programs, with F module library	6ES7 833-1CC00-0YX0	RS 485 bus connector with angled cable feeder Max. transmission rate 12 Mbit/s Without PG interface with PG interface	 6ES7 972-0BA41-0XA0 6ES7 972-0BB41-0XA0
F runtime license For using failsafe programs in CPU 417-4H; 1 license is required for each S7-400F/FH system.	6ES7 833-1CC00-6YX0	RS 485 bus connector with 90° cable feeder for Fast Connect connection method Max. transmission rate 12 Mbit/s Without PG interface with PG interface	 6ES7 972-0BA30-0XA0 6ES7 972-0BA50-0XA0 6ES7 972-0BB50-0XA0
"SIMATIC S7-400H program-mable controller" manual German English French Spanish Italian	 6ES7 988-8HA10-8AA0 6ES7 988-8HA10-8BA0 6ES7 988-8HA10-8CA0 6ES7 988-8HA10-8DA0 6ES7 988-8HA10-8EA0	RS 485 bus connector with axial cable feeder for SIMATIC OP, for connecting to PPI, MPI, PROFIBUS	6GK1 500-0EA02
"SIMATIC S7-400F/FH program-mable controller" manual German English	 6ES7 988-8FA10-8AA0 6ES7 988-8FA10-8BA0	PROFIBUS FastConnect bus cable Standard type specially designed for quick installation, 2-core, shielded, sold by the meter; Max. length supplied 1000 m, minimum order quantity 20 m	6XV1 830-0EH10
"Communication for SIMATIC S7-300/400" manual German English French Spanish Italian	 6ES7 398-8EA00-8AA0 6ES7 398-8EA00-8BA0 6ES7 398-8EA00-8CA0 6ES7 398-8EA00-8DA0 6ES7 398-8EA00-8EA0		
SIMATIC Manual Collection^{B)} Electronic manuals on CD-ROM, 5 languages: S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, Engineering Software, Runtime Software, PCS 7, SIMATIC HMI, SIMATIC NET	6ES7 998-8XC01-8YE0		

B) Subject to export regulations: AL: N and ECCN: EAR99S

SIMATIC S7-400

Central processing units

CPU 416F-2

Overview CPU 416F-2



- For configuration of a failsafe automation system for plants with increased safety requirements
- Powerful CPU in the upper performance range, based on the SIMATIC CPU 416-2
- With 2 interfaces (1x DP/MPI, 1x DP)
- Complies with safety requirements up to SIL 3 according to IEC 61508, AK6 according to DIN V 19250 and Cat. 4 according to EN 954-1
- Standard as well as safety-relevant tasks can be solved with just one CPU
- Multiprocessor mode possible
- Safety-relevant communication via PROFIBUS DP with *PROFIsafe* profile with distributed I/O stations
- Failsafe I/O modules of ET 200M/S/eco can be connected in distributed configuration
- Central and distributed use of standard modules for non-safety-relevant applications

Technical specifications

	6ES7 416-2FK02-0AB0
Supply voltages	
Rated value	
- 24 V DC	Yes
Voltages and currents	
• Incoming supply of external backup voltage to the CPU	5 to 15 V DC
Current consumption	
• from backplane bus 5 V DC, max.	1.6 A
• Power dissipation, typical	7.5 W
Back-up battery	
- Backup current, max.	420 µA
- Backup current, typical	40 µA
Memory/backup	
Memory	
• Working memory	
- expandable	No
• Load memory	
- expandable FEPRM	Yes; with Memory Card (FLASH)
- expandable FEPRM, max.	64 MByte
- integral RAM, max.	256 KByte
- expandable RAM	Yes; with Memory Card (RAM)
- expandable RAM, max.	64 MByte
Backup	
- available	Yes
- with battery	Yes; all data
- without battery	No
CPU/blocks	
DB	
- Number, max.	4,095; DB 0 reserved
- Size, max.	64 KByte
FB	
- Number, max.	2,048
- Size, max.	64 KByte
FC	
- Number, max.	2,048
- Size, max.	64 KByte
OB	
- Number, max.	see instruction list
- Size, max.	64 KByte

	6ES7 416-2FK02-0AB0
Nesting depth	
- per priority class	24
- additional levels within an error OB	2
CPU/processing times	
• for bit instruction, min.	0.08 µs
• for word instruction, min.	0.08 µs
• for integer math, min.	0.08 µs
• for floating-point math, min.	0.48 µs
Timers/counters and their retentive characteristics	
S7 counter	
- Number	512
• Retentivity	
- adjustable	Yes
- lower limit	0
- upper limit	511
- preset	from Z 0 to Z 7
• Counting range	
- lower limit	1
- upper limit	999
IEC counter	
- available	Yes
- Type	SFB, unlimited quantity (only limited by working memory)
S7 times	
- Number	512
• Retentivity	
- adjustable	Yes
- preset	no timers retentive
• Timing range	
- lower limit	10 ms
- upper limit	9,990 s
IEC timer	
- available	Yes
- Type	SFB, unlimited quantity (only limited by working memory)

Technical specifications (continued)

	6ES7 416-2FK02-0AB0
Data areas and their retentive characteristics	
• Retentive data area as a whole	total working and load memory (with backup battery)
Flags	
- Number	16 KByte
- adjustable retentivity	Yes; MB 0 to MB 16383
- Number of clock memories	8; 1 memory byte
Address area	
I/O address area	
- Inputs	16 KByte
- Outputs	16 KByte
• of which distributed	
- MPI/DP interface, inputs	2 KByte
- MPI/DP interface, outputs	2 KByte
- DP interface, inputs	8 KByte
- DP interface, outputs	8 KByte
Process image	
- Inputs, adjustable	16 KByte
- Outputs, adjustable	16 KByte
- Inputs, preset	512 Byte
- Outputs, preset	512 Byte
- Number of component process images, max.	8
- Access to consistent data in the process image	Yes
- Consistent data, max.	244 Byte
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
Configuration	
• connectable OP	63 without event processing, 12 with event processing
• Central units, max.	1
• Expansion units, max.	21
• Multi-computing	Yes; max. 4 CPUs (with UR1 or UR2)
IM	
- Number of pluggable IMs (overall), max.	6
- Number of pluggable IM 460s, max.	6
- Number of pluggable IM 463s, max.	4
Number of DP masters	
- integral	2
- via IM 467	4
- via CP	10; CP 443-5 Ext.
- Mixed mode of IM + CP permitted	No; IM467 cannot be used externally together with CP443-5
- via interface module	0
- No. pluggable S5 modules (via adapter casing in centr. unit) max	6

	6ES7 416-2FK02-0AB0
Number of FMs and CPs that can be operated (recommendation)	
- FM	limited by the number of slots and by the number of connections
- CP, point-to-point	limited by the number of slots
- CP, LAN	limited and number of connections
- PROFIBUS and Ethernet CPs	14; incl. CP 443-5 extended and IM 467
Time	
Clock	
- Hardware clock (realtime clock)	Yes
- buffered	Yes
- Triggering	1 ms
Run-time meter	
- Quantity	8
Time synchronization	
- supported	Yes
- on MPI, master	Yes
- on MPI, slave	Yes
- on DP, master	Yes
- on DP, slave	Yes
- in AS, master	Yes
- in AS, slave	Yes
S7 message functions	
• Number of stations that can log on for message functions, max.	12
• Symbol-related messages	Yes
Number of messages	
• Block-related messages	Yes
• Alarm 8 blocks	Yes
• Statuses	Yes
Test and startup functions	
Status/modify	
- Variable	Yes
Forcing	
- Forcing	Yes
• Status block	Yes
• Single step	Yes
• Number of breakpoints	4
Diagnostic buffer	
- available	Yes
- Number of inputs, max.	3,200
- adjustable	Yes
Communication functions	
• PG/OP communication	Yes
• Routing	Yes
Global data communication	
- supported	Yes
- Size of GD packets, max.	64 Byte
S7 basic communication	
- supported	Yes
- User data per job	76 Byte
S7 communication	
- supported	Yes
- as server	Yes
- as client	Yes
- User data per job, max.	64 KByte

SIMATIC S7-400

Central processing units

CPU 416F-2

Technical specifications (continued)

	6ES7 416-2FK02-0AB0
S5 compatible communication	
- supported	Yes; via CP and FC AG_SEND and FC AG_RECV
- User data per job, max.	8 KByte
Standard communication	
- Supported	Yes; via CP and loadable FB
Number of connections	
- overall	64
1st interface	
•Physical	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 rates, max.	12 Mbit/s
DP master	
- Number of connections, max.	32
•Services	
- PG/OP communication	Yes
- Routing	Yes
- S7 basic communication	No
- S7 communication	Yes
- Equidistance support	Yes
- Activate/deactivate DP slaves	Yes
- Direct data exchange (lateral communication)	Yes
- Transmission rates, max.	12 Mbit/s
- Number of DP slaves, max.	32
•User data per DP Slave	
- Inputs, max.	244 Byte
- Outputs, max.	244 Byte
DP slave	
•Services	
- Routing	Yes; with active interface
- Status/modify	Yes; with active interface
- Programming	Yes; with active interface
- Transmission rates, max.	12 Mbit/s
•Intermediate memory	
- Address areas, max.	32
- User data per address area, max.	32 Byte
- User data per address area, of which consistent, max.	32 Byte

	6ES7 416-2FK02-0AB0
2nd interface	
•Physical	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	No
- S7 communication	Yes
- Equidistance support	Yes
- Activate/deactivate DP slaves	Yes
- Direct data exchange (lateral communication)	Yes
- Transmission rates, max.	12 Mbit/s
- Number of DP slaves, max.	125
•Address area	
- Inputs, max.	8 KByte
- Outputs, max.	8 KByte
•User data per DP Slave	
- Inputs, max.	128 Byte
- Outputs, max.	128 Byte
DP slave	
•Services	
- Routing	Yes; with active interface
- Status/modify	Yes; with active interface
- Programming	Yes; with active interface
- Transmission rates, max.	12 Mbit/s
•Intermediate memory	
- Inputs	244 Byte
- Outputs	244 Byte
- Address areas, max.	32
- User data per address area, max.	32 Byte
- User data per address area, of which consistent, max.	32 Byte
Clock synchronism	
•User data per clock synchronous slave, max.	128 Byte
•Equidistance	Yes
•Shortest clock pulse	5 ms; 2.5 ms without using SFCs 126 / 127
CiR configuration in RUN	
•CiR synchronization time, base load	100 ms
•CiR synchronization time, time per I/O slave	120 µs

Technical specifications (continued)

	6ES7 416-2FK02-0AB0		6ES7 416-2FK02-0AB0
CPU/ programming		Dimensions and weight	
Programming language		•Weight, approx.	720 g
- STEP 7	Yes	•Width	25 mm
- LAD	Yes	•Height	290 mm
- FBD	Yes	•Depth	219 mm
- STL	Yes	•Required slots	1
- SCL	Yes		
- CFC	Yes		
- GRAPH	Yes		
- HiGraph®	Yes		
•Bracket levels	8		
•User program protection/ password protection	Yes		

SIMATIC S7-400

Central processing units

CPU 416F-2

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Ordering data	Order No.	Order No.	
CPU 416F-2 For constructing safety-related programmable controllers; 1.6 MB RAM, 24 V DC supply voltage, MPI/PROFIBUS DP-master interface, PROFIBUS DP master/slave interface, slot for memory card, incl. slot number labels, 2 keys	6ES7 416-2FK02-0AB0	S7-400 operations list German English French Spanish Italian	6ES7 498-8AA03-8AN0 6ES7 498-8AA03-8BN0 6ES7 498-8AA03-8CN0 6ES7 498-8AA03-8DN0 6ES7 498-8AA03-8EN0
Options package S7 F Distributed Safety For creating failsafe programs	6ES7 833-1FC00-0YX0	"Communication for SIMATIC S7-300/400" manual German English French Spanish Italian	6ES7 398-8EA00-8AA0 6ES7 398-8EA00-8BA0 6ES7 398-8EA00-8CA0 6ES7 398-8EA00-8DA0 6ES7 398-8EA00-8EA0
RAM memory card 64 KB 256 KB 1 MB 2 MB 4 MB 8 MB 16 MB ^{A)}	6ES7 952-0AF00-0AA0 6ES7 952-1AH00-0AA0 6ES7 952-1AK00-0AA0 6ES7 952-1AL00-0AA0 6ES7 952-1AM00-0AA0 6ES7 952-1AP00-0AA0 6ES7 952-1AS00-0AA0	SIMATIC Manual Collection ^{B)} Electronic manuals on CD-ROM, 5 languages: S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, Engineering Software, Runtime Software, PCS 7, SIMATIC HMI, SIMATIC NET	6ES7 998-8XC01-8YE0
FEPROM memory card 64 KB 256 KB 1 MB 2 MB 4 MB 8 MB 16 MB 32 MB ^{A)} 64 MB ^{A)}	6ES7 952-0KF00-0AA0 6ES7 952-0KH00-0AA0 6ES7 952-1KK00-0AA0 6ES7 952-1KL00-0AA0 6ES7 952-1KM00-0AA0 6ES7 952-1KP00-0AA0 6ES7 952-1KS00-0AA0 6ES7 952-1KT00-0AA0 6ES7 952-1KY00-0AA0	SIMATIC Manual Collection update service for 1 year ^{B)} Up-to-date Manual Collection CD as well as the three subsequent updates	6ES7 998-8XC01-8YE2
MPI cable For connecting SIMATIC S7 and the PG through MPI; length 5 m	6ES7 901-0BF00-0AA0	Brochure "S7-400 programmable controller - Design and implementation" German English French Spanish Italian	6ES7 498-8AA00-8AB0 6ES7 498-8AA00-8BB0 6ES7 498-8AA00-8CB0 6ES7 498-8AA00-8DB0 6ES7 498-8AA00-8EB0
Interface module IF 964-DP for connecting an additional DP line	6ES7 964-2AA01-0AB0	RS 485 bus connector with 90° cable feeder Max. transmission rate 12 Mbit/s Without PG interface With PG interface	6ES7 972-0BA12-0XA0 6ES7 972-0BB12-0XA0
Spare key for CPU 2 items (spare part)	6ES7 911-0AA00-0AA0	RS 485 bus connector with angled cable feeder Max. transmission rate 12 Mbit/s Without PG interface With PG interface	6ES7 972-0BA41-0XA0 6ES7 972-0BB41-0XA0
Mounting location number plates 1 set (spare part)	6ES7 912-0AA00-0AA0	RS 485 bus connector with 90° cable feeder for Fast Connect connection method Max. transmission rate 12 Mbit/s Without PG interface With PG interface	6ES7 972-0BA50-0XA0 6ES7 972-0BB50-0XA0
Documentation for S7-300F System description for configuration and programming, failsafe PROFISAFE modules German English French	6ES7 988-8FB10-8AA0 6ES7 988-8FB10-8BA0 6ES7 988-8FB10-8CA0	RS 485 bus connector with axial cable feeder for SIMATIC OP, for connecting to PPI, MPI, PROFIBUS	6GK1 500-0EA02
"SIMATIC S7-400 programmable controller" manual incl. list of operations German English French Spanish Italian	6ES7 498-8AA03-8AA0 6ES7 498-8AA03-8BA0 6ES7 498-8AA03-8CA0 6ES7 498-8AA03-8DA0 6ES7 498-8AA03-8EA0	PROFIBUS FastConnect bus cable Standard type specially designed for quick installation, 2-core, shielded, sold by the meter; Max. length supplied 1000 m, minimum order quantity 20 m	6XV1 830-0EH10

A) Subject to export regulations: AL: N and ECCN: EAR99H

B) Subject to export regulations: AL: N and ECCN: EAR99S

Overview



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

Technical specifications

	6ES7 960-1AA00-0XA0
Current consumption	
• from CPU, max.	500 mA; from interface 5 V
• Power dissipation, typical	2.5 W
Dimensions and weight	
• Weight, approx.	60 g

Ordering data

Sync module

for coupling the two CPUs 414-4H/417-4H when using S7-400H/F/FH; 2 module required per CPU;

For 6ES7 414-4HJ00-0AA0 and 6ES7 417-4HL01-0AA0; ^{A)}

For 6ES7 414-4HJ04-0AA0 and 6ES7 417-4HL04-0AA0; for patch cable, can be used with fiber-optic cables of up to 10 m in length ^{A)}

For 6ES7 414-4HJ04-0AA0 and 6ES7 417-4HL04-0AA0; for patch cable and installation cable, can be used with fiber-optic cables of up to 10 km in length ^{A)}

Order No.

6ES7 960-1AA00-0XA0

6ES7 960-1AA04-0XA0

6ES7 960-1AB04-0XA0

Fiber-optic plug-in cable

For Sync module 6ES7 960-1AA00-0XA0

- 1 m
- 2 m
- 10 m
- Other lengths

For Sync module 6ES7 960-1Ax04-0XA0

- 1 m
- 2 m
- 10 m

For Sync module 6ES7 960-1AB04-0XA0; fiber-optic monomode LC/LC duplex crossed 9/125 μ (max. 10 km)

Order No.

6ES7 960-1AA00-5AA0

6ES7 960-1AA00-5BA0

6ES7 960-1AA00-5KA0

on request

6ES7 960-1AA04-5AA0

6ES7 960-1AA04-5BA0

6ES7 960-1AA04-5KA0

on request

A) Subject to export regulations: AL: N and ECCN: EAR99H

SIMATIC S7-400

Central processing units

PROFIBUS module IF-964 DP

Overview



- For connecting distributed I/Os using PROFIBUS DP
- Transmission rate max. 12 Mbps
- Electrically isolated RS 485 interface
- Connection by means of 9-pin Sub D socket
- One or two PROFIBUS modules can be plugged into each S7-400 CPU:
 - CPU 414-3/416-3: 1 module
 - CPU 417-4: 2 modules

Technical specifications

	6ES7 964-2AA04-0AB0
Current consumption	
•from CPU, max.	150 mA; Current consumption from S7-400 bus: the module does not take up current at 24 V, it merely makes this voltage available at the DP interface. Total current consumption of the components connected to the DP interface, to a maximum of 150 mA.
•Power dissipation, typical	1 W
Communication functions	
Number of connections	
- overall	device-dependent
PROFIBUS DP	
•Length of cable, max.	1,200 m; at 9.6 kbits/s: max. 1200 m at 12 Mbits/s: max. 100 m
1st interface	
•Physical	RS 485 / PROFIBUS
•Isolated	Yes
Functionality	
- DP master	Yes; Default setting
- DP slave	Yes

	6ES7 964-2AA04-0AB0
DP master	
•Services	
- PG/OP communication	Yes
- Equidistance support	Yes
- SYNC/FREEZE	Yes
- Direct data exchange (lateral communication)	Yes
- Transmission rates, max.	12 Mbit/s
- Transmission rates, min.	9.6 kBit/s
- Number of DP slaves, max.	125; depending on the CPU being used
•Address area	
- Inputs, max.	device-dependent
- Outputs, max.	device-dependent
•User data per DP Slave	
- Inputs, max.	244 Byte
- Outputs, max.	244 Byte
Dimensions and weight	
•Weight, approx.	65 g
•Width	26 mm
•Height	54 mm
•Depth	130 mm

Ordering data

Order No.

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

6ES7 964-2AA04-0AB0

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
Voltages and currents					
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 5 V DC, max.	130 mA	20 mA	200 mA	80 mA	150 mA
• from supply voltage L+, max.	120 mA				
• Power dissipation, max.	5 W	6 W	16 W	12 W	8 W; 6.5 W (48 V DC)
Digital inputs					
• Number of digital inputs	16	32	32	16	16
Number of inputs that can be driven in parallel					
- Number of inputs that can be driven in parallel, up to 40 °C	16	32	32	16	16
- Number of inputs that can be driven in parallel, up to 60 °C	16	32	32	16	16
Length of cable					
- Length of cable 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
- Length of cable 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	100 m
Input voltage					
- Rated value, DC	24 V	24 V			
- Rated value, UC			120 V	120/230 V UC	24 to 60 V UC
- for signal "0"	-30 to 5 V DC	-30 to 5 V DC	0 to 20 V	0 to 40 V	-6 to +6 V DC 0 to 5 V AC
- for signal "1"	11 to 30 V DC	13 to 30 V	79 to 132 V AC 80 to 132 V DC	79 to 264 V AC 80 to 264 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

SIMATIC S7-400

Digital modules

Digital input SM 421

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 0 signal, max (permissible closed-circuit current) - for 1 signal, typical	6 mA; to 8 mA	1.3 mA 7 mA	2 mA; to 5 mA	0 to 6 mA AC at 120 V: AC 10 mA, DC 1.8 mA at 230 V: AC 14 mA, DC 2 mA	4 mA; to 10 mA
Input delay (at rated value of the input voltage) •For standard inputs - Parameterizable - Rated value	Yes; 0.05 / 0.1 / 0.5 / 3 ms	3 ms	10 / 20 ms	25 ms	Yes; 0.5 / 3 / 10 / 20 ms
Sensor Connectable encoders - 2-wire BEROs - permissible closed-circuit current (2-wire BEROs), max.	Yes 3 mA	Yes 1.5 mA	Yes 1 mA	Yes 5 mA	Yes 2 mA
Status information/ interrupts/ diagnostics Interrupts - Diagnostic interrupt - Process interrupt	Yes Yes				Yes Yes
Diagnostics - Diagnostics	Yes; internal/ external fault				Yes; internal/ external fault
Insulation •Insulation tested with	500 V DC	500 V DC	1500 V AC	1500 V AC	1500 V AC
Potentials/ electrical isolation Digital input functions - between the channels, in groups of - between the channels and the backplane bus	8 Yes	32 Yes	8 Yes	4 Yes	1 Yes
Dimensions and weight •Weight, approx. •Width •Height •Depth	600 g 25 mm 290 mm 210 mm	600 g 25 mm 290 mm 210 mm	600 g 25 mm 290 mm 210 mm	650 g 25 mm 290 mm 210 mm	600 g 25 mm 290 mm 210 mm

Ordering data	Order No.		Order No.
SM 421 digital input modules		SIMATIC Manual Collection^{B)}	6ES7 998-8XC01-8YE0
16 inputs, 24 V DC, with process/diagnostics interrupt	6ES7 421-7BH01-0AB0	Electronic manuals on CD-ROM, in 5 languages: S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, engineering software, runtime software, PCS 7, SIMATIC HMI, SIMATIC NET	
32 inputs, 24 V DC	6ES7 421-1BL01-0AA0		
32 inputs, 120 V UC	6ES7 421-1EL00-0AA0		
16 inputs, 120/230 V UC; inputs according to IEC 1131-2 type 2	6ES7 421-1FH20-0AA0	SIMATIC Manual Collection update service for 1 year^{B)}	6ES7 998-8XC01-8YE2
16 inputs, 24 to 60 V UC, with process/diagnostics interrupt	6ES7 421-7DH00-0AB0	Current Manual Collection CD as well as the three following updates	
Front connector		Manual "SIMATIC S7-400 programmable controller"	
1 unit, 48-pin		incl. operation list	
•With screw-type terminals	6ES7 492-1AL00-0AA0	German	6ES7 498-8AA03-8AA0
•With spring-loaded terminals	6ES7 492-1BL00-0AA0	English	6ES7 498-8AA03-8BA0
•With crimp contacts	6ES7 492-1CL00-0AA0	French	6ES7 498-8AA03-8CA0
Fully modular connection	see page 5/90	Spanish	6ES7 498-8AA03-8DA0
Cover foil for labeling strip	6ES7 492-2XX00-0AA0	Italian	6ES7 498-8AA03-8EA0
Spare part			
S7-SmartLabel	2XV9 450-1SL01-0YX0		
Software for machine labeling of modules directly from the STEP 7 project			
Labeling sheets for machine labeling			
DIN A4, for printing using laser printer; 10 units			
Petrol	6ES7 492-2AX00-0AA0		
Light beige	6ES7 492-2BX00-0AA0		
Yellow	6ES7 492-2CX00-0AA0		
Red	6ES7 492-2DX00-0AA0		

B) Subject to export regulations: AL: N and ECCN: EAR99S

SIMATIC S7-400

Digital modules

Digital output SM 422

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
Voltages and currents					
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)	120/230 V AC	230 V			
- permissible range, lower limit (AC)	79 V	2 V			
- permissible range, upper limit (AC)	264 V	264 V			
Current consumption					
• from load voltage L+ (no load), max.			30 mA	30 mA	120 mA
• from load voltage L1 (no load), max.	6 mA				
• from backplane bus 5 V DC, max.	400 mA	1 A	160 mA	200 mA	200 mA
• Power dissipation, max.	16 W	25 W	7 W	4 W	8 W
Digital outputs					
• Number of digital outputs	16	16; Relay	16	32	32
• Length of cable shielded, max.	1,000 m	1,000 m	1,000 m	1,000 m	1,000 m
• Length of cable unshielded, max.	600 m	600 m	600 m	600 m	600 m
• Short-circuit protection of the output	Yes; Fusing		Yes; clocking electronically	Yes; clocking electronically	Yes; clocking electronically
• Limitation of voltage induced on circuit interruption to			-30 V	-27 V	L+ (-45 V)
• Lamp load, max.	25 W		10 W	5 W	5 W
Output voltage					
- for 1 signal	L1 (-18.1 V)		L+ (-0.5 V)	L+ (-0.3 V)	L+ (-0.8 V)
Output current					
- for 1 signal rated value	2 A		2 A	0.5 A	0.5 A
- for 1 signal permissible range for 0 to 60 °C, min.	10 mA		5 mA	5 mA	5 mA
- for 1 signal permissible range for 0 to 60 °C, max.	2 A		2.4 A	0.6 A	0.6 A
- for 0 signal residual current, max.	2.6 mA		0.5 mA	0.3 mA	0.5 mA

Technical specifications (continued)

	6ES7 422-1FH00-0AA0	6ES7 422-1HH00-0AA0	6ES7 422-1BH11-0AA0	6ES7 422-1BL00-0AA0	6ES7 422-7BL00-0AB0
Switching frequency					
- at resistive load, max.	10 Hz		100 Hz	100 Hz	100 Hz
- at inductive load, max.	0.5 Hz		0.1 Hz	0.5 Hz	2 Hz
Summation current of the outputs (per group)					
- up to 60 °C, max.	2 A; 4 adjacent outputs each		2 A; two adjacent channels each	2 A; 8 adjacent outputs each	2 A
Relay outputs					
•Number of operating cycles		100,000; (AC 15 / DC 13), 3,000,000 mechanical			
Switching capacity of the contacts					
- at inductive load, max.		5 A; 1.2 A (60 V DC); 5 A (30 V DC/ 240 V AC)			
- at resistive load, max.		5 A; 5 A (DC 30) 5 A (240 V AC)			
Status information/ interrupts/ diagnostics					
Diagnostics					
- Diagnostics					Yes; internal/ external fault
Insulation					
•Insulation tested with	1500 V AC	1500 V AC	500 V DC	500 V DC	500 V DC
Potentials/ electrical isolation					
Digital output functions					
- between the channels, in groups of	4	2	8	32	8
- between the channels and the backplane bus	Yes	Yes	Yes	Yes	Yes
Dimensions and weight					
•Weight, approx.	802 g	700 g	600 g	600 g	600 g
•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

SIMATIC S7-400

Digital modules

Digital output SM 422

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Ordering data	Order No.		Order No.
SM 422 digital output modules		SIMATIC Manual Collection^{B)}	6ES7 998-8XC01-8YE0
16 outputs, 24 V DC; 2 A	6ES7 422-1BH11-0AA0	Electronic manuals on CD-ROM, in 5 languages: S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, engineering software, runtime software, PCS 7, SIMATIC HMI, SIMATIC NET	
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	SIMATIC Manual Collection update service for 1 year^{B)}	6ES7 998-8XC01-8YE2
16 outputs, relay contacts ^{A)}	6ES7 422-1HH00-0AA0	Current Manual Collection CD as well as the three following updates	
Front connector		Manual "SIMATIC S7-400 programmable controller"	
1 unit, 48-pin		incl. operation list	
•With screw-type terminals	6ES7 492-1AL00-0AA0	German	6ES7 498-8AA03-8AA0
•With spring-loaded terminals	6ES7 492-1BL00-0AA0	English	6ES7 498-8AA03-8BA0
•With crimp contacts	6ES7 492-1CL00-0AA0	French	6ES7 498-8AA03-8CA0
Fully modular connection	see page 5/90	Spanish	6ES7 498-8AA03-8DA0
Cover foil for labeling strip	6ES7 492-2XX00-0AA0	Italian	6ES7 498-8AA03-8EA0
Spare part			
Fuse cover^{A)}	6ES7 422-0XX00-7AA0		
Spare part, 4 units			
S7-SmartLabel	2XV9 450-1SL01-0YX0		
Software for machine labeling of modules directly from the STEP 7 project			
Labeling sheets for machine labeling			
DIN A4, for printing using laser printer; 10 units			
Petrol	6ES7 492-2AX00-0AA0		
Light beige	6ES7 492-2BX00-0AA0		
Yellow	6ES7 492-2CX00-0AA0		
Red	6ES7 492-2DX00-0AA0		

A) Subject to export regulations: AL: N and ECCN: EAR99H

B) Subject to export regulations: AL: N and ECCN: EAR99S

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 bits

Technical specifications

	6ES7 431-0HH00-0AB0	6ES7 431-1KF00-0AB0	6ES7 431-1KF10-0AB0	6ES7 431-1KF20-0AB0
Voltages and currents				
Load voltage L+				
- Rated value (DC)	24 V		24 V	24 V
- Reverse polarity protection	Yes		Yes	Yes
Current consumption				
• from load voltage L+ (no load), max.	400 mA		200 mA	200 mA
• from backplane bus 5 V DC, max.	100 mA	350 mA	600 mA	1,000 mA
• Power dissipation, typical	2 W	1.8 W	3.5 W	4.9 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
• Length of cable shielded, max	200 m	200 m	200 m; 50 m for thermocouples and input ranges <= 80 mV	200 m
• Permissible input voltage for the voltage input (destruction limit), max.	20 V	50 V	18 V	18 V
• Permissible input voltage for the current input (destruction limit), max.	40 mA	50 mA	40 mA	54 mA
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	
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

Technical specifications (continued)

	6ES7 431-0HH00-0AB0	6ES7 431-1KF00-0AB0	6ES7 431-1KF10-0AB0	6ES7 431-1KF20-0AB0
Input ranges (rated values), thermocouples				
- 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), resistances				
- 0 to 150 ohms			Yes	
- 0 to 300 ohms			Yes	
- 0 to 48 ohms			Yes	
- 0 to 600 ohms		Yes	Yes	Yes
- 0 to 6000 ohms			Yes; effective to 5000 ohms	
Input ranges (rated values), resistance thermometer				
- Ni 100			Yes	
- Pt 100			Yes	
- Pt 1000			Yes	
- Pt 200			Yes	
- Pt 500			Yes	
Characteristic curve linearization				
- parameterizable			Yes	
- for thermocouples			Type B, R, S, T, E, J, K, N, U, L	
- for resistance thermometer			Pt 100, Pt 200, Pt 500, Pt 1000, Ni 100	
Temperature compensation				
- external temperature compensation with compensating box possible			Yes	
- external temperature compensation with Pt100			Yes	
- dynamic reference temperature value			Yes	
Analog value formation				
Integration and conversion time/triggering per channel				
- with over-range (bits incl. sign), max	13 Bit	13 Bit	14 Bit	14 Bit
- Integration time parameterizable		Yes		
- Integration time, ms	16.67 / 20 ms	16.67 / 20 ms	16.67 / 20 ms	
- Basic conversion time, ms	55 / 65 ms	23 / 25 ms	20.1 / 23.5 ms	52 µs
- Additional conversion time for wire break monitoring			4.3 ms	
- Add'l conv. time for wire break monitoring and resistance meas.			5.5 ms	
- Additional conversion time for resistance measurement			40.2 / 47 ms	
- Interference voltage suppression for interference frequency f1 in Hz	60 / 50 Hz	60 / 50 Hz	60 / 50 Hz	400 / 60 / 50 Hz

Technical specifications (continued)

	6ES7 431-0HH00-0AB0	6ES7 431-1KF00-0AB0	6ES7 431-1KF10-0AB0	6ES7 431-1KF20-0AB0
Sensor				
Sensing element connection				
- for current measurement, as 2-wire measuring transducer	Yes	Yes; with external power supply	Yes	Yes
- for current measurement, as 4-wire measuring transducer	Yes	Yes	Yes	Yes
- for resistance measurement, with 2-wire connection		Yes	Yes	Yes
- for resistance measurement, with 3-wire connection			Yes	Yes
- for resistance measurement, with 4-wire connection		Yes	Yes	Yes
Error/accuracies				
Operational limit in the entire temperature range				
- relative to the input range, voltage	+/- 0.65 %; 1.0% at 1 to 5 V	+/- 1.25 %	+/- 0.5 %	+/- 0.9 %
- relative to the input range, current	+/- 0.65 %	+/- 1.25 %	+/- 0.5 %	+/- 0.9 %
- relative to the input range, resistance		+/- 1.25 %	+/- 0.5 %	+/- 0.9 %
- relative to the input range, resistance thermometer			+/- 0.5 %	
Basic error limit (operational limit at 25 °C)				
- relative to the input range, voltage	+/- 0.25 %; 0.5% at 1 to 5 V	+/- 0.8 %	+/- 0.3 %	+/- 0.75 %
- relative to the input range, current	+/- 0.25 %	+/- 0.8 %	+/- 0.3 %	+/- 0.75 %
- relative to the input range, resistance		+/- 0.8 %	+/- 0.3 %	+/- 0.75 %
- relative to the input range, resistance thermometer			+/- 0.3 %	
Insulation				
• Insulation tested with	1500 V AC between bus and analog section	1500 V AC between bus and analog section	1500 V AC between bus and analog section	1500 V AC between bus and analog section
Potentials/ electrical isolation				
Analogue output functions				
- Electrical isolation, analogue 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)	8 V AC	30 V AC	120 V AC	8 V AC
Dimensions and weight				
• Weight, approx.	500 g	480 g	500 g	500 g
• Width	25 mm	25 mm	25 mm	25 mm
• Height	290 mm	290 mm	290 mm	290 mm
• Depth	210 mm	210 mm	210 mm	210 mm
• Required slots	1	1	1	1

SIMATIC S7-400

Analog modules

Analog input SM 431

Technical specifications (continued)

	6ES7 431-7QH00-0AB0	6ES7 431-7KF00-0AB0	6ES7 431-7KF10-0AB0
Voltages and currents			
Load voltage L+			
- Rated value (DC)	24 V		
- Reverse polarity protection	Yes		
Current consumption			
•from load voltage L+ (no load), max.	400 mA		
•from backplane bus 5 V DC, max.	700 mA	1,200 mA	650 mA
•Power dissipation, typical	4.5 W	5 W	5 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
•Length of cable shielded, max	200 m; 50 m for thermocouples and input ranges ≤ 80 mV	200 m; 50 m for thermocouples and input ranges ≤ 80 mV	200 m; 50 m for thermocouples and input ranges ≤ 80 mV
•Permissible input voltage for the voltage input (destruction limit), max.	18 V	200 V; AC	+/- 30 V
•Permissible input voltage for the current input (destruction limit), max.	40 mA		
Input ranges (rated values), voltages			
- 1 to +5 V	Yes	Yes	
- -1 V to +1 V	Yes	Yes	
- -10 mV to +10 mV	Yes		
- -10 V to +10 V		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), thermocouples			
- 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), resistances			
- 0 to 150 ohms	Yes		
- 0 to 300 ohms	Yes		
- 0 to 48 ohms	Yes		
- 0 to 600 ohms	Yes		
- 0 to 6000 ohms	Yes; effective to 5000 ohms		
Input ranges (rated values), resistance thermometer			
- Ni 100	Yes		Yes
- Ni 1000	Yes		Yes
- Pt 100	Yes		Yes
- Pt 1000	Yes		Yes
- Pt 200	Yes		Yes
- Pt 500	Yes		Yes
Characteristic curve linearization			
- parameterizable	Yes	Yes	Yes
- for thermocouples	Type B, R, S, T, E, J, K, N, U, L	Type B, N, E, R, S, J, L, T, K, U	
- for resistance thermometer	Pt 100, Pt 200, Pt 500, Pt 1000, Ni 100, Ni 1000		Pt 100, Pt 200, Pt 500, Pt 1000, Ni 100, Ni 1000 choice of different characteristic (Europe/US)
Temperature compensation			
- external temperature compensation with compensating box possible	Yes	Yes	
- external temperature compensation with Pt100	Yes		
- internal temperature compensation possible		Yes	
- dynamic reference temperature value	Yes	Yes	
Analog value formation			
Integration and conversion time/triggering per channel			
- with over-range (bits incl. sign), max	16 Bit	16 Bit	16 Bit
- Integration time parameterizable	Yes		
- Integration time, ms	2.5 / 16.67 / 20 ms	20 ms at 50 Hz (ent. module)	20 ms at 50 Hz (ent. module incl. wire break)
- Basic conversion time, ms	6 / 21.1 / 23.5 ms		
- Additional conversion time for wire break monitoring	4.3 ms		
- Add'l conv. time for wire break monitoring and resistance meas.	5.5 ms	1 ms (mod.)	no
- Additional conversion time for resistance measurement	12 / 40.2 / 47 ms		
- Interference voltage suppression for interference frequency f1 in Hz	400 / 60 / 50 Hz	400 / 60 / 50 Hz	60 / 50 Hz
Sensor			
Sensing element connection			
- for current measurement, as 2-wire measuring transducer	Yes		
- for current measurement, as 4-wire measuring transducer	Yes	Yes	
- for resistance measurement, with 2-wire connection	Yes		
- for resistance measurement, with 3-wire connection	Yes		Yes
- for resistance measurement, with 4-wire connection	Yes	Yes	Yes

Technical specifications (continued)

	6ES7 431-7QH00-0AB0	6ES7 431-7KF00-0AB0	6ES7 431-7KF10-0AB0
Error/accuracies			
Operational limit in the entire temperature range			
- relative to the input range, voltage	+/- 0.4 %	on request	
- relative to the input range, current	+/- 0.4 %	on request	
- relative to the input range, resistance	+/- 0.4 %		
- relative to the input range, resistance thermometer	+/- 0.4 %		+/-1 °C
Basic error limit (operational limit at 25 °C)			
- relative to the input range, voltage	+/- 0.3 %	on request	
- relative to the input range, current	+/- 0.3 %	on request	
- relative to the input range, resistance	+/- 0.3 %		
- relative to the input range, resistance thermometer	+/- 0.3 %		+/-0.2 °C
Status information/ interrupts/ diagnostics			
Interrupts			
- Diagnostic interrupt	Yes; parameterizable	Yes	Yes
- Limit value interrupt	Yes; parameterizable	Yes	Yes
Diagnostics			
- Diagnostics	Yes; parameterizable	Yes	Yes
Insulation			
•Insulation tested with	1500 V AC between bus and analog section	1500 V AC between bus and analog section	1500 V AC between bus and analog section
Potentials/ electrical isolation			
Analog output functions			
- Electrical 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	no
Dimensions and weight			
•Weight, approx.	650 g	650 g	650 g
•Width	25 mm	25 mm	25 mm
•Height	290 mm	290 mm	290 mm
•Depth	210 mm	210 mm	210 mm
•Required slots	1	1	1

Ordering data	Order No.	Order No.
SM 431 analog input modules		
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 thermocouples (current, voltage) ^{A)}	6ES7 431-7KF00-0AB0	
8 inputs, floating, 16 bit, process interrupt capability, for thermal resistors ^{A)}	6ES7 431-7KF10-0AB0	
Front connector		
1 unit, 48-pin		
•With screw-type terminals	6ES7 492-1AL00-0AA0	
•With spring-loaded terminals	6ES7 492-1BL00-0AA0	
•With crimp contacts	6ES7 492-1CL00-0AA0	
1 unit; for 6ES7 431-7KF00-0AB0; spare part, included in scope of delivery of module	6ES7 431-7KF00-6AA0	
Fully modular connection	see page 5/90	
Range card for analog inputs	6ES7 974-0AA00-0AA0	
1 card for 2 inputs (spare part)		
Cover foil for labeling strip	6ES7 492-2XX00-0AA0	
Spare part		
	S7-SmartLabel	2XV9 450-1SL01-0YX0
	Software for machine labeling of modules directly from the STEP 7 project	
	Labeling sheets for machine labeling	
	DIN A4, for printing using laser printer; 10 units	
	Petrol	6ES7 492-2AX00-0AA0
	Light beige	6ES7 492-2BX00-0AA0
	Yellow	6ES7 492-2CX00-0AA0
	Red	6ES7 492-2DX00-0AA0
	SIMATIC Manual Collection^{B)}	6ES7 998-8XC01-8YE0
	Electronic manuals on CD-ROM, in 5 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^{B)}	6ES7 998-8XC01-8YE2
	Current Manual Collection CD as well as the three following updates	
	Manual "SIMATIC S7-400 programmable controller"	
	incl. operation list	
	German	6ES7 498-8AA03-8AA0
	English	6ES7 498-8AA03-8BA0
	French	6ES7 498-8AA03-8CA0
	Spanish	6ES7 498-8AA03-8DA0
	Italian	6ES7 498-8AA03-8EA0

A) Subject to export regulations: AL: N and ECCN: EAR99H

B) Subject to export regulations: AL: N and ECCN: EAR99S

SIMATIC S7-400

Analog modules

Analog output SM 432

Overview



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

Technical specifications

	6ES7 432-1HF00-0AB0
Voltages and currents	
Load voltage L+	
- Rated value (DC)	24 V
Current consumption	
• from backplane bus 5 V DC, max.	150 mA
• from supply voltage L+, max.	400 mA
• Power dissipation, max.	9 W
Analog outputs	
• Number of analog outputs	8
• Length of cable shielded, max	200 m
• Voltage output, short-circuit protection	Yes
• Voltage output, short-circuit current, max	25 mA
• Current output, open-circuit voltage, max.	18 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
Burden resistance (in the nominal output range)	
- at voltage outputs, min.	1 k Ω
- at voltage outputs, capacitive load, max.	1 μ F
- at current outputs, max.	500 Ω ; 600 ohms at reduced common-mode voltage to <1 V

	6ES7 432-1HF00-0AB0
Analog value formation	
Integration and conversion time/triggering per channel	
- with over-range (bits incl. sign), max	13 Bit
- Conversion time (per channel)	420 μ s
Settling time	
- for resistive load	0.1 ms
- for capacitive load	3.5 ms
- for inductive load	0.5 ms
Error/accuracies	
Operational limit in the entire temperature range	
- Relative to the output range, voltage	+/- 0.5 %
- Relative to the output range, current	+/- 1 %
Basic error limit (operational limit at 25 °C)	
- relative to the output range, voltage	+/- 0.2 %
- relative to the output range, current	+/- 0.3 %
Status information/ interrupts/ diagnostics	
• Applying substitute values	No
Insulation	
• Insulation tested with	1500 V AC between bus and analog section
Potentials/ electrical isolation	
Analog output functions	
- between the channels and the backplane bus	Yes
Dimensions and weight	
• Weight, approx.	650 g
• Width	25 mm
• Height	290 mm
• Depth	210 mm
• Required slots	1

Ordering data	Order No.		Order No.
SM 432 analog output modules 8 outputs, floating, 13 bit	6ES7 432-1HF00-0AB0	SIMATIC Manual Collection^{B)} Electronic manuals on CD-ROM, in 5 languages: S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, engineering software, runtime software, PCS 7, SIMATIC HMI, SIMATIC NET	6ES7 998-8XC01-8YE0
Front connector 1 unit, 48-pin		SIMATIC Manual Collection update service for 1 year^{B)} Current Manual Collection CD as well as the three following updates	6ES7 998-8XC01-8YE2
• With screw-type terminals	6ES7 492-1AL00-0AA0	Manual "SIMATIC S7-400 programmable controller" incl. operation list	
• With spring-loaded terminals	6ES7 492-1BL00-0AA0	German	6ES7 498-8AA03-8AA0
• With crimp contacts	6ES7 492-1CL00-0AA0	English	6ES7 498-8AA03-8BA0
Fully modular connection	see page 5/90	French	6ES7 498-8AA03-8CA0
Cover foil for labeling strip Spare part	6ES7 492-2XX00-0AA0	Spanish	6ES7 498-8AA03-8DA0
S7-SmartLabel Software for machine labeling of modules directly from the STEP 7 project	2XV9 450-1SL01-0YX0	Italian	6ES7 498-8AA03-8EA0
Labeling sheets for machine labeling DIN A4, for printing using laser printer; 10 units			
Petrol	6ES7 492-2AX00-0AA0		
Light beige	6ES7 492-2BX00-0AA0		
Yellow	6ES7 492-2CX00-0AA0		
Red	6ES7 492-2DX00-0AA0		

B) Subject to export regulations: AL: N and ECCN: EAR99S

SIMATIC S7-400

Function modules

FM 450-1 counter modules

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.

Additional information is available in the Internet under:

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

Technical specifications

	6ES7 450-1AP00-0AE0
Voltages and currents	
Auxiliary voltage 1L+, load voltage 2L+	
- 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 snap-over	
- 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+ (no load), max.	40 mA
•from backplane bus 5 V DC, max.	450 mA
•Power dissipation, typical	9 W
Connection system	
•Requisite front connector	1 x 48-pin
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 1 signal, typical	9 mA
Input delay (at rated value of the input voltage)	
- Input frequency (at 0.1 ms delay time), max.	200 kHz
•For standard inputs	
- Parameterizable	Yes
- at 0 to 1, max.	2.5 µs; ≥ 2.5 µs (200 kHz), ≤ 25 µs (20 kHz)

	6ES7 450-1AP00-0AE0
Digital outputs	
•Number of digital outputs	6
•Short-circuit protection of the output	Yes; clocking electronically
•Limitation of voltage induced on circuit interruption to	2L+ (-39 V)
Output voltage	
- for 0 signal (DC), max.	3 V
- for 1 signal	2L+ (-1.5 V)
Output current	
- for 1 signal rated value	0.5 A
- for 1 signal permissible range for 0 to 60 °C, min.	5 mA
- for 1 signal permissible range for 0 to 60 °C, max.	0.6 A
Output delay at resistive load	
- "0" to "1", max.	300 µs
Sensor supply	
5 V - sensor supply	
- 5 V	Yes; 5.2 V +/-2%
- Short-circuit protection	Yes
- Output current, max.	300 mA
24 V - sensor supply	
- 24 V	Yes; 1L+ (-3V)
- Short-circuit protection	Yes
- Output current, max.	300 mA
Sensor	
Connectable encoders	
- Incremental encoder (symmetrical)	Yes; with 2 pulse trains offset by 90°
- Incremental encoder (asymmetrical)	Yes
- 24 V initiator	Yes
- 24 V directional sensor	Yes; 1 pulse train, 1 direction level

Technical specifications (continued)

	6ES7 450-1AP00-0AE0
Counter	
•Number of counter inputs	2; 32 bits or +/-31 bits
Counter input 5 V	
- Type	RS 422
- Terminating resistance, approx.	220 Ω
- Differential input voltage	min. 0.5 V
- Count frequency, max.	500 kHz
Counter input 24 V	
- Input voltage, for 0 signal	-30 to 5 V
- Input voltage, for 1 signal	+11 to +30 V
- Input current, for 1 signal, typical	9 mA
- Count frequency, max.	200 kHz
- Minimum pulse width	≥ 2.5 μs (200 kHz), ≥ 25 μs (20 kHz) (parameterizable)
Parameters	
•Comment	Assigned binary addresses: 64 bytes/64 bytes
Insulation	
•Insulation tested with	500 V
Potentials/ electrical isolation	
Digital output functions	
- between the channels and the backplane bus	Yes; Optocoupler
Digital input functions	
- between the channels and the backplane bus	Yes; Optocoupler
Electrical isolation, counters	
- between the channels and the backplane bus	Yes; Optocoupler
Permissible potential difference	
•between different circuits	75 V DC / 60 V AC
Dimensions and weight	
•Weight, approx.	650 g
•Width	25 mm
•Height	290 mm
•Depth	210 mm

Ordering data

Order No.

FM 450-1 counter module with 2 channels, max. 500 kHz; for incremental encoders	6ES7 450-1AP00-0AE0
FM 450-1 manual	
German	6ES7 450-1AP00-8AG0
English	6ES7 450-1AP00-8BG0
French	6ES7 450-1AP00-8CG0
Italian	6ES7 450-1AP00-8EG0
Front connector	
1 item	
•With screw-type terminals	6ES7 492-1AL00-0AA0
•With spring-loaded terminals	6ES7 492-1BL00-0AA0
•With crimp contacts	6ES7 492-1CL00-0AA0
Front covers for CPU and function modules	6ES7 492-1XL00-0AA0
Spare part	

SIMATIC S7-400

Function modules

FM 451 positioning modules

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.

Additional information is available in the Internet under:

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

Technical specifications

	6ES7 451-3AL00-0AE0
Supply voltages	
Rated value	
- 24 V DC	Yes
Current consumption	
•Current consumption, max.	550 mA
Connection system	
•Requisite front connector	1 x 48-pin
Digital inputs	
•Number of digital inputs	12; 4 per axis
•Functions	Reference cam, reversing cam, set actual value on-the-fly, start/stop positioning motion
Input voltage	
- Rated value, DC	24 V
- for signal "0"	-3 to 5 V
- for signal "1"	11 to 30 V
Input current	
- for 1 signal, typical	6 mA
•For 2-wire BERO	
- For 1 signal, typical	30 mA
Digital outputs	
•Number of digital outputs	12; 4 per axis
•Functions	Rapid traverse, creep speed, clockwise rotation, counter-clockwise rotation
•Short-circuit protection of the output	Yes
Output voltage	
- for 1 signal	UP - 3 V
Output current	
- for 1 signal permissible range for 0 to 55 °C, max.	600 mA; at Upmax
- for 0 signal residual current, max.	0.5 mA

	6ES7 451-3AL00-0AE0
Sensor supply	
5 V - sensor supply	
- 5 V	Yes
- Output current, max.	210 mA
- Length of cable, max.	35 m; at max. 210 mA
24 V - sensor supply	
- 24 V	Yes
- Output current, max.	300 mA
- Length of cable, max.	100 m; at max. 300 mA
Absolute encoder (SSI) - sensor supply	
- Absolute encoder (SSI)	Yes
- Output voltage	24 V DC
- Output current, max.	300 mA
- Length of cable, max.	300 m; at max. 156 kbit/s
Sensor	
Connectable encoders	
- Incremental encoder (symmetrical)	Yes
- Incremental encoder (asymmetrical)	Yes
- Absolute encoder (SSI)	Yes
Incremental encoder (symmetrical)	
- Track mark signals	A, notA, B, notB
- Zero mark signal	N, notN
- Input signal	5 V differential signal (phys. RS 422)
- Input frequency, max.	1 MHz
Incremental encoder (asymmetrical)	
- Track mark signals	A, B
- Zero mark signal	N
- Input voltage	24 V
- Input frequency, max.	50 kHz; at 25 m cable length, 25 kHz at 100 m cable length
- Length of cable (shielded), max.	100 m
Absolute encoder (SSI)	
- Input signal	5 V differential signal (phys. RS 422)
- Data signal	DATA, notDATA
- Clock signal	CL, notCL
- Frame length	13 or 25 bits serial
- Clock frequency, max.	1.25 MHz
- Gray code	yes
- Length of cable (shielded), max.	300 m; at max. 156 kBit/s

Technical specifications (continued)

	6ES7 451-3AL00-0AE0
Potentials/ electrical isolation	
Digital output functions - Electrical isolation, digital output functions	Yes
Digital input functions - Electrical isolation, digital input functions	Yes
Environmental requirements	
Operating temperature - min.	0 °C
- max.	55 °C
Storage/transportation temperature - min.	-40 °C
- max.	70 °C
Relative humidity - Humidity rating F	Yes
Degree of protection and class of protection - IP 20	Yes
Dimensions and weight	
•Weight, approx.	1,300 g
•Width	50 mm
•Height	290 mm
•Depth	210 mm

Ordering data

Order No.

FM 451 positioning module for rapid traverse and creep- speed drives	6ES7 451-3AL00-0AE0
703 connecting cable to connect FM 351, FM 352, FM 354 to: •Siemens incremental position encoder 6FC9 320-3... 10 m, outgoing feeder cable upwards 20 m, outgoing feeder cable upwards •Incremental position encoder for 5 V signals (RS 422), supply voltage 5 V, 1 end open 5 m, outgoing feeder cable upwards 10 m, outgoing feeder cable upwards to connect FM 351, FM 352, FM 354 to: •Incremental position encoder for 24 V signals (RS 422), supply voltage 24 V, 1 end open 10 m, outgoing feeder cable downwards 32 m, outgoing feeder cable downwards •Absolute SSI position encoder, supply voltage 24 V, 1 end open 20 m, outgoing feeder cable downwards 20 m, outgoing feeder cable upwards 50 m, outgoing feeder cable downwards 50 m, outgoing feeder cable upwards	6ES5 703-1CB01 6ES5 703-1CC01 6ES5 703-2BF01 6ES5 703-2CB01 6ES5 703-4CB00 6ES5 703-4CD20 6ES5 703-5CC00 6ES5 703-5CC01 6ES5 703-5CF00 6ES5 703-5CF01
Sub-D connector 15-pin, male	6ES5 750-2AA21
Front connector 1 unit, 48-pin •With screw-type terminals •With spring-loaded terminals •With crimp contacts	6ES7 492-1AL00-0AA0 6ES7 492-1BL00-0AA0 6ES7 492-1CL00-0AA0
Front covers for CPU and function modules Spare part	6ES7 492-1XL00-0AA0

SIMATIC S7-400

Function modules

Cam control unit FM 452

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.

Additional information is available in the Internet under:

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

Technical specifications

	6ES7 452-1AH00-0AE0
Supply voltages	
Rated value	
- 24 V DC	Yes
Current consumption	
•Current consumption, max.	500 mA
Connection system	
•Requisite front connector	1 x 48-pin
Digital inputs	
•Number of digital inputs	11
•Functions	Reference point switches, set actual value on-the-fly/ inprocess length measurement, brake enabling, enable track output Nos. 3-10
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 0 signal, max (permissible closed-circuit current)	2 mA
•For 2-wire BERO	
- For 1 signal, typical	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 1 signal	UP - 0.8 V
Output current	
- for 1 signal permissible range for 0 to 55 °C, max.	600 mA; at Upmax
- for 0 signal residual current, max.	0.5 mA

	6ES7 452-1AH00-0AE0
Sensor supply	
5 V - sensor supply	
- 5 V	Yes
- Output current, max.	300 mA
- Length of cable, max.	32 m
24 V - sensor supply	
- 24 V	Yes
- Output current, max.	300 mA
- Length of cable, max.	100 m
Sensor	
Connectable encoders	
- Incremental encoder (symmetrical)	Yes
- Incremental encoder (asymmetrical)	Yes
- Absolute encoder (SSI)	Yes
- 2-wire BERO	Yes
Incremental encoder (symmetrical)	
- Track mark signals	A, notA, B, notB
- Zero mark signal	N, notN
- Input signal	5 V differential signal (phys. RS 422)
- Input frequency, max.	1 MHz
Incremental encoder (asymmetrical)	
- Track 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
Absolute encoder (SSI)	
- Input signal	5 V differential signal (phys. RS 422)
- Data signal	DATA, notDATA
- Clock signal	CL, notCL
- Frame length	13 or 25 bits serial
- Clock frequency, max.	1 MHz
- Gray code	yes
- Length of cable (shielded), max.	300 m; at max. 125 kHz

Technical specifications (continued)

	6ES7 452-1AH00-0AE0
Potentials/ electrical isolation	
Digital output functions - Electrical isolation, digital output functions	No
Digital input functions - Electrical isolation, digital input functions	No
Environmental requirements	
Operating temperature - min.	0 °C
- max.	55 °C
Storage/transportation temperature - min.	-40 °C
- max.	70 °C
Relative humidity - Humidity rating F	Yes
Degree of protection and class of protection - IP 20	Yes
Dimensions and weight	
•Weight, approx.	650 g
•Width	25 mm
•Height	290 mm
•Depth	210 mm

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	
FM 452 manual	
German	6ES7 452-1AH00-8AG0
English	6ES7 452-1AH00-8BG0
French	6ES7 452-1AH00-8CG0
Italian	6ES7 452-1AH00-8EG0
Front connector	
1 unit, 48-pin	
•With screw-type terminals	6ES7 492-1AL00-0AA0
•With spring-loaded terminals	6ES7 492-1BL00-0AA0
•With crimp contacts	6ES7 492-1CL00-0AA0

SIMATIC S7-400

Function modules

FM 453 positioning modules

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.

Additional information is available in the Internet under:

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

Technical specifications

	6ES7 453-3AH00-0AE0
Voltages and currents	
Auxiliary voltage 1L+ to 4L+	
- Rated value (DC)	24 V
- dynamic range	18.5 to 30.2 V
- static range	20.4 to 28.8 V
Current consumption	
• from load voltage 1L+, max	1 A; for 24 V displacement encoder; 1 A for 5 V displacement encoder
• from load voltage 2L+ up to 4L+, max.	2 A; per channel
• from backplane bus 5 V DC, max.	1.6 A; rated current
• Power dissipation, max.	8 W
Connection system	
• Requisite front connector	1 x 48-pin
Digital inputs	
• Number of digital inputs	6; per channel/axis configurable
• Functions	
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 (at rated value of the input voltage)	
• For standard inputs	
- at 0 to 1, max.	15 µs; over input voltage range, 8 µs at 24 V DC
- at 1 to 0, max.	45 µs; over input voltage range
Digital outputs	
• Number of digital outputs	4; per channel/axis configurable
• Functions	
• Short-circuit protection of the output	Yes
Output voltage	
- Rated value (DC)	24 V
- for 1 signal	UP - 0.3 V

	6ES7 453-3AH00-0AE0
Output current	
- for 1 signal rated value	0.5 A; at 40°C, 0.1 A at 60°C
- for 1 signal permissible range for 0 to 40 °C, min.	5 mA
- for 1 signal permissible range for 0 to 40 °C, max.	0.6 A
- for 1 signal permissible range for 40 to 60 °C, min.	5 mA
- for 1 signal permissible range for 40 to 60 °C, max.	0.12 A
- for 0 signal residual current, max.	2 mA
Switching frequency	
- at resistive load, max.	100 Hz
- at inductive load, max.	0.25 Hz
Sensor supply	
5 V - sensor supply	
- 5 V	Yes
- Output current, max.	300 mA
- Length of cable, max.	35 m; at max. 210 mA; 25 m at max. 300 mA
24 V - sensor supply	
- 24 V	Yes
- Length of cable, max.	100 m; at max. 300 mA
Sensor	
Connectable encoders	
- Incremental encoder (symmetrical)	Yes
- Absolute encoder (SSI)	Yes
Incremental encoder (symmetrical)	
- Input signal	5 V differential signal (phys. RS 422)
- Input frequency, max.	1 MHz; for 10 m cable length; 0.5 MHz for 35 m cable length
Absolute encoder (SSI)	
- Input signal	5 V differential signal (phys. RS 422)
- Clock frequency, max.	1.25 Mbit/s with 10 cable length (2.5 Mbit/s available soon)
- Length of cable (shielded), max.	250 m; at max. 156 kBit/s

Technical specifications (continued)

	6ES7 453-3AH00-0AE0		6ES7 453-3AH00-0AE0
Drive interface		Potentials/ electrical isolation	
Signal input I		Digital output functions	
- Type	Step drive interface, signal input "READY 1"	- Electrical isolation, digital output functions	Yes; Optocoupler
- Function	"Power section ready" at $U_i < 1 \text{ V}$, $I_i = 2 \text{ mA}$	Digital input functions	
Signal output I		- Electrical isolation, digital input functions	Yes; Optocoupler
- Type	5 V (phys. RS 422)	Environmental requirements	
- Function	Clock, direction, enable, current control	Operating temperature	
- Differential output voltage, min.	2 V; $R_L = 100 \text{ ohms}$	- min.	0 °C
- Differential output voltage, for 0 signal, max.	1.1 V; $I_o = 30 \text{ mA}$	- max.	55 °C
- Differential output voltage, for I signal, min.	3.7 V; $I_o = -30 \text{ mA}$	Storage/transportation temperature	
- Load resistance	55 Ω	- min.	-40 °C
- Pulse frequency	200 kHz; 500 kHz available soon	- max.	70 °C
- Length of cable, max.	35 m; 35 m for symm. transmission, 10 m for unsymm. transmission	Relative humidity	
Signal output II		- Humidity rating F	No
- Type	Contact relay	Degree of protection and class of protection	
- Function	Drive isolation for operation	- IP 20	Yes
- Load	1 A/50 V/30 VA DC	Dimensions and weight	
Signal output III		•Weight, approx.	1,620 g
- Type	Analog output	•Width	50 mm
- Function	Servo drive interface: setpoint output for the drive	•Height	290 mm
- Output voltage	-10 to +10 V	•Depth	210 mm
- Output current	-3 to +3 mA		
- Length of cable, max.	30 m		

Ordering data

	Order No.		Order No.
FM 453 positioning module	6ES7 453-3AH00-0AE0	Front connector	
with 3 channels/axes		1 item	
Setpoint value connecting cable		•With screw-type terminals	6ES7 492-1AL00-0AA0
for 3 servo motors	6FX2 002-3AD01-....	•With spring-loaded terminals	6ES7 492-1BL00-0AA0
for 3 stepper motors;	6FX2 002-3AB04-....	•With crimp contacts	6ES7 492-1CL00-0AA0
for 2 servo motors / 1 stepper motor	6FX2 002-3AB02-....	Front covers for CPU and function modules	6ES7 492-1XL00-0AA0
for 1 servo motor / 2 stepper motors	6FX2 002-3AB03-....	Spare part	

SIMATIC S7-400

Function modules

FM 455 closed-loop control modules

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 variants:
 - 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
Voltages and currents		
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+ (no load), max.	440 mA; typ. 370 mA	400 mA; typ. 330 mA
• Power dissipation, max.	17.3 W	16.2 W
• Power dissipation, typical	12 W	10.7 W
Connection system		
• Requisite front connector	2 x 48-pin	2 x 48-pin
Digital inputs		
• Number of digital inputs	16	16
Length of cable		
- Length of cable shielded, max	1,000 m	1,000 m
- Length of cable unshielded, max	600 m	600 m
• Input characteristic to comply with 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 1 signal, typical	7 mA	7 mA
Digital outputs		
• Number of digital outputs		32
• Length of cable shielded, max.		1,000 m
• Length of cable unshielded, max.		600 m
• Short-circuit protection of the output		Yes; electronic
• Limitation of voltage induced on circuit interruption to		L+ (-1.5 V)
• Lamp load, max.		5 W
• Driving a digital input		Yes

	6ES7 455-0VS00-0AE0	6ES7 455-1VS00-0AE0
Output voltage		
- for 1 signal		L+ (-2.5 V)
Output current		
- for 1 signal rated value		0.1 A
- for 1 signal permissible range for 0 to 60 °C, min.		5 mA
- for 1 signal permissible range for 0 to 60 °C, max.		150 mA
- for 0 signal residual current, max.		0.5 mA
Parallel switching of 2 outputs		
- for logical links		Yes
Switching frequency		
- at resistive load, max.		100 Hz
- at inductive load, max.		0.5 Hz
- at lamp load, max.		100 Hz
Load impedance range		
- lower limit		240 Ω
- upper limit		4 kΩ
Analog inputs		
• Number of analog inputs	16; 16 for thermocouples or 2-conductor connection 8 for Pt100 or 4-conductor connection	16; 16 for thermocouples or 2-conductor connection 8 for Pt100 or 4-conductor connection
• Length of cable shielded, max	200 m; 50m at 80 mV and thermocouples 20 V	200 m; 50m at 80 mV and thermocouples 20 V
• Permissible input voltage for the voltage input (destruction limit), max.		
• Permissible input voltage for the current input (destruction limit), max.	40 mA	40 mA
Input ranges (rated values), voltages		
- 0 to +10 V	Yes	Yes
- -1.75 to +11.75 V	Yes	Yes
- -80 mV to +80 mV	Yes	Yes

Technical specifications (continued)

	6ES7 455-0VS00-0AE0	6ES7 455-1VS00-0AE0
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), thermocouples		
- 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 thermometer		
- Pt 100	Yes	Yes
Characteristic curve linearization		
- parameterizable	Yes	Yes
- for thermocouples	Type B, J, K, R, S	Type B, J, K, R, S
- for resistance thermometer	Pt 100 (standard)	Pt 100 (standard)
Temperature compensation		
- external temperature compensation with Pt100	Yes; parameterizable	Yes; parameterizable
- internal temperature compensation possible	Yes; parameterizable	Yes; parameterizable
Analog outputs		
• Number of analog outputs	16	
• Length of cable 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, open-circuit voltage, max.	18 V	
Output ranges, voltage		
- 0 to 10 V	Yes	
- -10 to +10 V	Yes	
Output ranges, current		
- 0 to 20 mA	Yes	
- -20 to +20 mA	Yes	
- 4 to 20 mA	Yes	
Actuator connection		
- for voltage output 2-wire connection	Yes	
- for current output 2-wire connection	Yes	
Burden resistance (in the nominal output range)		
- at voltage outputs, min.	1 kΩ	
- at voltage outputs, capacitive load, max.	1 μF	
- at current outputs, max.	500 Ω	
- at current outputs, inductive load, max.	1 mH	
Analog value formation		
• Measuring principle	integrating	integrating

	6ES7 455-0VS00-0AE0	6ES7 455-1VS00-0AE0
Integration and conversion time/triggering per channel		
- with over-range (bits incl. sign), max	14 Bit; 12 or 14 bits, parameterizable	14 Bit; 12 or 14 bits, 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	0.1 ms	0.1 ms
- for capacitive load	3.3 ms	3.3 ms
- for inductive load	0.5 ms	0.5 ms
Sensor		
Sensing element connection		
- for voltage measurement	Yes	Yes
- for current measurement, as 4-wire measuring transducer	Yes	Yes
Connectable encoders		
- 2-wire BEROs	Yes	Yes
- permissible closed-circuit current (2-wire BEROs), max.	1.5 mA	1.5 mA
Error/accuracies		
• Linearity error (relative to the output range)	+/- 0.05 %	
• Linearity error (relative to the input range)	+/- 0.05 %	+/- 0.05 %
• Temperature error (relative to the output range)	+/- 0.02 %/K	
• Temperature error (relative to the input range)	+/- 0.005 %/K	+/- 0.005 %/K
Operational limit in the entire temperature range		
- Relative to the output range, voltage	+/- 0.5 %	
- Relative to the output range, current	+/- 0.6 %	
- relative to the input range, voltage	+/-0.6 to +/-1%	+/-0.6 to +/-1%
- relative to the input range, current	+/-0.6 to +/-1%	+/-0.6 to +/-1%
- relative to the input range, resistance thermometer	+/-0.6 to +/-1%	+/-0.6 to +/-1%
Basic error limit (operational limit at 25 °C)		
- relative to the output range, voltage	+/- 0.2 %	
- relative to the output range, current	+/- 0.3 %	
- relative to the input range, voltage	+/-0.4 to +/-0.6%	+/-0.4 to +/-0.6%
- relative to the input range, current	+/-0.4 to +/-0.6%	+/-0.4 to +/-0.6%
- relative to the input range, resistance thermometer	+/-0.4 to +/-0.6%	+/-0.4 to +/-0.6%
Interference voltage suppression for f = n x (fl +/- 1 %)		
- Series-mode interference (peak value of interference < rated val, min.	40 dB	40 dB
- Common-mode interference (USS < 2.5 V), min.	70 dB	70 dB

SIMATIC S7-400

Function modules

FM 455 closed-loop control modules

Technical specifications (continued)

	6ES7 455-0VS00-0AE0	6ES7 455-1VS00-0AE0		6ES7 455-0VS00-0AE0	6ES7 455-1VS00-0AE0
Control engineering			Potentials/ electrical isolation		
•Number of controllers			Electrical isolation, controller		
			- between the channels		
			- between the channels and the backplane bus		
			No		
			Yes; Optocoupler		
			No		
			Yes; Optocoupler		
Status information/ interrupts/ diagnostics			Permissible potential difference		
•Applying substitute values			•between the in puts and MANA (UCM)		
			2.5 V DC		
			•between Mininternal and the inputs		
			75 V DC / 60 V AC		
			75 V DC / 60 V AC		
Insulation			Dimensions and weight		
•Insulation tested with			•Weight, approx.		
			1,400 g		
			•Width		
			50 mm		
			•Height		
			290 mm		
			•Depth		
			210 mm		

Ordering data	Order No.		Order No.
FM 455 C controller module	6ES7 455-0VS00-0AE0	FM 455 manual	
with 16 analog outputs for 16 continuous-action controllers		German	6ES7 455-0VS00-8AA0
		English	6ES7 455-0VS00-8BA0
		French	6ES7 455-0VS00-8CA0
		Italian	6ES7 455-0VS00-8EA0
FM 455 S closed-loop control module	6ES7 455-1VS00-0AE0	Front connector	
with 32 digital outputs for 16 step or pulse controllers		1 unit, 48-pin	
		•With screw-type terminals	6ES7 492-1AL00-0AA0
		•With spring-loaded terminals	6ES7 492-1BL00-0AA0
		•With crimp contacts	6ES7 492-1CL00-0AA0

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.

SIMATIC S7-400

Function modules

FM 458-1 DP basic modules

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 607-0AA1
Supply voltages	
Rated value	
- 5 V DC	Yes
Current consumption	
•Current consumption, max.	2.3 A
- Backup current, max.	10 μ A
Memory/backup	
Backup	
- available	Yes; Backup battery of the SIMATIC power supply (3.4 V)
Time	
Clock	
- Hardware clock (realtime clock)	Yes
- Triggering	0.1 ms
PROFIBUS DP	
•Equidistance	Yes; with connection to interrupt tasks
•Direct data exchange (lateral communication)	Yes

	6DD1 607-0AA1
Digital inputs	
•Number of digital inputs	8; Connector X2
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 0 signal, max (permissible closed-circuit current)	0 mA
- for 1 signal, typical	3 mA; at 24 V
Input delay (at rated value of the input voltage)	
•For standard inputs	
- at 0 to 1, max.	20 μ s
Status information/ interrupts/ diagnostics	
Interrupts	
- Interrupts	Yes
Potentials/ electrical isolation	
Digital input functions	
- Electrical isolation, digital input functions	No; via optional interface module only
Dimensions and weight	
•Weight, approx.	0.8 kg
•Required slots	1

Ordering data	Order No.		Order No.
FM 458-1 DP application module Basic module for handling computing, open-loop control and closed-loop control tasks with PROFIBUS DP interface	6DD1 607-0AA1	RS 485 bus connector with 90° outgoing feeder cable Max. transmission rate 12 Mbit/s Without PG interface With PG interface	6ES7 972-0BA12-0XA0 6ES7 972-0BB12-0XA0
Micro memory card for FM 458-1 DP basic module 2 MB 4 MB 8 MB	6ES7 953-8LL11-0AA0 6ES7 953-8LM11-0AA0 6ES7 953-8LP11-0AA0	RS 485 bus connector with slanting outgoing feeder cable Max. transmission rate 12 Mbit/s Without PG interface With PG interface	6ES7 972-0BA41-0XA0 6ES7 972-0BB41-0XA0
FM 458-1 DP user guide ^{A)} English/German	6DD1 904-0AE1	RS 485 bus connector with 90° outgoing feeder cable for FastConnect system Max. transmission rate 12 Mbit/s Without PG interface With PG interface	6ES7 972-0BA50-0XA0 6ES7 972-0BB50-0XA0
SC 64 interface cable for connection of FM 458-1 to the serial port of a PG/PC	6DD1 684-0GE0	PROFIBUS FastConnect bus cable Standard type with special design for quick assembly, 2-core, shielded, meter goods; max. consignment 1000 m, minimum order 20 m Preferred lengths: 20 m 50 m 100 m	6XV1 830-0EH10 6XV1 830-0EN20 6XV1 830-0EN50 6XV1 830-0ET10
SB10 interface module for connection of 8 binary I/Os to FM 458-1 DP	6DD1 681-0AE2		
SB60 interface module for connection of 8 binary I/Os to FM 458-1 DP, input voltage 115/230 V AC/DC	6DD1 681-0AF4		
SB61 interface module for connection of 8 binary I/Os to FM 458-1 DP, input voltage 24/48 V DC	6DD1 681-0EB3		
SU12 interface module for connection of 10 signals to FM 458-1 DP	6DD1 681-0AJ1		

A) Subject to export regulations: AL: N and ECCN: EAR99H

SIMATIC S7-400

Function modules

EXM 438-1 input/output extension

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	
- 5 V DC	Yes
- 24 V DC	Yes; to be applied from outside
Current consumption	
•Current consumption, typical	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 0 signal, max (permissible closed-circuit current)	0 mA
- for 1 signal, typical	3 mA
Input delay (at rated value of the 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
•Short-circuit protection of the output, response threshold, typical	250 mA
•Limitation of voltage induced on circuit interruption to	Supply voltage + 1 V
Output voltage	
- for 0 signal (DC), max.	3 V
- for 1 signal (DC), max.	Supply voltage - 2.5 V
Output current	
- for 1 signal rated value	50 mA
- for 1 signal permissible range for 0 to 40 °C, min.	100 mA
- for 0 signal residual current, max.	20 µA
- Maximum switching current	80% at 50°C all outputs 50 mA
Output delay at resistive load	
- "0" to "1", max.	15 µs

	6DD1 607-0CA1
Analog inputs	
•Number of analog inputs	5; Differential inputs
Input ranges (rated values), voltages	
- -10 V to +10 V	Yes; -10 V +/- 4 LSB to +10 V +/- 4 LSB (1 LSB = 4.88 mV)
- Input resistance (-10 V to +10 V)	470 kΩ
Analog outputs	
•Number of analog outputs	8; 4 outputs 16 bits 4 outputs 12 bits
•Voltage output, short-circuit protection	Yes; to ground
•Voltage output, short-circuit current, max	16 bits: 27 mA 12 bits: 100 mA
Output ranges, voltage	
- -10 to +10 V	Yes
Analog value formation	
Integration and conversion time/triggering per channel	
- with over-range (bits incl. sign), max	4 AA: 16 bits 4 AA: 12 bits 5 AE: 12 bits
- Conversion time (per channel)	4 AA(16 bits): 2 µs 4 AA(12 bits): 4 µs 5 AE: 45 µs
Sensor supply	
•Output voltage	approx. 14 V (non-floating)
•Output current, rated value	100 mA
•Short-circuit protection	Yes; electronic
Sensor	
•Number of sensors that can be connected, max.	12; 8 incremental encoders (synchronizable), 4 absolute value encoders
Connectable encoders	
- Incremental encoder (symmetrical)	Yes
- Incremental encoder (asymmetrical)	Yes
- Absolute encoder (SSI)	Yes; Single or multturn encoder with SSI (synchronous serial) or EnDat interface

Technical specifications (continued)

	6DD1 607-0CA1
Incremental encoder (symmetrical)	
- Track mark signals	1.) for tracks A and B (displaced through 90°) possibly with zero pulse N; 2.) for separate forwards and reverse track
- Input signal	at 0 signal: -5 V to 0 V; at 1 signal: +3 V to +5 V; permissible input voltage range: differential voltage -5 V to +5 V; max. input current: 15 mA (Caution: not limited at the module!)
- Input frequency, max.	2.5 MHz
Incremental encoder (asymmetrical)	
- Track mark signals	Track A and B (displaced through 90 degrees) possibly with zero pulse N
- Input voltage	at 0 signal: -30 V to +4 V (at 15 mA load); at 1 signal: +8 V to +30 V (at 15 mA load); permissible input voltage range: differential voltage -30 V to +30 V
- Input frequency, max.	1 MHz; Track frequency
Absolute encoder (SSI)	
- Input signal	5 V in accordance with RS 422
- Data signal	Dual, gray, gray excess code
- Clock frequency, max.	2 MHz; 100 kHz to 2 MHz (depending on line length)

	6DD1 607-0CA1
Error/accuracies	
•Linearity error (relative to the output range)	(+/- 1 LSB)
Potentials/ electrical isolation	
Analog output functions	
- Electrical isolation, analog output functions	No
Analog output functions	
- Electrical isolation, analog inputs	No
Digital output functions	
- Electrical isolation, digital output functions	No
Digital input functions	
- Electrical isolation, digital input functions	No
Dimensions and weight	
•Weight, approx.	1 kg
•Required slots	1

Ordering data

	Order No.	Order No.
EXM 438-1 input/output expansion	6DD1 607-0CA1	
for direct exchange of digital and analog signals between FM 458-1 DP and the plant		
SB10 interface module	6DD1 681-0AE2	
for connection of 8 binary inputs or outputs to FM 458-1 DP		
SB60 interface module	6DD1 681-0AF4	
for connecting 8 binary inputs to FM 458-1 DP, input voltage 115/230 V AC/DC		
SB61 interface module	6DD1 681-0EB3	
for connecting 8 binary inputs to FM 458-1 DP, input voltage 24/48 V DC		
SB70 interface module	6DD1 681-0AG2	
for connecting 8 binary inputs to FM 458-1 DP, output voltage 230 V AC/DC		
SB71 interface module		6DD1 681-0DH1
for connecting 8 binary inputs to FM 458-1 DP, output voltage 24/48 V DC		
SU12 interface module		6DD1 681-0AJ1
for connection of 10 signals to FM 458-1 DP		
SU13 interface module		6DD1 681-0GK0
for connection of 50 signals to FM 458-1 DP		
SC 62 interface cable		6DD1 684-0GC0
for connection of EXM 438-1 to up to 5 SBxx or SU12		
SC 63 interface cable		6DD1 684-0GD0
for connection of EXM 438-1 to an SU13		
FM 458-1 DP user guide ^{A)}		6DD1 904-0AE1
English/German		

A) Subject to export regulations: AL: N and ECCN: EAR99H

SIMATIC S7-400

Function modules

EXM 448/448-1 universal communication expansion

Overview



- Optional plug-in expansion module for the FM 458-1 DP basic module
- For fast communication via PROFIBUS DP or SIMOLINK
- EXM 448: with vacant slot for a MASTERDRIVES option module
- EXM 448-1: with installed MASTERDRIVES option module SLB for configuration of a SIMOLINK fiber-optic connection

Technical specifications

	6DD1 607-0EA0	6DD1 607-0EA1
Supply voltages		
Rated value		
- 5 V DC	Yes	Yes
Current consumption		
• Current consumption, typical	0.8 A	0.8 A
Dimensions and weight		
• Weight, approx.	0.8 kg	0.8 kg
• Required slots	1	1

Ordering data

Order No.	
EXM 448 universal communications expansion module	6DD1 607-0EA0
for fast communication, e.g. with drives; with vacant slot for MASTERDRIVES option module	
EXM 448-1 universal communications expansion module	6DD1 607-0EA1
for fast communication, e.g. with drives; with MASTERDRIVES option module SLB for designing a SIMOLINK fiber-optic connection	

A) Subject to export regulations: AL: N and ECCN: EAR99H

Order No.	
COM PROFIBUS V5.1 parameterization software	6ES5 895-6SE03
for parameterization of PROFIBUS networks for Windows 95/98/NT/2000/Me on CD-ROM, in 5 languages, incl. documentation	
FM 458-1 DP user guide ^{A)}	6DD1 904-0AE1
English/German	

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	
- 5 V DC	Yes
Current consumption	
•Current consumption, typical	0.6 A
Dimensions and weight	
•Weight, approx.	0.9 kg
•Required slots	1

Ordering data

Order No.

EXM 448-2 universal communications expansion ^{A)}	6DD1 607-0EA2
For fast communication with drives; for constructing two SIMOLINK fiber-optic connections	
FM 458-1 DP User Manual ^{A)}	6DD1 904-0AE1
English/German	

A) Subject to export regulations: AL: N and ECCN: EAR99H

SIMATIC S7-400

Function modules

Accessories for FM 458-1 DP

Overview SC 64 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.

Overview SB60 interface module



The interface module is used to connect 8 digital inputs with conversion from 115/230 V DC/AC to 24 V DC

Overview SB70 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 120 V DC/AC on the plant side using relays.

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.

SIMATIC S7-400

Function modules

Accessories for FM 458-1 DP

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

SB 10 interface module

Number of digital inputs or outputs	8
Electrical isolation	No
Max. cable cross-section	1.5 mm ²
Dimensions (W x H x D) in mm	45 x 130 x 156
Weight	0.3 kg

SB60 interface module

Number of digital inputs for	8
• Input voltage	115/230 V DC/AC
Electrical isolation	Yes, via optocoupler
Insulation voltage	Separation assured: • Isolation between inputs and outputs assured • 1125 V AC test voltage for input current circuit
Max. cable cross-section	1.5 mm ²
Dimensions (W x H x D) in mm	45 x 130 x 156
Weight	0.31 kg

SB61 interface module

Number of digital inputs for	8
• Input voltage	24/48 V DC
Electrical isolation	Yes, via optocoupler
Max. cable cross-section	1.5 mm ²
Dimensions (W x H x D) in mm	45 x 130 x 156
Weight	0.32 kg

SB70 interface module

Number of digital outputs	8
• Output voltage, max	120 V DC/AC
Relay switching current	
• For 120 V AC	2 A
• For 120 V DC	0.2 A
Electrical isolation	Using relay
Isolation voltage	Separation assured: • Isolation between inputs and outputs assured • 1125 V AC test voltage for input current circuits
Max. cable cross-section	1.5 mm ²
Dimensions (W x H x D) in mm	45 x 130 x 156
Weight	0.32 kg

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 mm ²
Dimensions (W x H x D) in mm	45 x 130 x 156
Weight	0.32 kg

Technical specifications (continued)

SU12 interface module

Number of signal cables which can be connected	10
Signal amplitude per signal, max.	60 V, 0.5 A
Electrical isolation	No
Max. cable cross-section	1.5 mm ²
Dimensions (W x H x D) in mm	45 x 130 x 156
Weight	0.28 kg

SU13 interface modul

Number of signal cables which can be connected	50
Signal amplitude per signal, max.	60 V, 0.5 A
Electrical isolation	No
Max. cable cross-section	1.5 mm ²
Dimensions (W x H x D) in mm	45 x 130 x 156
Weight	0.3 kg

Ordering data

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 modules 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

Order No.

Order No.
SB60 interface module 8 digital inputs, 120 V AC
6DD1 681-0AF4
SB61 interface module 8 digital inputs, 24/48 V DC
6DD1 681-0EB3
SB70 interface module 8 digital outputs with relay
6DD1 681-0AG2
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 modul with screw-plug-in terminal
6DD1 681-0GK0

IP 242B counter module

Overview

- For acquiring and processing count pulses up to a frequency of 500 kHz
- Used for counting pulses, generating frequencies, splitting frequencies as well as measuring frequency, time and velocity.
- For applications in which the count has to be processed extremely quickly.

For further information and ordering data, please refer to Catalog ST 50, CA 01 or the A&D Mall.

Ordering data

Order No.

IP 242B counter module ^{A)}
including S7 adapter casing

6ES7 470-1AB00-0AA0

To be ordered separately:

IP242B configuring package in S7 adapter casing

comprising a manual and standard function blocks

German

6ES5 242-5AB11

English

6ES5 242-5AB21

French

6ES5 242-5AB31

Italian

6ES5 242-5AB51

Terminal connector

6ES5 983-2AB11

4 units

Converter

6ES5 242-1AU11

for 24 V asymmetric incremental encoders to 5 V (RS 422)
symmetric incremental encoders

705 connecting cable

6ES5 705-2CC00

for Siemens position encoders (RS 422)

A) Subject to export regulations: AL: N and ECCN: EAR99H

SIMATIC S7-400

SIMATIC S5 intelligent input/output modules

IP 244 temperature control module

Overview

- For controlling and monitoring temperatures and for acquiring and monitoring analog measured values

For further information and ordering data, please refer to Catalog ST 50, CA 01 or the A&D Mall.

Ordering data

Order No.

IP 244 thermostat module
including S7 adapter casing

6ES7 470-1AD00-0AA0

To be ordered separately:

IP 244 configuration package in S7 adapter casing

comprising a manual and standard function blocks

German

6ES5 244-5AA11

English

6ES5 244-5AA21

French

6ES5 244-5AA31

Italian

6ES5 244-5AA51

721-4 connecting cable

between IP 244 and binary inputs or outputs

2.5 m

6ES5 721-4BC50

5 m

6ES5 721-4BF00

10 m

6ES5 721-4CB00

721-5 connecting cable

between IP 244 and analog inputs or outputs

2.5 m

6ES5 721-5BC50

5 m

6ES5 721-5BF00

32 m

6ES5 721-5CD20

SIMATIC S7-400

Communication

CP 440

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	
- 5 V DC	Yes
- 24 V DC	Yes
Current consumption	
• from backplane bus 5 V DC, max.	360 mA
• Power dissipation, typical	1.7 W
Memory/backup	
Memory	
- Memory requirement per interface in the S7 CPU memory card	1 to 5 kBytes for parameters, 0 to 55 kBytes for message texts
Communication functions	
• S7 extended communication	Yes
Number of connections	
- overall	31

	6ES7 440-1CS00-0YE0
Interfaces	
• Number	1
• Physical interface, RS422/RS485 (X.27)	Yes
• RS 422/485, length of cable (shielded), max.	1,200 m
Point-to-point	
Integral protocol driver	
- 3964 (R)	Yes
- ASCII	Yes
Transmission rate, 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; separate parameterization masks
Dimensions and weight	
• Weight, approx.	720 g
• Width	25 mm
• Height	290 mm
• Depth	210 mm

Ordering data

CP 440 communications processor
with one RS 422/485 (X.27) interface

Order No.

6ES7 440-1CS00-0YE0

RS 422/485 connecting cable
for linking to SIMATIC S7

5 m
10 m
50 m

Order No.

6ES7 902-3AB00-0AA0
6ES7 902-3AC00-0AA0
6ES7 902-3AG00-0AA0

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 (retrofitable)
- Simple parameterization via a parameterization tool integrated into STEP 7

Technical specifications

	6ES7 441-1AA03-0AE0	6ES7 441-2AA03-0AE0
Supply voltages		
Rated value		
- 5 V DC	Yes	
- 24 V DC	Yes	
Current consumption		
•from backplane bus 5 V DC, max.	700 mA; without interface module	700 mA; without interface module
Memory/backup		
Memory		
- Memory requirement per interface in the S7 CPU memory card	1 to 5 kBytes for parameters, 0 to 55 kBytes for message texts	1 to 5 kBytes for parameters, 0 to 55 kBytes for message texts, 0 to 64 kBytes for loadable drivers
Communication functions		
•S7 extended communication	Yes	Yes
Number of connections		
- overall	8	8
Interfaces		
•Number	1; variable	2; variable
•Physical interface, 20mA (TTY)	Yes	Yes
•Physical interface, RS 232C (V.24)	Yes	Yes
•Physical interface, RS422/RS485 (X.27)	Yes	Yes
•20mA (TTY), length of cable (shielded), max.	1,000 m	1,000 m
•RS 232, length of cable (shielded), max.	10 m	10 m
•RS 422/485, length of cable (shielded), max.	1,200 m	1,200 m
Interface modules		
- 20 mA (TTY), current consumption from 5 V/24 V, max.	300 mA at 5 V, 45 mA at 24 V	300 mA at 5 V, 45 mA at 24 V
- RS 422/485 (X.27), current consumption from 5 V, max.	300 mA	300 mA
- RS232C (V.24), current consumption from 5 V, max.	300 mA	300 mA

	6ES7 441-1AA03-0AE0	6ES7 441-2AA03-0AE0
Point-to-point		
•Supported printers	HP-Deskjet, HP-Laserjet, IBM-Proprietary, user-defined	HP-Deskjet, HP-Laserjet, IBM-Proprietary, user-defined
•Transmission rate, max.	38.4 kBit/s	115.2 kBit/s; split between both interfaces
Integral protocol driver		
- 3964 (R)	Yes	Yes
- ASCII	Yes	Yes
- Printer	Yes	Yes
- Customer-specific drivers for later loading		Yes
- RK512		Yes
Transmission rate, 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 rate, 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 rate, 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
CPU/ programming		
Configuration software		
- STEP 7	Yes; separate parameterization masks	Yes; separate parameterization masks

SIMATIC S7-400

Communication

CP 441-1, CP 441-2

Technical specifications (continued)

	6ES7 441-1AA03-0AE0	6ES7 441-2AA03-0AE0
Dimensions and weight		
•Weight, approx.	720 g; interface module: 100g	720 g; interface module: 100g
•Width	25 mm	25 mm
•Height	290 mm	290 mm
•Depth	210 mm	210 mm

Ordering data

Order No.

CP 441-1 communications processor with one variable interface for interface submodules; incl. configuring package on CD	6ES7 441-1AA03-0AE0
CP 441-2 communications processor with two variable interfaces for interface submodules; incl. configuring package on CD	6ES7 441-2AA03-0AE0
Interface modules	
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
CP 441-1, CP 441-2 manual	
German	6ES7 441-2AA00-8AA0
English	6ES7 441-2AA00-8BA0
French	6ES7 441-2AA00-8CA0
Italian	6ES7 441-2AA00-8EA0
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

Overview



- Master connection of the S7-400 to PROFIBUS
- Communication services:
 - PG/OP communication
 - S7 communication
 - S5-compatible communication (SEND/RECEIVE)
 - PROFIBUS FMS
- Time-of-day synchronization
- Simple configuration and programming using PROFIBUS
- PG communication between networks through S7 routing
- Easy to integrate into the SIMATIC S7-400 system
- Module changeover without PG
- Operation in the SIMATIC H system for redundant S7 communication

5

Technical specifications

Data transmission rate	9.6 kbit/s to 12 Mbit/s
Interface	
• Connection to PROFIBUS	9-pin Sub-D socket (RS 485)
Power supply	5 V DC $\pm$ 5%
Current input from 5 V DC	1.2 A
Power loss	6.5 W
Perm. ambient conditions	
• Operating temperature	0 °C to +60 °C
• Transport/storage temperature	-40 °C to +70 °C
• Relative humidity	Max. 95% at +25°C
Construction	
• Dimensions (WxHxD) in mm	25 x 290 x 210
• Weight	Approx. 700 g
Performance data for S7 communication	
• Number of connections that can be used	16 to 48 ¹⁾

1) Dependent on CPU type

Performance data for S5-compatible communication (SEND/RECEIVE)	
• Number of connections that can be used	Max. 32
• Useful data / connection	max. 240 bytes (SEND and RECEIVE)
Performance data for FMS function	
• Number of connections that can be used	Max. 48
• Variable length READ	Max. 237 bytes
• Variable length WRITE	Max. 233 bytes
• Configurable server variables	512
• Variables that can be loaded from partners	2640
Multi-protocol operation	
• Number of connections that can be used (2 of which are reserved for PG/OP communication)	Max. 59

SIMATIC S7-400

Communication

CP 443-5 Basic

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Ordering data	Order No.		Order No.
CP 443-5 communications processor Communications processor for connecting S7-300 to PROFIBUS, FMS, S5-compatible communication, PG/OP and S7 communication; with electronic manual on CD-ROM	6GK7 443-5FX02-0XE0	PROFIBUS FastConnect RS 485 bus connector With 90° cable outlet; With insulation displacement method, max. data transmission rate 12 Mbit/s •without PG interface •with PG interface	6ES7 972-0BA50-0XA0 6ES7 972-0BB50-0XA0
NCM S7 configuration software for PROFIBUS Configuration software for PROFIBUS CPs for SIMATIC S7 V5.x, executable under STEP 7 V5.x; with electronic manual on CD-ROM English, French, German, Italian and Spanish	Delivered with STEP 7 Version 5	PROFIBUS bus connector IP20 For connection to PPI, MPI, PROFIBUS •without PG interface •with PG interface	6ES7 972-0BA12-0XA0 6ES7 972-0BB12-0XA0
"NCM S7 for PROFIBUS" manual Paper version for V5.x (STEP 7 V5.x) •German •English •French •Spanish •Italian	6GK7 080-5AA04-8AA0 6GK7 080-5AA04-8BA0 6GK7 080-5AA04-8CA0 6GK7 080-5AA04-8DA0 6GK7 080-5AA04-8EA0	PROFIBUS 12M bus terminal Bus terminal for connecting PROFIBUS stations up to 12 Mbit/s with connecting cable "Communication with SIMATIC" manual •German •English •French •Spanish •Italian	6GK1 500-0AA10 6ES7 398-8EA00-8AA0 6ES7 398-8EA00-8BA0 6ES7 398-8EA00-8CA0 6ES7 398-8EA00-8DA0 6ES7 398-8EA00-8EA0

Overview



- DP V1 master connection of S7-400 to PROFIBUS
- For configuring additional PROFIBUS DP lines
- Communication services:
 - PROFIBUS DP
 - PG/OP communication
 - S7 communication
 - S5-compatible communication (SEND/RECEIVE)
- Time-of-day synchronization
- Simple configuration and programming using PROFIBUS
- PG communication between networks through S7 routing
- Easy to integrate into the SIMATIC S7-400 system
- Module replacement without the need for a programming device.
- Operation in the SIMATIC H system for redundant S7 communication or DP master communication
- Data record routing (PROFIBUS DP)
- Add or change distributed I/O during normal operation

Technical specifications

Data transmission rate	9.6 kbit/s to 12 Mbit/s
Interfaces	
•Ports	9-pin Sub-D socket (RS 485)
Power supply	5 V DC $\pm$ 5% 24 V DC $\pm$ 5%
Current input from 5 V DC	1.3 A
Power loss	6.5 W
Perm. ambient conditions	
•Operating temperature	0 °C to +60 °C
•Transport/storage temperature	-40 °C to +70 °C
•Relative humidity	Max. 95% at +25°C
Construction	
•Dimensions (WxHxD) in mm	25 x 290 x 210
•Weight	Approx. 700 g
Number of external DP-lines in one central rack	10

Performance data for DP master function

•DP master	DP-V1
•Number of operable DP slaves	Max. 125
•Size of DP data areas overall	
- DP input area	Max. 4 KB
- DP output range	Max. 4 KB
•Size of DP data areas per connected DP slave	
- DP input area	Max. 244 bytes
- DP output range	Max. 244 bytes

Performance data for S7 communication

•Number of connections that can be used	16 to 48 ¹⁾
---	------------------------

Performance data for S5-compatible communication (SEND/RECEIVE)

•Number of connections that can be used	Max. 32
•Useful data / connection	max. 240 bytes (SEND and RECEIVE)

Multi-protocol operation

•Number of connections that can be used (2 of which are reserved for PG/OP communication)	
- Without DP	Max. 59
- With DP	Max. 55

1) Dependent on CPU type

SIMATIC S7-400

Communication

CP 443-5 Extended

5

Ordering data	Order No.		Order No.
CP 443-5 Extended communications processor For connection of SIMATIC S7-400 to PROFIBUS Extended version for PROFIBUS DP; with electronic manual on CD-ROM	6GK7 443-5DX03-0XE0	PROFIBUS FastConnect RS 485 bus connector With 90° cable outlet; With insulation displacement method, max. data transmission rate 12 Mbit/s •without PG interface •with PG interface	6ES7 972-0BA50-0XA0 6ES7 972-0BB50-0XA0
NCM S7 configuration software for PROFIBUS Configuration software for PROFIBUS CPs for SIMATIC S7 V5.1 and newer executable under STEP 7 V5.1; with electronic manual on CD-ROM English, French, German, Italian and Spanish	Delivered with STEP 7 Version 5	PROFIBUS bus connector IP20 For connection to PPI, MPI, PROFIBUS •without PG interface •with PG interface	6ES7 972-0BA12-0XA0 6ES7 972-0BB12-0XA0
"NCM S7 for PROFIBUS" manual Paper version for V5.x (STEP 7 V5.x)		PROFIBUS 12M bus terminal Bus terminal for connecting PROFIBUS stations up to 12 Mbit/s with connecting cable	6GK1 500-0AA10
•German •English •French •Spanish •Italian	6GK7 080-5AA04-8AA0 6GK7 080-5AA04-8BA0 6GK7 080-5AA04-8CA0 6GK7 080-5AA04-8DA0 6GK7 080-5AA04-8EA0	"Communication with SIMATIC" manual •German •English •French •Spanish •Italian	6ES7 398-8EA00-8AA0 6ES7 398-8EA00-8BA0 6ES7 398-8EA00-8CA0 6ES7 398-8EA00-8DA0 6ES7 398-8EA00-8EA0

Overview



- Connection of SIMATIC S7-400 to Industrial Ethernet
 - 10/100 Mbit/s full/half duplex connection with autosensing for automatic switchover between AUI, ITP and RJ45 interface
 - Universal connection options for ITP, RJ45 and AUI
 - Multi-protocol operation with ISO, TCP/IP and UDP transport protocol
 - Adjustable Keep Alive function
- Communication services:
 - ISO, TCP/IP and UDP transport protocols
 - PG/OP communication
 - S7 communication
 - S5-compatible communication
- Multicast for UDP
- Cross-network programming device/operator panel communication through S7 routing
- Remote programming and initial startup via the network
- Access protection by means of configurable access list

5

Technical specifications

Data transmission rate	10/100 Mbit/s autosensing
Interfaces	
• Connection to Industrial Ethernet	15-pin Sub-D connector
- AUI (10 Mbit/s)	
- ITP (10/100 Mbit/s)	
• 10BaseT, 100BaseTX	RJ45
Current consumption	
• From +5 V DC (± 5%)	Approx. 1.4 A
• From 24 V DC (± 5%)	Typ. 220 mA, Max. 350 mA (depending on the interface used)
Power loss	8.6 W
Perm. environmental conditions	
• Operating temperature	0°C to +60°C
• Transport/storage temperature	-40 °C to +70 °C
• Relative humidity	Max. 95% at +25 °C
Design	
• Module format	Compact module S7-400, single width
• Dimensions (W x H x D) in mm	25 x 290 x 210
• Weight	Approx. 700 g
Configuration software	NCM S7 for Industrial Ethernet (included in the scope of supply of STEP 7 V5.x)

Performance data	
S5-compatible communication (SEND/RECEIVE)	
• Sum of all simultaneously operable ISO/TCP/UDP connections	Max. 64
• Number of useful data ISO or TCP/IP	Max. 8 Kbytes
• Number of useful data UDP	Max. 2 Kbytes
S7 communication	
• Number of connections ¹⁾	Max. 48
Multi-protocol operation	
• Sum of all simultaneously operable connections	Max. 64

1) Use depends on performance of used S7-CPU/FM

SIMATIC S7-400

Communication

CP 443-1

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Ordering data

Order No.

Order No.

CP 443-1

communications processor

For connecting SIMATIC S7-400 to Industrial Ethernet through TCP/IP, ISO and UDP; for S7 communication, S5-compatible communication (SEND/RECEIVE) with FETCH/WRITE with and without RFC 1006, diagnostic expansions, Multicast, access protection over IP access list, initial start-up over LAN 10/100 Mbit/s with electronic manual on CD-ROM

6GK7 443-1EX11-0XE0

NCM S7 configuration software for Industrial Ethernet

Configuration software for Industrial Ethernet-CPs for SIMATIC S7; V5.x, operating under STEP 7 V5.x; on CD-ROM with electronic manual in German, English, French, Spanish, Italian

Included in the STEP 7 V5.x package

Documentation S7-CPs/NCM S7

for Industrial Ethernet and PROFIBUS; manual package for configuring S7-CPs, IE/PB Link and PC-Stations (STEP 7 V5.3)

- German
- English

6GK7 080-0AA01-8AA0
6GK7 080-0AA01-8BA0

IE FC RJ45 Plug 180

RJ45 plug-in 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 item
- 1 pack = 10 items
- 1 pack = 50 items

6GK1 901-1BB10-2AA0

6GK1 901-1BB10-2AB0

6GK1 901-1BB10-2AE0

Overview



- Connection of SIMATIC S7-400 to Industrial Ethernet
 - 10/100 Mbit/s full/half duplex connection with autosensing
 - Connection via RJ45
 - Multi-protocol operation for ISO, TCP/IP and UDP
 - Adjustable Keep Alive function
- Communication services:
 - PROFINET IO Controller
 - PROFINET CBA
 - ISO, TCP/IP and UDP transport protocols: Multicast for UDP
 - Programming device/operator panel communication: Cross-network by means of S7 routing
 - S7 communication
 - S5-compatible communication
 - IT communication:
 - HTTP communication supports access to process data through Web browsers;
 - FTP communication supports program-controlled FTP client communication,
 - Access to data blocks through FTP server,
 - Data handling for own file system through FTP, E-mail
- IP address assignment via DHCP, simple PC tool or via the user program (e.g. HMI)
- Access protection by means of configurable access list
- Single-width module with integrated 4-port switch saves space in the rack and control cabinet. Thanks to the integrated autocrossing function, the CP 443-1 Advanced is very well suited for establishing small local networks.
- Module replacement without programming device; all information is stored on the C-PLUG (also file system for IT functions).
- Extensive diagnostic functions for all modules in the rack
- Integration into network management systems through the support of SNMP V1 MIB-II

Technical specifications

Data transmission rate	10/100 Mbit/s autosensing
Interfaces	
• 10BaseT, 100BaseTX	4x RJ45
Power supply	DC +5 V (+/- 5%) from the backplane bus
Current consumption	
• From backplane bus	Max. 1.8 A
Power loss	7.25 W
Perm. ambient conditions	
• Operating temperature	0 °C to +60 °C
• Transport/storage temperature	-40 °C to +70 °C
• Relative humidity	Max. 95% at +25 °C
Construction	
• Module format	Compact module S7-400, single width
• Dimensions (W x H x D) in mm	25 x 290 x 217
• Weight	Approx. 750 g
Configuring software	STEP7 V5.3 + SP1 ¹⁾²⁾

Performance data	
Memory capacity	
• Flash memory file system	32 MB, approx. 30 MB of which is freely available to the user
• RAM	32 MB, approx. 30 MB of which is freely available to the user; additional 512 KB buffered via central backup battery
PG/OP communication	
• Number of PG connections	Max. 2
• Number of OP connections	Max. 30
S7 communication	
• Number of connections	Max. 128
S5-compatible communication (SEND/RECEIVE)	
• Sum of all simultaneously operable TCP/UDP connections	Max. 64
• Useful data	
- ISO or TCP/IP	Max. 8 KB
- UDP	Max. 2 KB
- E-mail	Max. 2 KB
PROFINET communication	
	See http://www.siemens.com/profinet/ik-info
HTTP communication	
• Number of server connections	Max. 4
Multi-protocol operation	
• Sum of all simultaneously operable connections	Max. 128

1) For configuring PROFINET IO

2) For configuring PROFINET CBA, iMap V2.0 is also required

SIMATIC S7-400

Communication

CP 443-1 Advanced

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Ordering data	Order No.	Order No.
CP 443-1 Advanced communications processor^{H)} for the connection of SIMATIC S7-400 to Industrial Ethernet, PROFINET IO-Controller, PROFINET CBA, TCP/IP, ISO and UDP; for S7 communication, S5-compatible communication (SEND/RECEIVE) with FETCH/WRITE, with and without RFC 1006, diagnostic expansions, multicast, clock synchronization via SIMATIC procedure or NTP, access protection via IP access list, FTP client/server, HTTP server, HTML diagnostics, SNMP, DHCP, e-mail, data storage on C-PLUG, 4-port switch on board, initialization via LAN 10/100 Mbit/s; with electronic manual on CD-ROM	6GK7 443-1EX40-0XE0	Configuring software NCM S7 for Industrial Ethernet CPs for SIMATIC S7; V5.x, operating under STEP 7 V5.x; with electronic manual on CD-ROM, German, English, French, Spanish, Italian Included in the STEP 7 V5.x scope of supply
C-Plug^{A)} Replacement 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	6GK1 900-0AB00	Documentation S7-CPs/NCM for Industrial Ethernet and PROFIBUS; manual package for configuring S7-CPs, IE/PB Link and PC-Stations (STEP 7 V5.3) •German •English 6GK7 080-0AA01-8AA0 6GK7 080-0AA01-8BA0
IE FC RJ45 Plug 180 RJ45 plug-in 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/CPU with Industrial Ethernet interface •1 pack = 1 item •1 pack = 10 items •1 pack = 50 items	6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0	Software iMap V2.0 for configuring PROFINET CBA, <u>Requirement:</u> Windows 2000 Prof. SP4 or Windows XP Prof. SP1; on PG or PC with Pentium processor, min. 500 MHz; STEP 7, V5.2 SP 1 and higher incl. NCM, SIMATIC NET IE SOFTNET-PG, V6.2 and higher; PN OPC server, V6.2 and higher <u>Type of delivery:</u> German, English with electronic documentation; •Single license •Software update service •Upgrade iMap V2.0 single license 6ES7 820-0CC03-0YX0 6ES7 820-0CC01-0YX2 6ES7 820-0CC03-0YX4

A) Subject to export regulations: AL: N and ECCN: EAR99H

H) Subject to export regulations: AL: N and ECCN: 5A991

Overview



- The connection for the SIMATIC S7-400 to Industrial Ethernet
 - 10/100 Mbit/s full/half duplex connection with autosensing for automatic switchover between AUI, ITP and RJ45 interface
 - universal connection options for ITP, RJ45 and AUI
 - Multi-protocol operation for ISO, TCP/IP and UDP
 - Adjustable Keep Alive function
- Communication services:
 - Programming device/operator panel communication
 - S7 communication
 - S5-compatible communication
 - IT communication
- Web-function for access to process data via Web browser
- E-mail function for sending electronic messages via the S7-400.
- FTP communication permits program-controlled FTP client communication, access to data blocks via FTP server
- Multicast for UDP
- Cross-network programming device/operator panel communication through S7 routing
- Remote programming and initial startup via the network

Technical specifications

Data transmission rate	10/100 Mbit/s autosensing
Interfaces	
• Connection to Industrial Ethernet	15-pin Sub-D socket
- AUI (10 Mbit/s)	
- ITP (10/100 Mbit/s)	
• 10BaseT, 100BaseTX	RJ45
Current consumption	
• from DC + 5V (±5%)	approx. 1.5 A
• from DC +24V (±5%)	typ. 220 mA max. 340 mA
Power loss	9.1 W
Perm. ambient conditions	
• Operating temperature	0 °C to +60 °C
• Transport/storage temperature	-40 °C to +70 °C
• Relative humidity	Max. 95% at +25 °C
Construction	
• Module format	Compact module S7-400, single width
• Dimensions (WxHxD) in mm	25 x 290 x 210
• Weight	Approx. 700 g
Configuring software	NCM S7 for Industrial Ethernet V5 or higher (included in the scope of delivery of STEP 7 V5.x).

Performance data	
IT communication	
Number of connections to an e-mail server	Max. 1
FTP communication	
Number of client connections	Max. 10
Number of server connections	Max. 2
Capacity of flash memory file system	10 MB
Service life of the Flash Memory cells	10,000 write cycles
S5-compatible communication (SEND/RECEIVE)	
• Sum of all simultaneously operable ISO/TCP/UDP connections	Max. 64
• Useful data	
- ISO or TCP/IP	Max. 8 KB
- UDP	Max. 2 Kbyte
- E-mail	Max. 2 Kbyte
S7 and programmable device/operator panel communication	
• Number of connections ¹⁾	Max. 48
Multi-protocol operation	
• Sum of all simultaneously operable connections	Max. 64

1) Use depends on performance of S7-CPU/FM used.

Ordering data	Order No.	Order No.
CP 443-1 IT communications processor for the connection of SIMATIC S7-400 to Industrial Ethernet for S5-compatible communication (SEND/RECEIVE), S7 communication, E-mail and WWW server; with electronic manual on CD-ROM	6GK7 443-1GX20-0XE0	NCM S7 configuration software for Industrial Ethernet Configuration software for Industrial Ethernet-CPs for SIMATIC S7; V5.x, operating under STEP 7 V5.x; on CD-ROM with electronic manual in German, English, French, Spanish, Italian Documentation S7-CPs/NCM S7 for Industrial Ethernet and PROFIBUS; manual package for configuring S7-CPs, IE/PB Link and PC-Stations (STEP 7 V5.3) •German •English
IE FC RJ45 Plug 180 RJ45 plug-in 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/CPU's with Industrial Ethernet interface •1 pack = 1 item •1 pack = 10 items •1 pack = 50 items	6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0	

Overview



- The link to Industrial Ethernet in conjunction with MMS services as per MAP 3.0
- To off-load the CPU from communication tasks and to implement additional links
- MMS services:
 - Environment Management
 - VMD Support Services
 - Variable Access Services

Technical specifications

	6ES7 444-1MX00-0XE0
Current consumption	
• from backplane bus 5 V DC, max.	3.1 A
• Power dissipation, typical	15.6 W
Communication functions	
• Bus protocol/transfer protocol	MAP 3.0 based on the transport protocol according to ISO 8073 class 4
• S7 extended communication	Yes
Number of connections	
- overall	1
Connection system	
• Bus lines	15-pin sub-D female connector (automatic switchover between AUI and Industrial Twisted Pair)
Industrial Ethernet	
• Transmission rate, max.	10 Mbit/s

	6ES7 444-1MX00-0XE0
Environmental requirements	
Operating temperature	
- min.	0 °C
- max.	40 °C
- Forced ventilation	55 °C
Storage/transportation temperature	
- min.	-20 °C
- max.	60 °C
Relative humidity	
- Operation, min.	8 %
- Operation, max.	80 %; at 25 °C (no condensation)
Vibration	
- Operation, tested to IEC 60068-2-6	Yes; 10 to 58 Hz: 0.0035 mm, const. amplitude, 58 to 500 Hz: 0.5 g, const. acceleration
Dimensions and weight	
• Weight, approx.	2,080 g
• Width	50 mm
• Height	290 mm
• Depth	210 mm

Ordering data

Order No.
CP 444 communications processor
for connecting SIMATIC S7-400 to Industrial Ethernet using MMS services to MAP 3.0
6ES7 444-1MX00-0XE0

Order No.
CP 444 manual
German
English
6ES7 444-2AA00-8AA0
6ES7 444-2AA00-8BA0

SIMATIC S7-400

Modules for SIMATIC S7-400H

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

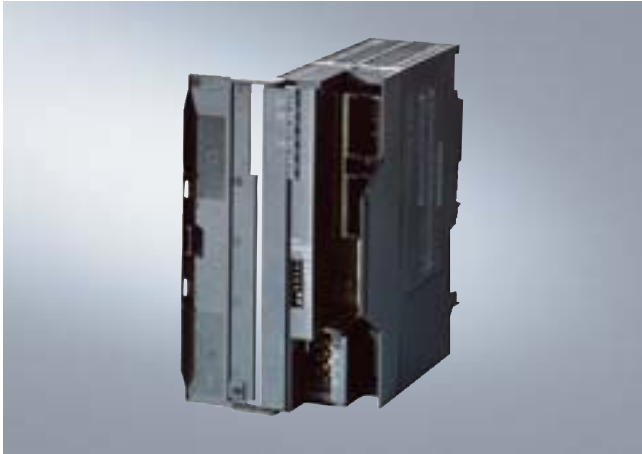
	6ES7 197-1LA02-0XA0
System	
Requirements of a DP master system	
- Length diagnostics frame	231 Byte
- Length configuration frame	244 Byte
- Length user data frame	244 Byte
- Length parameterization frame	214 Byte
Protocols	
• PROFIBUS DP protocol	Yes

	6ES7 197-1LA02-0XA0
PROFIBUS DP	
• Transmission rate, max.	12 Mbit/s; 9.6 / 19.2 / 45.45 / 93.75 / 187.5 / 500 kbit/s 1.5 / 3 / 6 / 12 Mbit/s
Dimensions and weight	
• Weight, approx.	350 g
• Width	40 mm
• Height	125 mm
• Depth	130 mm

Ordering data

	Order No.
Y-link	6ES7 197-1LA02-0XA0
For connecting single channel DP slaves to SIMATIC S7-400H; comprising 2 IM 157 interface modules, 1 Y-coupler, 1 BM IM157 bus module, 1 BM Y-coupler bus module	

Overview



- For connecting the ET 200M as a slave to the optical PROFIBUS
- Optical expansion to IM 153-2 (High Feature) (RS 485)
- Integral fiber-optic interface for plastic and PCF cables
- Redundancy capability
- With time stamping functionality and time synchronization

5

Technical specifications

IM 153-2 FO interface module

Data transmission rate	9.6 kbit/s to 12 Mbit/s (not 3 and 6 Mbit/s)
Transmission technology	FOC; Wavelength $\lambda = 660 \text{ nm}$
Internode communication support	Yes, transmitter (from 6ES7 153-2AB01-0XB0)
Interfaces	
• Connection to optical PROFIBUS	2 x duplex sockets
Supply voltage	24 V DC through screw terminals
• Permissible range (including ripple)	20.4 to 28.8 V
• Current consumption at 24 V DC, typical	625 mA

IM 153-2 FO interface module (continued)

Output voltage	5 V DC
Output current (at 5 V DC), max.	1 A (for backplane bus)
Configuring software	STEP 7/ COM PROFIBUS/third-party tools using GSD file
Degree of protection	IP20
Ambient temperature	0°C to +60 °C
Operating altitude, max.	3000 m above mean sea level
Dimensions (W x H x D) in mm	40 x 125 x 120
Weight, approx.	350 g

SIMATIC S7-400

Modules for SIMATIC S7-400F/FH

IM 153-2 FO

Ordering data

Order No.

IM 153-2 FO interface module ^{A)}

High Feature for max. 8 S7-300 modules, redundancy capable, with integrated FOC interface for assembling an optical line

6ES7 153-2BB00-0XB0

IM 153/IM 153 active bus module

For 2 IM 153-2 FO for assembling redundant systems

6ES7 195-7HD10-0XA0

Bus module for ET 200M

- For accommodating an PS and an IM 153 for hot swapping incl. bus module cover
- For accommodating two 40 mm wide I/O modules for hot swapping
- For accommodating one 80 mm wide I/O module for hot swapping

6ES7 195-7HA00-0XA0

6ES7 195-7HB00-0XA0

6ES7 195-7HC00-0XA0

Accessories

PROFIBUS plastic fiber-optic connector / polishing kit ^{A)}

100 Simplex plugs and 5 polishing kits, for assembling PROFIBUS plastic fiber-optic cables for the optical PROFIBUS DP; for 25 modules

6GK1 901-0FB00-0AA0

PROFIBUS plastic fiber-optic stripping tool set ^{A)}

To remove the external or core sleeve of plastic fiber-optic cables

6GK1 905-6PA10

Connection adapters

Packet of 50 for using Simplex plugs in integrated FO interfaces; for 25 modules

6ES7 195-1BE00-0XA0

SIMATIC DP profile rail for ET 200M

For accommodating max. 5 bus modules for

- Length 483 mm
- Length 530 mm

6ES7 195-1GA00-0XA0

6ES7 195-1GF30-0XA0

SIMATIC S7-300 profile rail

- Length 160 mm
- Length 480 mm
- Length 530 mm
- Length 830 mm
- Length 2000 mm

6ES7 390-1AB60-0AA0

6ES7 390-1AE80-0AA0

6ES7 390-1AF30-0AA0

6ES7 390-1AJ30-0AA0

6ES7 390-1BC00-0AA0

SIMATIC Manual Collection ^{B)}

Electronic manuals on CD, multilingual: S7-200, TD 200, S7-300, M7-300, C7, S7-400, M7-400, STEP 7, Engineering Tools, Runtime Software, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication)

6ES7 998-8XC01-8YE0

SIMATIC Manual Collection update service for 1 year ^{B)}

Scope of supply: CD containing the current S7 Manual Collection and the three subsequent updates

6ES7 998-8XC01-8YE2

A) Subject to export regulations: AL: N and ECCN: EAR99H

B) Subject to export regulations: AL: N and ECCN: EAR99S

SIMATIC S7-400

Modules for SIMATIC S7-400F/FH

Isolating module

Overview

- Supports hybrid operation of fail safe signal modules in safety mode and S7-300 standard modules in an ET 200M
- PROFIBUS DP line configuration with copper bus cables. Fiber-optic cables are not necessary.
- Any IM 153-x can be used

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

Technical specifications

	6ES7 195-7KF00-0XA0
Dimensions and weight	
•Weight, approx.	10 g

Ordering data

Order No.

Isolating module ^{A)} for simultaneous operation of fail-safe and standard modules in an ET 200M	6ES7 195-7KF00-0XA0
Isolating bus module for accommodating the isolating module in an ET 200M	6ES7 195-7HG00-0XA0

A) Subject to export regulations: AL: N and ECCN: EAR99H

SIMATIC S7-400

Modules for SIMATIC S7-400F/FH

SIPLUS Isolating module

Overview

- Supports hybrid operation of fail safe signal modules in safety mode and S7-300 standard modules in an ET 200M
- PROFIBUS DP line configuration with copper bus cables. Fiber-optic cables are not necessary.
- Any IM 153-x can be used

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

This module is designed for

- an ambient range of $-25\text{ }^{\circ}\text{C}$ to $+70\text{ }^{\circ}\text{C}$, condensation permissible.
- extraordinary medial load (for example by chloric and sulphuric atmospheres).

Technical specifications

6AG1 195-7KF00-2XA0

see 6ES7 195-7KF00-0XA0

Ordering data

Order No.

SIPLUS Isolating module

(extended temperature range and extraordinary medial load) for simultaneous operation of fail-safe and standard modules in an ET 200M

6AG1 195-7KF00-2XA0

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

Ordering data	Order No.
Front connector 48-pin, for signal modules, function modules; 1 item • With screw-type terminals • With spring-loaded terminals • With crimp contacts 48-pin, for signal modules, function modules; 84 items • With screw-type terminals • With crimp contacts for 6ES7 431-7KF00-0AB0; spare part, included in scope of delivery of module; 1 item	6ES7 492-1AL00-0AA0 6ES7 492-1BL00-0AA0 6ES7 492-1CL00-0AA0 6ES7 492-1AL00-1AB0 6ES7 492-1CL00-1AB0 6ES7 431-7KF00-6AA0
Crimp contacts 250 units	6XX3 070
Crimping tool for crimping the contacts	6XX3 071
Front cover for front connector 6 units	6ES7 492-2XL00-0AA0
Connection terminal for modules 6 units	6ES7 490-1BA00-0AA0

B) Subject to export regulations: AL: N and ECCN: EAR99S

Manual "SIMATIC S7-400 programmable controller"

incl. operation list

German

English

French

Spanish

Italian

SIMATIC Manual Collection^{B)}

Electronic manuals on CD-ROM, in 5 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^{B)}

Current Manual Collection CD as well as the three following updates

Order No.

6ES7 498-8AA03-8AA0

6ES7 498-8AA03-8BA0

6ES7 498-8AA03-8CA0

6ES7 498-8AA03-8DA0

6ES7 498-8AA03-8EA0

6ES7 998-8XC01-8YE0

6ES7 998-8XC01-8YE2

SIMATIC S7-400

Connection methods

Fully modular connection

Benefits



- Simple plug connections for front connector module, cable and terminal block
- Fast, low-cost wiring
- Power supply for digital and analog modules can be connected to the front connector module or terminal block
- Reduction in wiring errors, clear control cabinet wiring
- Byte-oriented signal distribution with digital modules
- Each component can be replaced individually
- Any cable length can be configured without waste

Technical specifications

Technical specifications for front connector module

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

Terminal blocks for 1-wire connection and 3-wire initiators

Max. operating voltage	60 V DC
Continuous current per signal	1 A
Max. summation current (voltage input)	4 A/byte
Operating temperature	0 °C to + 60 °C
Mounting position	Any
Air 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 severity 3
Dimensions (W x H x D) in mm	
• 1-wire connection 6ES7924-0AA00-_A_0	Approx. 51 x 41 x 55
• For 3-wire initiators 6ES7924-0CA00-_A_0	Approx. 60 x 41 x 70

Terminal blocks with relay 8S

Field circuit side	
Coil operating voltage	24 V DC
Input connections	None
Contact side	
Number of relay outputs	8 (NO contacts)
Contact design	Single contact, 1 NO
Switching capacity (resistive load)	Max. 2 A/250 V AC, max. 2 A/30 V DC max. 0.2 A/60 V DC Recommended minimum load ≥ 100 mA
Switching frequency	6 cycles/minute
Service life	
• Mechanical	10 x 10 ⁶ switching operations
• Electrical	600 x 10 ³ switching operations at 230 V AC/2 A/ power factor = 1
Operating temperature	0 °C to +60 °C
Mounting position	Horizontal, ventilation slots upwards and downwards. To permit heat dissipation, a space of at least 30 mm must be left above and below the relay terminal block
Air and creepage distances	IEC 1131-2 (1992), EN 50 178 (4/98) overvoltage category III, pollution severity 2 between trigger circuit and relay contacts: 5.5 mm between contact groups K0-K3 and K4-K7: 5.5 mm within a contact group: 3.2 mm UL and CSA available soon
Terminal blocks can be removed for independent wiring	
• For 24 V power supply for digital modules	4-pole terminal block
• For relay outputs	Two 8-pole terminal blocks
Dimensions (W x H x D) in mm 6ES7924-0CD00-_A_0	Approx. 60 x 68 x 78

Technical specifications (continued)

Terminal blocks for 2 A modules of the SIMATIC S7

Max. operating voltage	60 V DC
Continuous current per signal lead	2 A
Operating temperature	0 °C to + 60 °C
Mounting position	Any
Air 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 severity 3
Dimensions (W x H x D) in mm 6ES7924-0BB00-_A_0	Approx. 60 x 41 x 70

Terminal blocks for analog modules of the SIMATIC S7

Max. operating voltage	60 V DC
Continuous current per signal lead	1 A
Operating temperature	0 °C to + 60 °C
Mounting position	Any
Air 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 severity 3
Dimensions (W x H x D) in mm 6ES7924-0CC00-_A_0	Approx. 60 x 41 x 70

Ordering data

Order No.

Front connector module (digital 4 x 8 I/O)

Power supply via:

- Screw-type terminals **6ES7 921-4AB00-0AA0**

Front connector module (1 x 8 outputs) for 2 A digital outputs

Power supply via:

- Screw-type terminals **6ES7 921-4AD00-0AA0**

Front connector module (analog)

Power supply via:

- Screw-type terminals **6ES7 921-4AG00-0AA0**

Flat round cable 16-core, 0.14 mm²

Unshielded

- 30 m **6ES7 923-0CD00-0AA0**
- 60 m ^{A)} **6ES7 923-0CG00-0AA0**

Shielded

- 30 m **6ES7 923-0CD00-0BA0**
- 60 m **6ES7 923-0CG00-0BA0**

Flat round cable 2 x 16-core, 0.14 mm²

Unshielded

- 30 m **6ES7 923-2CD00-0AA0**
- 60 m **6ES7 923-2CG00-0AA0**

8 connectors (16-pin)

Insulation displacement with 8 strain reliefs

- 6ES7 921-3BE10-0AA0**

Crimping tool

For preparing the connectors (female ribbon cable connectors)

- 6ES7 928-0AA00-0AA0**

Terminal block for 1-wire connection

1 unit

- Spring-loaded terminals **6ES7 924-0AA00-0AB0**
- Screw-type terminals **6ES7 924-0AA00-0AA0**
- 10 units
- Spring-loaded terminals **6ES7 924-0AA00-1AB0**
- Screw-type terminals **6ES7 924-0AA00-1AA0**

Terminal block for 2A modules

1 unit

- Spring-loaded terminals **6ES7 924-0BB00-0AB0**
- Screw-type terminals **6ES7 924-0BB00-0AA0**

10 units

- Spring-loaded terminals **6ES7 924-0BB00-1AB0**
- Screw-type terminals **6ES7 924-0BB00-1AA0**

Terminal block for 3-wire initiators

1 unit

- Spring-loaded terminals **6ES7 924-0CA00-0AB0**
- Screw-type terminals **6ES7 924-0CA00-0AA0**

10 units

- Spring-loaded terminals **6ES7 924-0CA00-1AB0**
- Screw-type terminals **6ES7 924-0CA00-1AA0**

Terminal block with relays

1 unit

- Spring-loaded terminals **6ES7 924-0CD00-0AB0**
- Screw-type terminals **6ES7 924-0CD00-0AA0**

Terminal block for analog modules

1 unit

- Spring-loaded terminals **6ES7 924-0CC00-0AB0**
- Screw-type terminals **6ES7 924-0CC00-0AA0**

10 units

- Spring-loaded terminals **6ES7 924-0CC00-1AB0**
- Screw-type terminals **6ES7 924-0CC00-1AA0**

Shield plate for analog terminal block

4 units

Terminal elements

2 units

- For 2 cables with 2 to 6 mm diameter **6ES7 390-5AB00-0AA0**

- For 1 cable with 3 to 8 mm diameter **6ES7 390-5BA00-0AA0**

- For 1 cable with 4 to 13 mm diameter **6ES7 390-5CA00-0AA0**

A) Subject to export regulations: AL: N and ECCN: EAR99H

SIMATIC S7-400

Connection methods

Front connector with single cores

Overview



The flexible connection permits a fast and direct connection between the input/output modules of the SIMATIC S7-400 and the individual elements in the switchgear cabinet.

Single cores already attached reduce wiring overheads.

Core cross-sections of 0.5 mm² also permit higher currents.

- Individual cores can be routed directly to each element in the control cabinet
- Higher currents are possible using a larger cross-section, with a smaller voltage drop
- Reduction in wiring overhead thanks to simple plugging-on of the preassembled cable onto the I/O module
- Simple wiring. The number printed on the core corresponds to the connection point on the I/O connector
- Clear control cabinet wiring thanks to bundled individual cores

Technical specifications

Front connector with single cores

Rated operating voltage	DC 24 V
Max. permissible continuous current if all cores carry load simultaneously	1.0 A
Permissible ambient air temperature	0 to +60 °C
Number of cores	46
Core type	H05V-K-single cores or UL-Style 1007/1569 CSA-AWM TR64

Front connector with single cores

Cross-section	0.5 mm ² , Cu
Bundle diameter in mm	approx. 17
Color of core	blue, RAL 5010
Designation of the cores	numbered consecutively from 3 to 48 (adapter contact = core number)
Design	Screw-type terminal or crimp contact

Ordering data

Front connector with single cores Core type H05V-K 46 x 0.5 mm² for SIMATIC S7-400

Screw connection

Package size 1 unit

- 2.5 m
- 3.2 m
- 5 m

- Special lengths

Package size 5 units

- 2.5 m
- 3.2 m
- 5 m

Crimp connection

Package size 1 unit

- 2.5 m
- 3.2 m
- 5 m

- Special lengths

Package size 5 units

- 2.5 m
- 3.2 m
- 5 m

Order No.

6ES7 922-4BC50-0AD0
6ES7 922-4BD20-0AD0
6ES7 922-4BF00-0AD0
On request

6ES7 922-4BC50-5AD0
6ES7 922-4BD20-5AD0
6ES7 922-4BF00-5AD0

6ES7 922-4BC50-0AE0
6ES7 922-4BD20-0AE0
6ES7 922-4BF00-0AE0
On request

6ES7 922-4BC50-5AE0
6ES7 922-4BD20-5AE0
6ES7 922-4BF00-5AE0

Order No.

Front connector with single cores Core type UL/CSA certified 46 x 0.5 mm² for SIMATIC S7-400

Screw version

Package size 1 unit

- 3.2 m
- 5 m

- Special lengths

6ES7 922-4BD20-0UD0
6ES7 922-4BF00-0UD0
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 configuring central controllers and expansion racks
- For up to 18 modules
- Also suitable for S7-400H

UR2 (Universal Rack)

- For configuring central controllers and expansion racks
- For up to 9 modules

- Also suitable for S7-400H

CR2 (Central Rack)

- For configuring central controllers
- For up to 18 modules
- Segmented racks:
For operating two independent S7-400 CPUs without S7-400 multicompacting, but with communication between the CPUs via the backplane bus (C-bus). Both CPUs can address local, separate I/O modules (segmented P-bus).

CR3 (Central Rack)

- For configuring central controllers
- Optimized for distributed automation tasks as it can support up to 4 modules

UR2-H

- For setting up a complete S7-400H system in a single mounting rack
- Also suitable for S7-400:
Operation of 2 separate CPUs with their own I/O (own P-bus and K-bus)
- Can also be used as an expansion rack
- For up to 18 modules

ER1 (Expansion Rack)

- For cost-effective configuration of expansion racks
- For up to 18 modules with restricted functionality
- Also suitable for S7-400H

ER2 (Expansion Rack)

- For cost-effective configuration of expansion racks
- For up to 9 modules with restricted functionality
- Also suitable for S7-400H

Technical specifications

	6ES7 400-1TA01-0AA0	6ES7 400-1JA01-0AA0	6ES7 401-2TA01-0AA0	6ES7 401-1DA01-0AA0
Configuration				
•Number of single-width slots, max.	18	9	18; 2 segments with 8 and 10 slots	4
Racks				
- K bus	Yes	Yes	Yes	Yes
- P bus	Yes	Yes	Yes	Yes
Dimensions and weight				
•Weight, approx.	3,000 g	1,500 g	3,000 g	1,500 g
•Width	482.5 mm	257.5 mm	482.5 mm	130 mm
•Height	290 mm	290 mm	290 mm	290 mm
•Depth	27.5 mm	27.5 mm	27.5 mm	27.5 mm

	6ES7 400-2JA00-0AA0	6ES7 403-1TA01-0AA0	6ES7 403-1JA01-0AA0
Configuration			
•Number of single-width slots, max.	18	18	9
Racks			
- K bus	Yes		
- P bus	Yes	Yes	Yes
Dimensions and weight			
•Weight, approx.	3,000 g	2,500 g	1,250 g
•Width	482.5 mm	482.5 mm	257.5 mm
•Height	290 mm	290 mm	290 mm
•Depth	27.5 mm	27.5 mm	27.5 mm

Racks

Ordering data	Order No.		Order No.
UR1 subrack for central controllers and expansion units, 18 slots	6ES7 400-1TA01-0AA0	UR2-H Subrack for divided central controllers, 18 slots	6ES7 400-2JA00-0AA0
UR2 subrack for central controllers and expansion units, 9 slots	6ES7 400-1JA01-0AA0	ER1 rack for expansion units, P bus only, 18 slots	6ES7 403-1TA01-0AA0
CR1 rack for segmented central controllers, 18 slots, 2 local segments	6ES7 401-2TA01-0AA0	ER2 rack for expansion units, P bus only, 9 slots	6ES7 403-1JA01-0AA0
CR3 rack for central controllers and expansion units, 4 slots; optimized for distributed automation solutions	6ES7 401-1DA01-0AA0	Module location 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

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Technical specifications

	6ES7 408-1TA01-0XA0	6ES7 408-1TB00-0XA0		6ES7 408-1TA01-0XA0	6ES7 408-1TB00-0XA0
Supply voltages			Current consumption		
Rated value			• 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
- 24 V DC	Yes		• Power dissipation, max.	11 W	20 W
- permissible range, lower limit (DC)	19.2 V		Relay outputs		
- permissible range, upper limit (DC)	30 V		• Rated supply voltage of the relay L+ (DC)	24 V	24 V
- 120 V AC		Yes	Switching capacity of the contacts		
- 230 V AC		Yes	- at resistive load, max.	200 mA	200 mA
- permissible range, lower limit (AC)		85 or 170 V AC	Dimensions and weight		
- permissible range, upper limit (AC)		132 V AC or 264 V AC	• Weight, approx.	1.6 kg	2 kg
- permissible frequency range, lower limit		47 Hz	• Width	482.5 mm	482.5 mm
- permissible frequency range, upper limit		63 Hz	• Height	109.5 mm	109.5 mm
			• Depth	235 mm	235 mm

Ordering data

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 units	

Order No.

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

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

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

For further information and ordering data refer to Catalog ST 50, CA 01 or the A&D Mall.

Overview



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

Technical specifications

	6ES7 460-0AA01-0AB0
Current consumption	
•from backplane bus 5 V DC, max.	140 mA
•Power dissipation, max.	700 mW
Configuration	
•Length of cable between two adjacent interface modules, max.	5 m

	6ES7 460-0AA01-0AB0
Dimensions and weight	
•Weight, approx.	600 g
•Width	25 mm
•Height	290 mm
•Depth	217 mm

Ordering data

	Order No.
IM 460-0 interface module	6ES7 460-0AA01-0AB0
Send interface module for central connection up to 5 m; with K bus transmission	

	Order No.
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

SIMATIC S7-400

Interface modules

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 5 V DC, max.	290 mA
• Power dissipation, max.	1,450 mW
Configuration	
• Length of cable between two adjacent interface modules, max.	5 m

	6ES7 461-0AA01-0AA0
Dimensions and weight	
• Weight, approx.	610 g
• Width	25 mm
• Height	290 mm
• Depth	217 mm

Ordering data

IM 461-0 interface module
Receive interface module for central connection up to 5 m; with K bus transmission

Order No.

6ES7 461-0AA01-0AA0

468-1 connecting cable
between IM 460-0 and IM 461-0;
IM 460-3 and IM 461-3
0.75 m
1.5 m
5 m

Order No.

6ES7 468-1AH50-0AA0
6ES7 468-1BB50-0AA0
6ES7 468-1BF00-0AA0

Terminating connector
for IM 461-0

6ES7 461-0AA00-7AA0

Overview



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

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Technical specifications

	6ES7 460-1BA01-0AB0
Current consumption	
•from backplane bus 5 V DC, max.	85 mA
•Power dissipation, max.	425 mW
Configuration	
•Length of cable between two adjacent interface modules, max.	1.5 m

	6ES7 460-1BA01-0AB0
Dimensions and weight	
•Weight, approx.	600 g
•Width	25 mm
•Height	290 mm
•Depth	217 mm

Ordering data

Order No.
IM 460-1 interface module
Send interface module for central connection up to 1.5 m; with 5 V power supply, without K bus transmission
6ES7 460-1BA01-0AB0

Order No.
468-3 connecting cable
between IM 460-1 and IM 461-1;
0.75 m
1.5 m
6ES7 468-3AH50-0AA0
6ES7 468-3BB50-0AA0

SIMATIC S7-400

Interface modules

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 5 V DC, max.	120 mA
•Power dissipation, max.	600 mW
Configuration	
•Length of cable between two adjacent interface modules, max.	1.5 m

	6ES7 461-1BA01-0AA0
Dimensions and weight	
•Weight, approx.	610 g
•Width	25 mm
•Height	290 mm
•Depth	217 mm

Ordering data

IM 461-1 interface module
Receive interface module for central connection up to 1.5 m; with K bus transmission

Order No.

6ES7 461-1BA01-0AA0

468-3 connecting cable
between IM 460-1 and IM 461-1;
0.75 m
1.5 m

Order No.

6ES7 468-3AH50-0AA0
6ES7 468-3BB50-0AA0

Overview



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

5

Technical specifications

	6ES7 460-3AA01-0AB0
Current consumption	
• from backplane bus 5 V DC, max.	1,550 mA
• Power dissipation, max.	7,750 mW
Configuration	
• Length of cable between two adjacent interface modules, max.	102 m

	6ES7 460-3AA01-0AB0
Dimensions and weight	
• Weight, approx.	630 g
• Width	25 mm
• Height	290 mm
• Depth	217 mm

Ordering data

	Order No.
IM 460-3 interface module	6ES7 460-3AA01-0AB0
Send interface module for distributed connection up to 102 m; with K bus transmission	

	Order No.
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

SIMATIC S7-400

Interface modules

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 5 V DC, max.	620 mA
•Power dissipation, max.	3,100 mW
Configuration	
•Length of cable between two adjacent interface modules, max.	102 m

	6ES7 461-3AA01-0AA0
Dimensions and weight	
•Weight, approx.	620 g
•Width	25 mm
•Height	290 mm
•Depth	217 mm

Ordering data

IM 461-3 interface module
Receive interface module for distributed connection up to 102 m; with K bus transmission

Order No.

6ES7 461-3AA01-0AA0

468-1 connecting cable
between IM 460-3 and IM 461-3

0.75 m
1.5 m
5 m
10 m
25 m
50 m
100 m

Terminating connector
for IM 461-3

Order No.

6ES7 468-1AH50-0AA0
6ES7 468-1BB50-0AA0
6ES7 468-1BF00-0AA0
6ES7 468-1CB00-0AA0
6ES7 468-1CC50-0AA0
6ES7 468-1CF00-0AA0
6ES7 468-1DB00-0AA0

6ES7 461-3AA00-7AA0

Overview



- Send IM for distributed expansion with SIMATIC S5 expansion rack up to 600 m
- Can be plugged into central controller
- Up to 8 SIMATIC S5 expansion racks can be connected
- Can be used exclusively with IM 314

5

Technical specifications

	6ES7 463-2AA00-0AA0
Current consumption	
•from backplane bus 5 V DC, max.	1,320 mA
•Power dissipation, max.	6,600 mW
Configuration	
•Length of cable between first and the last interface module, max.	600 m

	6ES7 463-2AA00-0AA0
Dimensions and weight	
•Weight, approx.	360 g
•Width	25 mm
•Height	290 mm
•Depth	217 mm

Ordering data

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

	Order No.
721 connecting cable	
between IM 463-2 and IM 314	
1 m	6ES5 721-0BB00
1,6 m	6ES5 721-0BB60
2 m	6ES5 721-0BC00
2,5 m	6ES5 721-0BC50
5 m	6ES5 721-0BF00
16 m	6ES5 721-0CB60

SIMATIC S7-400

Interface modules

IM 467, IM 467 FO

Overview



- For connection of the S7-400 as a master to PROFIBUS DP
- For setting up further PROFIBUS DP lines
- PROFIBUS DP communication services and PG/OP communication
- Simple programming and configuring via PROFIBUS
- Interfaces: RS 485 (IM 467) or integrated FO interface (IM 467 FO)

Designed for Industry

- Subprocess-oriented configuration of an automation solution through the use of several IMs
- Allows up to 14 additional DP bus lines to be connected to the S7-400
- Integrated fiber-optic interface

Technical specifications

	6ES7 467-5GJ02-0AB0	6ES7 467-5FJ00-0AB0
Supply voltages		
Rated value		
- 5 V DC	Yes; +/- 5 %	Yes; +/- 5 %
- 24 V DC	Yes; +/- 5 %	Yes; +/- 5 %
Current consumption		
• from backplane bus 5 V DC, max.	1,300 mA	1,300 mA
Configuration		
• Number of modules per CPU	10 in CR (depending on CPU type)	10 in CR (depending on CPU type)
1st interface		
• Type of interface	9-pin sub-D female connector	2 x duplex socket
• Physical	RS 485	FO/Lambda = 660 nm
Functionality		
- DP master	Yes	Yes
DP master		
- Number of connections, max.	32; depending on the CPU type	32; depending on the CPU type
Services		
- Equidistance support	Yes	Yes
- Direct data exchange (lateral communication)	Yes	Yes
- Transmission rates, max.	12 Mbit/s	12 Mbit/s; not 3 and 6 Mbit/s
- Transmission rates, min.	9.6 kBit/s	9.6 kBit/s
- Number of DP slaves, max.	96	96
Address area		
- Inputs, max.	4 KByte	4 KByte
- Outputs, max.	4 KByte	4 KByte
User data per DP Slave		
- Inputs, max.	244 Byte	244 Byte
- Outputs, max.	244 Byte	244 Byte

	6ES7 467-5GJ02-0AB0	6ES7 467-5FJ00-0AB0
Environmental requirements		
Operating temperature		
- min.	0 °C	0 °C
- max.	60 °C	60 °C
Storage/transportation temperature		
- min.	-40 °C	-40 °C
- max.	70 °C	70 °C
Air pressure		
- Altitude above MSL, max.	3,000 m	3,000 m
Relative humidity		
- Operation, max.	95 %; at 26°C	95 %; at 26°C
Dimensions and weight		
• Weight, approx.	700 g	700 g
• Width	25 mm	25 mm
• Height	290 mm	290 mm
• Depth	210 mm	210 mm

Ordering data	Order No.		Order No.
IM 467 interface module for connection to PROFIBUS DP; RS 485	6ES7 467-5GJ02-0AB0	Manual "SIMATIC S7-400 programmable controller" incl. operation list	
IM 467 FO interface module for connection to PROFIBUS DP; fiber-optic interface	6ES7 467-5FJ00-0AB0	German	6ES7 498-8AA03-8AA0
		English	6ES7 498-8AA03-8BA0
		French	6ES7 498-8AA03-8CA0
		Spanish	6ES7 498-8AA03-8DA0
		Italian	6ES7 498-8AA03-8EA0
RS 485 bus terminal connector with 90° outgoing feeder cable for FastConnect system Max. transmission rate 12 Mbit/s		Manual "Communication for SIMATIC S7-300/-400"	
Without PG interface	6ES7 972-0BA50-0XA0	German	6ES7 398-8EA00-8AA0
With PG interface	6ES7 972-0BB50-0XA0	English	6ES7 398-8EA00-8BA0
Connection adapters pack of 50, for use of the simplex plugs with the IM 467 FO	6ES7 195-1BE00-0XA0	French	6ES7 398-8EA00-8CA0
		Spanish	6ES7 398-8EA00-8DA0
		Italian	6ES7 398-8EA00-8EA0

Overview



- Power supplies for the SIMATIC S7-400
- For conversion of AC or DC network voltages into the required 5 V and 24 V DC operating voltages
- Output current 4 A, 10 A and 20 A

Technical specifications

	6ES7 405-0DA01-0AA0	6ES7 405-0KA01-0AA0	6ES7 405-0KR00-0AA0	6ES7 405-0RA01-0AA0
Power supply				
• Line supply/voltage failure buffering	4.5 ms; +/- 0.5 ms	20 ms	20 ms	20 ms
• Line supply/voltage failure buffering to comply with the NAMUR recommendation	No	Yes	Yes	Yes
Input voltage				
- Rated value, 24 V DC	Yes	Yes	Yes	Yes
- Rated value, 48 V DC		Yes	Yes	Yes
- Rated value, 60 V DC		Yes	Yes	Yes
- permissible range, lower limit (DC)	static 19.2 V dynamic 18.5 V	static 19.2 V dynamic 18.5 V	static 19.2 V dynamic 18.5 V	static 19.2 V dynamic 18.5 V
- permissible range, upper limit (DC)	static 30 V dynamic 30.2 V	Static: 72 V; dynamic 75.5 V	static: 72 V dynamic 75.5 V	static: 72 V dynamic 75.5 V
Input current				
- Rated value at 24 V DC	2 A	4.5 A	4.5 A	7.3 A
- Rated value at 48 V DC		2.1 A	2.1 A	3.45 A
- Rated value at 60 V DC		1.7 A	1.7 A	2.75 A
- Inrush current, max.	27 A; Half-value width 10 ms	18 A; Half-value width 20 ms	18 A; Half-value width 20 ms	33 A; Half-value width 1.5 ms
Output voltage				
- Rated value, 5 V DC	Yes	Yes	Yes	Yes
- Rated value, 24 V DC	Yes	Yes	Yes	Yes
Output current				
- for backplane bus (5 V DC), max.	4 A; 100 mA base load required	10 A; 200 mA base load required	10 A; 200 mA base load required	20 A; 200 mA base load required
- for backplane bus (24 V DC), max.	0.5 A; idling-proof	1 A; idling-proof	1 A; idling-proof	1 A; idling-proof
- Short-circuit protection	Yes	Yes	Yes	Yes
Voltages and currents				
• Power consumption, typical	48 W	104 W	104 W	175 W
Current consumption				
• Power dissipation, typical	16 W	29 W	29 W	51 W
Back-up battery				
- Backup battery (optional)	Yes; 1 x lithium AA; 3.6 V/1.9 Ah	Yes; 2 x lithium AA; 3.6 V/1.9 Ah	Yes; 2 x lithium AA; 3.6 V/1.9 Ah	Yes; 2 x lithium AA; 3.6 V/1.9 Ah
Connection system				
• Connecting cables/ cross-sections	3 x 1.5 mm ² , solid or stranded wire, outer diameter 3 to 9 mm	3 x 1.5 mm ² , solid or stranded wire, outer diameter 3 to 9 mm	3 x 1.5 mm ² , solid or stranded wire, outer diameter 3 to 9 mm	3 x 1.5 mm ² , solid or stranded wire, outer diameter 3 to 9 mm
Potentials/ electrical isolation				
• primary/secondary	Yes	Yes	Yes	Yes

Technical specifications (continued)

	6ES7 405-0DA01-0AA0	6ES7 405-0KA01-0AA0	6ES7 405-0KR00-0AA0	6ES7 405-0RA01-0AA0
Environmental requirements				
Degree of protection and class of protection				
- Protection class	1; with protective conductor	1; with protective conductor	1; with protective conductor	1; with protective conductor
Standards, approvals, certification				
•FM approval	Yes; up to 40°C: T4; up to 60°C: T3C	Yes; up to 40°C: T4	Yes; up to 40°C: T4	Yes; up to 40°C: T4
Dimensions and weight				
•Weight, approx.	800 g	1,400 g	1,360 g	2,200 g
•Width	25 mm	50 mm	50 mm	75 mm
•Height	290 mm	290 mm	290 mm	290 mm
•Depth	217 mm	217 mm	217 mm	217 mm
•Required slots	1	2	2	3

Ordering data

Order No.	Order No.
PS 405 power supply modules 24 V DC; 5 V DC, 24 V DC	PS 407 power supply modules 120/230 V AC; 5 V DC, 24 V DC
4 A	4 A
10 A, wide range	10 A
10 A, redundant, wide range	10 A, redundant,
20 A, wide range	20 A
Power plug for PS 405	Power plug for PS 407
Spare part	Spare part
Backup battery	Backup battery
Type AA; 1.9 Ah	Type AA; 1.9 Ah

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.

Additional information is available in the Internet under:

<http://www.s7-smartlabel.com>

Label cover

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

Technical specifications

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

Ordering data

Labeling sheets

DIN A4, for printing using laser printer; 10 units

Petrol

Light beige

Yellow

Red

Order No.

6ES7 492-2AX00-0AA0

6ES7 492-2BX00-0AA0

6ES7 492-2CX00-0AA0

6ES7 492-2DX00-0AA0

Order No.

Cover film for labeling strips

10 units (spare part)

6ES7 492-2XX00-0AA0

Overview

Cover film for labeling strips

- Petrol-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

Order No.

Power plug for PS 405 Spare part	6ES7 490-0AA00-0AA0
Power plug for PS 407 Spare part	6ES7 490-0AB00-0AA0
Replacement fan Spare part	6ES7 408-1TA00-6AA0





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SIMATIC C7

Introduction

SIMATIC C7

Overview



- Control systems for the low-end performance range
- Combines SIMATIC S7-300 programmable controller and SIMATIC operator panel in one unit
- Ultra-compact complete machine control
- Highly suitable for industrial use
- User-friendly operation, simple fan-free configuration and reduced installation effort
- Easily adaptable to increasing requirements through the use of the extensive range of S7-300 modules

Overview



- The low-cost entry point in the world of SIMATIC C7 control systems
- For all applications which require fast PLC performance and easy to use human-machine interface functionality
- With user-friendly, onboard I/O for space-saving implementation at the machine level
- Integrated technology functions for counting, frequency measurement and closed-loop control

A micro memory card and connector set are required for C7 operation.

Technical specifications

	6ES7 613-1CA01-0AE3
Supply voltages	
Rated value	
- 24 V DC	Yes
- permissible range, lower limit (DC)	20.4 V
- permissible range, upper limit (DC)	28.8 V
Current consumption	
• Inrush current, max.	1 A
• Current consumption, typical	350 mA; idling
Digital outputs	
• Power dissipation, typical	11 W
Memory/backup	
Memory	
- Micro memory card	Yes; all the data are on the MMC of the CPU
• Working memory	
- integral	32 KByte; for program and data, less the display data
- expandable	No
• Load memory	
- expandable EPROM	with Micro Memory Card (MMC)
• User memory	
- integral	see CPU working memory
Backup	
- available	Yes; guaranteed by MMC (maintenance-free)
- without battery	Yes; Program and data
CPU/blocks	
DB	
- Number, max.	127; DB 0 reserved
- Size, max.	16 KByte
FB	
- Number, max.	128
- Size, max.	16 KByte
FC	
- Number, max.	128
- Size, max.	16 KByte

	6ES7 613-1CA01-0AE3
OB	
- Size, max.	16 KByte
Nesting depth	
- per priority class	6
- additional levels within an error OB	4
CPU/processing times	
• for bit instruction, min.	0.1 µs
• for bit instruction, max.	0.2 µs
• for word instruction, min.	0.5 µs
• for integer math, min.	1 µs
• for floating-point math, min.	15 µs
Timers/counters and their retentive characteristics	
S7 counter	
- Number	256
• of which retentive without battery	
- adjustable	Yes
- lower limit	0
- upper limit	256
• Counting range	
- lower limit	0
- upper limit	999
IEC counter	
- available	Yes
- Type	SFB, unlimited quantity (only limited by working memory)
S7 times	
- Number	256
• of which retentive without battery	
- adjustable	Yes
- lower limit	0
- upper limit	256
• Timing range	
- lower limit	10 ms
- upper limit	9,990 s
IEC timer	
- available	Yes
- Type	SFB

Technical specifications (continued)

	6ES7 613-1CA01-0AE3
Data areas and their retentive characteristics	
Flags	
- Number	256 Byte
- adjustable retentivity	Yes; MB 0 bis MB 255
Address area	
Process image	
- Inputs	128 Byte
- Outputs	128 Byte
Digital channels	
- Inputs	992
- Outputs	992
Analog channels	
- Inputs	248
- Outputs	124
Configuration	
•Number of modules per system, max.	4
Number of DP masters	
- integral	0
- via CP	1
Number of FMs and CPs that can be operated (recommendation)	
- FM	8
- CP, point-to-point	4
- CP, LAN	2
Expansion modules	
- Number of expansion modules, max.	4; Max. 2 flat alignment, max. 4 deep alignment
Time	
Clock	
- Hardware clock (realtime clock)	Yes
- buffered	Yes
Run-time meter	
- Quantity	1
Time synchronization	
- supported	Yes
S7 message functions	
•Number of stations that can log on for message functions, max.	5
Communication functions	
•Number of logical connections (including the network), max.	1; fixed with integral CPU
•PG/OP communication	Yes
Global data communication	
- Number of send GD packets, max.	4
- Number of receive GD packets, max.	4
- Size of GD packets, max.	22 Byte
S7 basic communication	
- supported	Yes
- User data per job	76 Byte
S7 communication	
- supported	Yes
- User data per job, max.	64 KByte

	6ES7 613-1CA01-0AE3
Number of connections	
- overall	8
- reserved for PG communication	1
- customizable for PG communication, max.	7
- reserved for OP communication	1
- customizable for OP communication, max.	7
- reserved for S7 basic communication	4
- customizable for S7 basic communication, max.	4
1st interface	
•Isolated	No
Functionality	
- MPI	Yes
- DP master	No
- DP slave	No
MPI	
- Number of connections	8
•Services	
- PG/OP communication	Yes
- Global data communication	Yes
- S7 basic communication	Yes
- S7 communication	Yes
- S7 communication, as client	No
- S7 communication, as server	Yes
- Transmission rates, max.	187.5 kBit/s
CPU/ programming	
Programming language	
- LAD	Yes
- FBD	Yes
- STL	Yes
- SCL	Yes
- CFC	Yes
- GRAPH	Yes
- HiGraph®	Yes
Software library	
•Bracket levels	8
•User program protection/password protection	Yes
Digital inputs	
•Number of digital inputs	24
Length of cable	
- Length of cable shielded, max.	1,000 m; 100 m for technological functions
- Length of cable unshielded, max.	600 m
Input voltage	
- Rated value, DC	24 V
- for signal "0"	-3 to 5 V
- for signal "1"	15 to 30 V
Input current	
- for 1 signal, typical	8 mA
Input delay (at rated value of the input voltage)	
•For standard inputs	
- Parameterizable	Yes; 0.1 / 0.3 / 3 / 15 ms
•for counters/technological functions	
- at 0 to 1, max.	16 µs

Technical specifications (continued)

	6ES7 613-1CA01-0AE3
Digital outputs	
•Number of digital outputs	16
•Length of cable shielded, max.	1,000 m
•Length of cable unshielded, max.	600 m
•Short-circuit protection of the output	Yes; clocking electronically
•Limitation of voltage induced on circuit interruption to	L+ (-48 V)
Output voltage	
- for 1 signal	L+ (-0.8 V)
Output current	
- for 1 signal permissible range for 0 to 40 °C, max.	0.5 A
- for 1 signal permissible range for 40 to 60 °C, max.	0.5 A
- for 1 signal minimum load current	5 mA
- for 0 signal residual current, max.	0.5 mA
Switching frequency	
- at resistive load, max.	100 Hz
- at inductive load, max.	0.5 Hz
Summation current of the outputs (per group)	
•horizontal mounting positions	
- up to 40 °C, max.	4,000 mA
- up to 60 °C, max.	2,000 mA
Analog inputs	
•Number of analog inputs	4
•Number of analog inputs for voltage/current measurement	4
•Number of analog inputs for resistance/temperature measurement	1
Input ranges (rated values), voltages	
- 0 to +10 V	Yes
- -10 V to +10 V	Yes
Input ranges (rated values), currents	
- 0 to 20 mA	Yes
- -20 to +20 mA	Yes
- 4 to 20 mA	Yes
Input ranges (rated values), resistances	
- 0 to 600 ohms	Yes
Input ranges (rated values), resistance thermometer	
- Pt 100	Yes
Analog outputs	
•Number of analog outputs	2
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
Analog value formation	
Integration and conversion time/triggering per channel	
- with over-range (bits incl. sign), max.	12 Bit
- Integration time parameterizable	Yes; 2.5 / 16.6 / 20 ms
- Conversion time (per channel)	1 ms

	6ES7 613-1CA01-0AE3
Sensor	
Connectable encoders	
- 2-wire BEROs	Yes
- permissible closed-circuit current (2-wire BEROs), max.	1.5 mA
Error/accuracies	
Basic error limit (operational limit at 25 °C)	
- relative to the output range, voltage	+/- 0.7 %
- relative to the output range, current	+/- 0.7 %
- relative to the input range, voltage	+/- 0.7 %
- relative to the input range, current	+/- 0.7 %
- relative to the input range, resistance	+/- 3 %
- relative to the input range, resistance thermometer	+/- 3 %
Integral functions	
•Number of counters	3
•Count frequency (counters) max.	30 kHz
•Frequency measurement	Yes
•PID controller	Yes
•Number of pulse outputs	3
•Cut-off frequency (pulse)	2.5 kHz
Operator control and monitoring	
•Graphic objects	Yes
•Info texts	Yes; 128
•Messages	Yes; with buffer
•Number of process pictures	128
•Number of variables per picture, max.	8
•Password protection	Yes
Keyboard	
- Number of operating cycle keys	1,000,000
- Number of function keys	10; can be used at same time as numeric input
- Number of softkey keys	4
Display	
- Type	LCD backlit
- Number of lines	4
- Number of characters per line	20
- Background lighting MTBF (at 20°C)	100,000 h
Potentials/ electrical isolation	
Analog output functions	
- Electrical isolation, analog output functions	Yes; common for analog I/O
Analog output functions	
- Electrical isolation, analog inputs	Yes; common for analog I/O
Digital output functions	
- between the channels	Yes
- between the channels, in groups of	8
Digital input functions	
- between the channels	Yes
- between the channels, in groups of	8; and 16

Technical specifications (continued)

6ES7 613-1CA01-0AE3			
Environmental requirements		Relative humidity	
•Environmental conditions		- Operation, min.	5 %
Operating temperature		- Operation, max.	95 %; RH stressing level 2 in accordance with IEC 1131-2
- 45 degree mounting, min.	0 °C	Degree of protection and class of protection	
- 45 degree mounting, max.	45 °C	- IP 20	Yes; Housing
- vertical mounting, min.	0 °C	- IP 65	Yes; Front
- vertical mounting, max.	50 °C	Dimensions and weight	
- horizontal mounting, min.	0 °C	•Weight, approx.	1,350 g
- horizontal mounting, max.	40 °C	•Width	215 mm
Air pressure		•Height	165 mm
- permissible range, min	795 hPa	•Depth	79 mm
- permissible range, max	1,080 hPa	•Installation cutout, width	202 mm
		•Installation cutout, height	152 mm
		Online languages	
		•Number	3

Ordering data	Order No.	Order No.
C7-613 control system	6ES7 613-1CA01-0AE3	Accessories
32 KB RAM (PLC), 24 DI, 16 DO, 5 AI, 2 AO onboard; backlit LC display (4 lines, 20 characters/line; with mounting accessories		SIMATIC C7 simulator
Micro memory card		with 16 onboard DIs and 16 onboard DOs; with switches and LEDs for simulating 16 Dis and 16 DOs
essential for operation		I/O set
64 KB	6ES7 953-8LF11-0AA0	for expansion of C7-613/C7- 635/C7-636 by max. 4 modules; assembly onto rear of system
128 KB	6ES7 953-8LG11-0AA0	For 2 modules, flat mounting
512 KB	6ES7 953-8LJ11-0AA0	For 4 modules, deep mounting
2 MB	6ES7 953-8LL11-0AA0	I/O expansion cable
4 MB	6ES7 953-8LM11-0AA0	for external expansion of SIMATIC C7-613/C7-635/C7-636 by max. 4 modules; 1.5 m long
8 MB	6ES7 953-8LP11-0AA0	SIMATIC Manual Collection ^{B)}
Connector set		Electronic manuals on CD-ROM, multi-language
for I/Os and power supply; essential for operation		SIMATIC Manual Collection Maintenance service for 1 year ^{B)}
With screw-type terminals	6ES7 635-0AA00-4AA0	Current S7 Manual Collection CD as well as the three following updates
With spring-loaded terminals	6ES7 635-0AA00-4BA0	Spare parts
C7-613 Configuration Tools	6ES7 613-0CA00-7AA0	Service package
Standard function blocks for configuring HMI functions; on CD-ROM		3 seals, 10 clamps, for all SIMATIC C7-613, C7-635 and C7-636
C7-613 manual package		Grounding rail
C7-613 manual and S7-300 manual		with shield terminals for analog I/O
German	6ES7 613-1CA00-8AA0	
English	6ES7 613-1CA00-8BA0	
French	6ES7 613-1CA00-8CA0	
Spanish	6ES7 613-1CA00-8DA0	
Italian	6ES7 613-1CA00-8EA0	
C7-613 manual		
German	6ES7 613-1CA00-8AB0	
English	6ES7 613-1CA00-8BB0	
French	6ES7 613-1CA00-8CB0	
Spanish	6ES7 613-1CA00-8DB0	
Italian	6ES7 613-1CA00-8EB0	

B) Subject to export regulations: AL: N and ECCN: EAR99S

Overview



- Cost-effective control systems
- For all applications which require fast PLC performance and easy to use human-machine interface functionality
- Featuring larger RAM for extensive application programs
- With the user-friendly control functions of the SIMATIC OP7 operator panel

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Technical specifications

	6ES7 633-1DF02-0AE3	6ES7 633-2BF02-0AE3
Supply voltages		
Rated value		
- 24 V DC	Yes	Yes
- permissible range, lower limit (DC)	20.4 V	20.4 V
- permissible range, upper limit (DC)	30.2 V	30.2 V
Current consumption		
• Current consumption, max.	1 A	1 A
• Current consumption, typical	550 mA	550 mA
Digital outputs		
• Power dissipation, typical	12 W	12 W
Memory/backup		
Memory		
• Working memory		
- integral	48 KByte; 16 K statements RAM	64 KByte; 20 K statements RAM
• Load memory		
- expandable FEPRM	Yes	Yes
- expandable FEPRM, max.	512 KByte	512 KByte
- integral RAM, max.	80 KByte	96 KByte
• User memory		
- integral	128 KByte; Flash	128 KByte; Flash
Backup		
- available	Yes	Yes
- with battery	Yes; all data	Yes; all data
- without battery	Yes; 4736 bytes; parameterizable for flags, timers, counters, data	Yes; 4736 bytes; parameterizable for flags, timers, counters, data

	6ES7 633-1DF02-0AE3	6ES7 633-2BF02-0AE3
CPU/blocks		
DB		
- Number, max.	255; DB 0 reserved	255; DB 0 reserved
FB		
- Number, max.	192; see instruction list	192; see instruction list
FC		
- Number, max.	192; see instruction list	192; see instruction list
OB		
- Number, max.	see instruction list	see instruction list
Nesting depth		
- per priority class	8	8
CPU/processing times		
• for bit instruction, min.	0.3 µs	0.3 µs
• for bit instruction, max.	0.6 µs	0.6 µs
• for word instruction, min.	1 µs	1 µs
• for integer math, min.	2 µs	2 µs
• for floating-point math, min.	50 µs	50 µs
• for timing/counting instructions, min.	12 µs	12 µs
Timers/counters and their retentive characteristics		
S7 counter		
- Number	64	64
• of which retentive with battery		
- adjustable	Yes	Yes
- lower limit	0	0
- upper limit	63	63
• of which retentive without battery		
- adjustable	Yes	Yes
- lower limit	0	0
- upper limit	63	63
• Counting range		
- lower limit	0	0
- upper limit	999	999

Technical specifications (continued)

	6ES7 633-1DF02-0AE3	6ES7 633-2BF02-0AE3
S7 times		
- Number	128	128
•of which retentive with battery		
- adjustable	Yes	Yes
- lower limit	0	0
- upper limit	127	127
•of which retentive without battery		
- adjustable	Yes	Yes
- lower limit	0	0
- upper limit	127	127
•Timing range		
- lower limit	10 ms	10 ms
- upper limit	9,990 s	9,990 s
Data areas and their retentive characteristics		
Flags		
- Number	256 Byte	256 Byte
- adjustable retentivity	Yes	Yes
- of which retentive with battery	0 to 2047	0 to 2047
- of which retentive without battery	0 to 2047	0 to 2047
Address area		
I/O address area		
- Inputs	1 KByte	1 KByte
- Outputs	1 KByte	1 KByte
Process image		
- Inputs	128 Byte	128 Byte
- Outputs	128 Byte	128 Byte
Configuration		
•Number of modules per system, max.	8	8
•Connectable programming devices/PCs	SIMATIC PG/PC, Standard PC	SIMATIC PG/PC, Standard PC
•Modules per rack, max.	8	8
•Number of rows, max.	3	3
•Integral interface module IM 360	Yes	Yes
•Number of modules per DP slave interface module, max.	32; 122 byte address area per DP-station	32; 122 byte address area per DP-station
Number of DP masters		
- integral	0	1
- via CP	1; CP 342-5	1; CP 342-5
Number of FMs and CPs that can be operated (recommendation)		
- FM	8	8
- CP, point-to-point	4	4
- CP, LAN	2	2
Expansion modules		
- Number of expansion modules, max.	24	24
I/O expansions		
- Analog inputs/outputs, max.	192	192
- Digital inputs/outputs, max.	768	768

	6ES7 633-1DF02-0AE3	6ES7 633-2BF02-0AE3
Time		
Clock		
- Hardware clock (realtime clock)	Yes; CPU	Yes; CPU
- Software clock	Yes; OP	Yes; OP
Communication functions		
•PG/OP communication	Yes	Yes
•S7 extended communication	Yes; Server	Yes; Server
Global data communication		
- supported	Yes	Yes
S7 basic communication		
- supported	Yes	Yes
S5 compatible communication		
- supported	Yes	Yes
Standard communication		
- supported	Yes	Yes
Number of connections		
- of which dynamic	8	8
- of which static	4	4
Interfaces		
•Number of printer interfaces	1; RS232	1; RS232
1st interface		
Functionality		
- MPI	Yes; assigns 2 stations per unit (1 x CPU, 1 x OP)	Yes; assigns 2 stations per unit (1 x CPU, 1 x OP)
- DP master	No	Yes
- DP slave	No	Yes
MPI		
•Services		
- Number of stations, max.	32; PG/PC, OP, C7, S7-300/400, M7	32; PG/PC, OP, C7, S7-300/400, M7
- Transmission rates, max.	187.5 kBit/s	187.5 kBit/s
DP master		
•Services		
- Transmission rates, max.		12 Mbit/s
- Number of DP slaves, max.		64
2nd interface		
Functionality		
- DP master		Yes
- DP slave		Yes
DP master		
•Services		
- Transmission rates, max.		12 Mbit/s
- Number of DP slaves, max.		64

Technical specifications (continued)

	6ES7 633-1DF02-0AE3	6ES7 633-2BF02-0AE3
CPU/ programming		
Configuration software		
- STEP 7	Yes	Yes
- STEP 7 Lite	Yes	Yes
- ProTool	Yes	Yes
- ProTool/Lite	Yes	Yes
- ProTool/Pro	Yes	Yes
Programming language		
- LAD	Yes	Yes
- FBD	Yes	Yes
- STL	Yes	Yes
- SCL	Yes	Yes
- CFC	Yes	Yes
- GRAPH	Yes	Yes
- HiGraph®	Yes	Yes
Software library		
- Process diagnostics	Yes; C7-CPU	Yes; C7-CPU
- Software controller	Yes; 16 circuits	Yes; 16 circuits
•Instruction set	see instruction list	see instruction list
•Bracket levels	8	8
•User program protection/password protection	Yes	Yes
•Program organization	linear, structured	linear, structured
•System functions (SFC)	see instruction list	see instruction list
Cycle time monitoring		
- lower limit	1 ms	1 ms
- upper limit	6,000 ms	6,000 ms
- adjustable	Yes	Yes
- preset	150 ms	150 ms
Digital inputs		
•Number of digital inputs	16	
Length of cable		
- Length of cable shielded, max.	1,000 m	
- Length of cable unshielded, max.	600 m	
Input voltage		
- Rated value, DC	24 V	
- for signal "0"	-3 to 5 V	
- for signal "1"	11 to 30 V	
Input current		
- for 1 signal, typical	11.5 mA	
Input delay (at rated value of the input voltage)		
•For standard inputs		
- at 0 after 1, max.	4.8 ms; typ. 3 ms	
Digital outputs		
•Number of digital outputs	16	
•Length of cable shielded, max.	1,000 m	
•Length of cable unshielded, max.	600 m	
•Short-circuit protection of the output	Yes; clocking electronically	
•Limitation of voltage induced on circuit interruption to	48 V	
•Lamp load, max.	5 W	

	6ES7 633-1DF02-0AE3	6ES7 633-2BF02-0AE3
Output voltage		
- for 1 signal	L+ (-0.8 V)	
Output current		
- for 1 signal rated value	0.5 A	
- for 1 signal minimum load current	5 mA	
- for 0 signal residual current, max.	0.5 mA	
Switching frequency		
- at resistive load, max.	100 Hz	
- at inductive load, max.	0.5 Hz	
Summation current of the outputs (per group)		
•horizontal mounting positions		
- up to 20 °C, max.	4 A	
- up to 40 °C, max.	2 A	
Analog inputs		
•Number of analog inputs	4	
•Permissible input voltage for the voltage input (destruction limit), max.	30 V	
•Permissible input voltage for the current input (destruction limit), max.	30 mA	
•Cycle time (all channels), typical	2 ms	
Input ranges (rated values), voltages		
- -10 V to +10 V	Yes	
Input ranges (rated values), currents		
- -20 to +20 mA	Yes	
- 4 to 20 mA	Yes	
Analog outputs		
•Number of analog outputs	4	
•Length of cable shielded, max.	200 m	
•Voltage output, short-circuit protection	Yes	
•Voltage output, short-circuit current, max	25 mA	
•Current output, open-circuit voltage, max.	16 V; +/-	
•Cycle time (all channels) max.	4 ms; typ. 2 ms	
Output ranges, voltage		
- -10 to +10 V	Yes	
Output ranges, current		
- -20 to +20 mA	Yes	
- 4 to 20 mA	Yes	
Burden resistance (in the nominal output range)		
- at voltage outputs, min.	2 kOhm	
- at voltage outputs, capacitive load, max.	1 µF	
- at current outputs, max.	0.5 kOhm	
- at current outputs, inductive load, max.	1 mH	

Technical specifications (continued)

	6ES7 633-1DF02-0AE3	6ES7 633-2BF02-0AE3
Analog value formation		
Integration and conversion time/triggering per channel		
- with over-range (bits incl. sign), max.	12 Bit	
- Conversion time (per channel)	0.5 ms	
Settling time		
- for resistive load	0.1 ms	
- for capacitive load	3.3 ms	
- for inductive load	0.5 ms	
Universal inputs		
•Number of universal inputs	4	
•Usable as	UE1 Digital/ alarm input 24V DC or up/down counter; UE2 Digital/ alarm input 24V DC or up/down counter; UE3 Digital/ alarm input 24V DC or up/down counter or frequency/ period duration counter; UE4 Digital/alarm input 24 V DC	
•Length of cable shielded, max.	1,000 m	
•Counter frequency, max.	10 kHz	
Input voltage		
- Rated value (DC)	24 V	
- for 0 signal	-3 to 5 V	
- for 1 signal	11 to 30 V	
Input current		
- for 1 signal	typ. 11.5 mA	
Sensor		
Connectable encoders	Yes	
- 2-wire Beros	2 mA	
- permissible closed-circuit current (2-wire Beros), max.		
Error/accuracies		
Operational limit in the entire temperature range		
- Relative to the output range, voltage	+/- 0.8 %	
- Relative to the output range, current	+/- 1 %	
- relative to the input range, voltage	+/- 0.8 %	
- relative to the input range, current	+/- 0.8 %	
Basic error limit (operational limit at 25 °C)		
- relative to the output range, voltage	+/- 0.5 %	
- relative to the output range, current	+/- 0.6 %	
- relative to the input range, voltage	+/- 0.6 %	
- relative to the input range, current	+/- 0.6 %	

	6ES7 633-1DF02-0AE3	6ES7 633-2BF02-0AE3
Counter		
•Number of counter inputs	3; UE1, UE2, UE3	
•Principle	Counting edges	
•Counting range, description	UE1, UE2: up: 0 to 65535, down: 65535 to 0; UE3: up: 0 to 16777215, down: 16777215 to 0, on reaching "0" on reaching the limit value in the program	
•Limit value (nominal) default	one counter per value	
External gate counter		
- Number of external gate counters	3	
- Principle	Counting edges within a gate time via an external pin	
- Counting range	UE1, UE2: 0 to 65535; UE3: 0 to 16777215	
Frequency counter		
•Number of frequency counters	1; UE3	
•Principle	Counting pulses within a time period	
•Gate width, adjustable	Yes	
•Gate width	0.1 / 1 / 10 s (adjustable)	
•Counting range	0 to 16777215	
Period duration counter		
•Number	1; UE3	
•Period duration, max.	8.38 s; or 0.12 Hz	
•Principle	Counting fixed time units between two positive edges	
•Counting range, lower limit	0	
•Counting range, upper limit	16.777.214	

Technical specifications (continued)

	6ES7 633-1DF02-0AE3	6ES7 633-2BF02-0AE3
Status information/ interrupts/ diagnostics		
•Applying substitute values	Yes; parameterizable	
Interrupts		
- Interrupt cycle	Yes; parameterizable	
- Diagnostic interrupt	Yes; Measuring range overflow, software-driven wire break detection at 4 to 20 mA; parameterizable for parameter errors	
Diagnostics		
- Diagnostic functions	Yes; C7-CPU	
Operator control and monitoring		
•Number of process pictures	99	99
•Number of variables in message text, max.	8	8
•Entries per process picture	99	99
•Password protection	Yes	Yes
•Password levels	9	9
Keyboard		
- Number of function keys	16	16
- Number of softkey keys	4	4
Display		
- Type	LCD backlit	LCD backlit
- Number of lines	4	4
- Number of characters per line	20	20
- Height of characters	8 mm	8 mm
- Background lighting MTBF (at 20°C)	100,000 h; approx. 11 years	100,000 h; approx. 11 years
- Dynamic objects	Input, output, input/output fields, date/time fields, symbolic input/output fields	Input, output, input/output fields, date/time fields, symbolic input/output fields
Event/alarm messages		
- Number of entries in process event buffer, max.	256	256
- Event messages, max.	499	499
- Scrolling through event messages, max.	256	256
- Alarm messages	Yes	Yes
- Number of alarm messages, max.	499	499
- Number of entries in the alarm message buffer, max.	256	256
- Number of symbols/character sets	1	1
Recipes		
- Number, max.	99	99
- Data records per recipe, max.	99	99
- Entries per data record, max.	99	99
- Recipe data memory, max	4 KByte	4 KByte

	6ES7 633-1DF02-0AE3	6ES7 633-2BF02-0AE3
Insulation		
•Insulation tested with	500 V DC	500 V DC
Potentials/ electrical isolation		
Analog output functions		
- Electrical isolation, analog output functions	Yes; together with AE	
Analog output functions		
- Electrical isolation, analog inputs	Yes; together with AA	
Digital output functions		
- Electrical isolation, digital output functions	Yes; Optocoupler 8	
- between the channels, in groups of		
Digital input functions		
- Electrical isolation, digital input functions	Yes; Optocoupler 16	
- between the channels, in groups of		
Electrical isolation, universal input functions		
- Electrical isolation, universal input functions	No	
Environmental requirements		
Operating temperature		
- 45 degree mounting, min.	0 °C	0 °C
- 45 degree mounting, max.	45 °C	45 °C
- vertical mounting, min.	0 °C	0 °C
- vertical mounting, max.	50 °C	50 °C
Air pressure		
- permissible range, min	795 hPa	795 hPa
- permissible range, max	1,080 hPa	1,080 hPa
Relative humidity		
- Operation, min.	5 %	5 %
- Operation, max.	95 %; no condensation	95 %; no condensation
Degree of protection and class of protection		
- IP 20	Yes; Housing	Yes; Housing
- IP 65	Yes; Front	Yes; Front
Dimensions and weight		
•Weight, approx.	1,800 g	1,600 g
•Width	240 mm	240 mm
•Height	203.5 mm	203.5 mm
•Depth	90 mm	74.4 mm
•Installation cutout, width	231 mm	231 mm
•Installation cutout, height	159 mm	159 mm
Online languages		
•Number	3	3

SIMATIC C7

Control systems

C7-633

6

Ordering data	Order No.		Order No.
C7-633 DP control system 64 KB RAM (PLC), with PROFIBUS DP interface, without onboard I/O; 128 KB flash EPROM for HMI data, LED backlit LCD (4 lines, 20 characters/line, 8 mm character height); with installation accessories, 24 V DC connector and backup battery	6ES7 633-2BF02-0AE3	Accessories	
		FEPROM memory card	
		16 KB	6ES7 951-0KD00-0AA0
		32 KB	6ES7 951-0KE00-0AA0
		64 KB	6ES7 951-0KF00-0AA0
		128 KB	6ES7 951-0KG00-0AA0
		512 KB	6ES7 951-0KJ00-0AA0
C7-633/P control system 48 KB RAM (PLC), 16 DI, 16 DO, 4 AI, 4 AO, 4 UI onboard; 128 KB flash EPROM for HMI data, LED backlit LCD (4 lines, 20 characters/line, 8 mm character height); with mounting accessories, connector set and backup battery	6ES7 633-1DF02-0AE3	SIMATIC C7 simulator with integrated 16 DI and 16 DO; with switches and LEDs for simulating 16 DIs and 16 DOs	6ES7 620-0AA00-4AA0
C7-633, C7-634 documentation package comprising C7-633, C7-634 manual, S7-300 manual, OP7, OP17 manual		Connector set for I/O and power supply	6ES7 623-1AE01-4AA0
German	6ES7 633-1AF01-8AA0	Backup battery 3.6 V; 1.5 Ah	6ES7 623-1AE01-5AA0
English	6ES7 633-1AF01-8BA0	PROFIBUS DP bus connector;	
French	6ES7 633-1AF01-8CA0	•With 90° outgoing feeder cable, max. transmission rate 12 Mbit/s - without PG interface	6ES7 972-0BA12-0XA0
Spanish	6ES7 633-1AF01-8DA0	- with PG interface	6ES7 972-0BB12-0XA0
Italian	6ES7 633-1AF01-8EA0	•With 90° outgoing feeder cable for FastConnect system, max. transmission rate 12 Mbit/s - without PG interface	6ES7 972-0BA50-0XA0
Manual "Communication for SIMATIC S7-300/-400"		- with PG interface	6ES7 972-0BB50-0XA0
German	6ES7 398-8EA00-8AA0	•With axial outgoing feeder cable for SIMATIC OP, for connecting to PPI, MPI, PROFIBUS	6GK1 500-0EA02
English	6ES7 398-8EA00-8BA0	PROFIBUS bus components	see Catalogs IK PI, CA 01
French	6ES7 398-8EA00-8CA0	for configuring MPI/PROFIBUS communication	
Spanish	6ES7 398-8EA00-8DA0	Spare parts	
Italian	6ES7 398-8EA00-8EA0	Service package	6ES7 623-1AE00-3AA0
SIMATIC Manual Collection ^{B)}	6ES7 998-8XC01-8YE0	Seal, 4 clamps, 2 connectors;	
Electronic manuals on CD-ROM, multi-language			
SIMATIC Manual Collection Maintenance service for 1 year ^{B)}	6ES7 998-8XC01-8YE2		
Current S7 Manual Collection CD as well as the three following updates			

B) Subject to export regulations: AL: N and ECCN: EAR99S

Overview



- Control systems for advanced applications
- With onboard I/O for use at machine level
- With integrated PROFIBUS DP connection for distributed structures
- Variant with context-sensitive touch functionality
- Graphical visualization and operator support for particularly convenient use

A micro memory card and connector set are required for C7 operation.

Technical specifications

	6ES7 635-2EC01-0AE3	6ES7 635-2EB01-0AE3
Supply voltages		
Rated value		
- 24 V DC	Yes	Yes
- permissible range, lower limit (DC)	20.4 V	20.4 V
- permissible range, upper limit (DC)	28. V	28.8 V
Current consumption		
• Inrush current, max.	1 A	1 A
• Current consumption, max.	1 A	1 A
• Current consumption, typical	350 mA; idling	350 mA; idling
Digital input		
- from load voltage L+ (without load), max.	70 mA	70 mA
Digital outputs		
- from load voltage L+, max.	20 mA; per group	20 mA; per group
	14 W	14 W
• Power dissipation, typical		
Memory/backup		
Memory		
- Micro memory card	Yes	Yes
- Compact flash card	Yes; optional	Yes; optional
Working memory		
- integral	64 KByte	64 KByte
- expandable	No	No
Load memory		
- pluggable (MMC)	Yes	Yes
- pluggable (MMC), max.	8 MByte	8 MByte
User memory		
- integral	768 KByte; for configuring the panel	768 KByte; for configuring the panel
Backup		
- available	Yes; guaranteed by MMC (maintenance-free)	Yes; guaranteed by MMC (maintenance-free)

	6ES7 635-2EC01-0AE3	6ES7 635-2EB01-0AE3
CPU/blocks		
DB		
- Number, max.	511; DB 0 reserved	511; DB 0 reserved
- Size, max.	16 KByte	16 KByte
FB		
- Number, max.	512; see instruction list	512; see instruction list
- Size, max.	16 KByte	16 KByte
FC		
- Number, max.	512; see instruction list	512; see instruction list
- Size, max.	16 KByte	16 KByte
OB		
- Number, max.	see instruction list	see instruction list
- Size, max.	16 KByte	16 KByte
Nesting depth		
- per priority class	8	8
- additional levels within an error OB	4	4
CPU/processing times		
• for bit instruction, min.	0.1 µs	0.1 µs
• for word instruction, min.	0.2 µs	0.2 µs
• for integer math, min.	2 µs	2 µs
• for floating-point math, min.	6 µs	6 µs

Technical specifications (continued)

	6ES7 635-2EC01-0AE3	6ES7 635-2EB01-0AE3
Timers/counters and their retentive characteristics		
S7 counter		
- Number	256	256
• Retentivity		
- adjustable	Yes	Yes
- 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		
- available	Yes	Yes
- Type	SFB, unlimited quantity (only limited by working memory)	SFB, unlimited quantity (only limited by working memory)
- Number	Unlimited (limited only by the main memory)	Unlimited (limited only by the main memory)
S7 times		
- Number	256	256
• Retentivity		
- adjustable	Yes	Yes
- preset	No retention	No retention
• Timing range		
- lower limit	10 ms	10 ms
- upper limit	9,990 s	9,990 s
IEC timer		
- available	Yes	Yes
- Type	SFB, unlimited quantity (only limited by working memory)	SFB, unlimited quantity (only limited by working memory)
- Number	Unlimited (limited only by the main memory)	Unlimited (limited only by the main memory)
Data areas and their retentive characteristics		
• Retentive data area as a whole, max.	All	All
Flags		
- Number	256 Byte	256 Byte
- adjustable retentivity	Yes	Yes
- preset retentivity	MB 0 to MB 15	MB 0 to MB 15
- Number of clock memories	8; (1 memory byte)	8; (1 memory byte)
Data blocks		
- Number, max.	511	511
- Size, max.	16 KByte	16 KByte
Local data		
- per priority class, max.	510 Byte	510 Byte

	6ES7 635-2EC01-0AE3	6ES7 635-2EB01-0AE3
Address area		
I/O address area		
- Inputs	1 KByte	1 KByte
- Outputs	1 KByte	1 KByte
Process image		
- Inputs	128 Byte	128 Byte
- Outputs	128 Byte	128 Byte
Digital channels		
- integrated channels (DI)	24	24
- integrated channels (DO)	16	16
- Inputs	8.192	8.192
- Outputs	8.192	8.192
- Inputs, of which central	922	922
- Outputs, of which central	922	922
Analog channels		
- integrated channels (AI)	4; and 1x PT100	4; and 1x PT100
- integrated channels (AO)	2	2
- Inputs	512	512
- Outputs	512	512
- Inputs, of which central	248	248
- Outputs, of which central	248	248
Configuration		
• Number of modules per system, max.	23	23
• Racks, max.	4	4
• Modules per rack, max.	4; 4 in subrack 0, 8 in subracks 1 and 2, 7 in subrack 3	4; 4 in subrack 0, 8 in subracks 1 and 2, 7 in subrack 3
Number of DP masters		
- integral	1	1
- via CP	1	1
Number of FMs and CPs that can be operated (recommendation)		
- FM	8	8
- CP, point-to-point	8	8
- CP, LAN	10	10
Time		
Clock		
- Hardware clock (realtime clock)	Yes	Yes
- buffered	Yes	Yes
- Backup duration	6 week(s); (at 40 °C ambient temperature)	6 week(s); (at 40 °C ambient temperature)
- Deviation per day, max	10 s	10 s
Run-time meter		
- Quantity	1	1
- Number	0	0
- Range of values	0 to 2 ³¹ hours (when using SFC 101)	0 to 2 ³¹ hours (when using SFC 101)
- Granularity	1 hour	1 hour
- retentive	Yes; must be restarted on each complete restart	Yes; must be restarted on each complete restart

Technical specifications (continued)

	6ES7 635-2EC01-0AE3	6ES7 635-2EB01-0AE3
Time synchronization		
- supported	Yes	Yes
- on MPI, master	Yes	Yes
- on MPI, slave	Yes	Yes
- in AS, master	Yes	Yes
S7 message functions		
•Number of stations that can log on for message functions, max.	12; (depending on the configured connections for PG/OP and S7 basic communication)	12; (depending on the configured connections for PG/OP and S7 basic communication)
•Process diagnostic messages	Yes	Yes
•simultaneously active Alarm-S blocks, max.	40	40
Test and startup functions		
Status/modify		
- Variable	Yes	Yes
- Variables	Inputs, outputs, flags, DB, timers, counters	Inputs, outputs, flags, DB, timers, counters
- Number of variables, max.	30	30
- of which status variables, max.	30	30
- of which modify variables, max.	14	14
Forcing		
- Forcing	Yes	Yes
- Forcing, variables	Inputs, outputs	Inputs, outputs
- Forcing, number of variables, max.	10	10
•Status block	Yes	Yes
•Single step	Yes	Yes
•Number of breakpoints	2	2
•Number of entries in the diagnostic buffer, max.	100	100
Diagnostic buffer		
- available	Yes	Yes
- Number of inputs, max.	100	100
- adjustable	No	No
Communication functions		
•Number of logical connections (including the network), max.	4; 1 fixed with integral CPU	4; 1 fixed with integral CPU
•PG/OP communication	Yes	Yes
Global data communication		
- supported	Yes	Yes
- Number of GD packets, max.	4	4
- Number of send GD packets, max.	4	4
- Number of receive GD packets, max.	4	4
- Size of GD packets, max.	22 Byte	22 Byte
- Size of GD packets (of which consistent), max.	22 Byte	22 Byte

	6ES7 635-2EC01-0AE3	6ES7 635-2EB01-0AE3
S7 basic communication		
- supported	Yes	Yes
- User data per job	76 Byte	76 Byte
- User data per job (of which consistent), max.	76 Byte; 76 bytes (for X_SEND and X_RECV) 64 bytes (for X_PUT and X_GET as server)	76 Byte; 76 bytes (for X_SEND and X_RECV) 64 bytes (for X_PUT and X_GET as server)
S7 communication		
- supported	Yes	Yes
- as server	Yes	Yes
- as client	Yes; via CP and loadable FB	Yes; via CP and loadable FB
- User data per job, max.	180 KByte; at PUT/GET	180 KByte; at PUT/GET
- User data per job (of which consistent), max.	64 Byte	64 Byte
S5 compatible communication		
- supported	Yes; via CP and loadable FB	Yes; via CP and loadable FB
Number of connections		
- overall	12	12
- usable for PG communication	11	11
- reserved for PG communication	1	1
- Customizable for PG communication, min.	1	1
- customizable for PG communication, max.	11	11
- usable for OP communication	11	11
- reserved for OP communication	1	1
- Customizable for OP communication, min.	1	1
- customizable for OP communication, max.	11	11
- usable for S7 basic communication	8	8
- reserved for S7 basic communication	8	8
- Customizable for S7 basic communication, min.	0	0
- customizable for S7 basic communication, max.	8	8
- usable for routing	4	4

Technical specifications (continued)

	6ES7 635-2EC01-0AE3	6ES7 635-2EB01-0AE3
Interfaces		
•Number of printer interfaces	1; serial	1; serial
1st interface		
•Type of interface	integrated RS 485 interface	integrated RS 485 interface
•Physical	RS 485	RS 485
•Isolated	No	No
•Power supply to interface (15 to 30 V DC), max.	200 mA	200 mA
Functionality		
- MPI	Yes	Yes
MPI		
- Number of connections	12	12
•Services		
- PG/OP communication	Yes	Yes
- Routing	Yes	Yes
- Global data communication	Yes	Yes
- S7 basic communication	Yes	Yes
- S7 communication	Yes	Yes
- S7 communication, as client	Yes; via CP and loadable FB	Yes; via CP and loadable FB
- S7 communication, as server	Yes	Yes
- Transmission rates, max.	187.5 kBit/s	187.5 kBit/s
2nd interface		
•Type of interface	integrated RS 485 interface	integrated RS 485 interface
•Physical	RS485	RS485
•Isolated	Yes	Yes
•Power supply to interface (15 to 30 V DC), max.	200 mA	200 mA
•Number of connection resources	12	12
Functionality		
- MPI	No	No
- DP master	Yes	Yes
- DP slave	Yes	Yes
DP master		
- Number of connections, max.	12	12
- 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
- Routing	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	Yes	Yes
- SYNC/FREEZE	Yes	Yes
- Activate/deactivate DP slaves	Yes	Yes
- Direct data exchange (lateral communication)	Yes	Yes
- Transmission rates, max.	12 Mbit/s	12 Mbit/s
- Number of DP slaves, max.	32	32

	6ES7 635-2EC01-0AE3	6ES7 635-2EB01-0AE3
•Address area		
- Inputs, max.	1 KByte	1 KByte
- Outputs, max.	1 KByte	1 KByte
•User data per DP Slave		
- Inputs, max.	244 Byte	244 Byte
- Outputs, max.	244 Byte	244 Byte
DP master		
- Number of connections, max.		
•Services	12	12
- PG/OP communication	Yes	Yes
- Routing	Yes; only when interfaces active	Yes; only when interfaces active
- Global data communication	No	No
- S7 basic communication	No	No
- S7 communication	No	No
- Direct data exchange (lateral communication)	Yes	Yes
- DPV1	No	No
- Transmission rates, max.	12 Mbit/s	12 Mbit/s
•Intermediate memory		
- Inputs	244 Byte	244 Byte
- Outputs	244 Byte	244 Byte
- Address areas, max.	32	32
- User data per address area, max.	32 Byte	32 Byte
CPU/ programming		
Configuration software		
- ProTool	Yes; or SIMATIC ProTool/Pro Configuration as of Version 6.0 SP1	Yes; or SIMATIC ProTool/Pro Configuration as of Version 6.0 SP1
- ProTool/Lite	Yes	Yes
- ProTool/Pro	Yes; Also flexible configuration with WinCC	Yes; Also flexible configuration with WinCC
Programming language		
- LAD	Yes	Yes
- FBD	Yes	Yes
- STL	Yes	Yes
- SCL	Yes	Yes
- CFC	Yes	Yes
- GRAPH	Yes	Yes
- HiGraph®	Yes	Yes
Software library		
•Instruction set	see instruction list	see instruction list
•Bracket levels	8	8
•User program protection/password protection	Yes	Yes
•System functions (SFC)	see instruction list	see instruction list
•System function blocks (SFB)	see instruction list	see instruction list

Technical specifications (continued)

	6ES7 635-2EC01-0AE3	6ES7 635-2EB01-0AE3
Integrated inputs/outputs		
Default addresses of the integral		
- Digital inputs	124.0 to 126.7	124.0 to 126.7
- Digital outputs	124.0 to 125.7	124.0 to 125.7
- Analog inputs	752 to 761	752 to 761
- Analog outputs	752 to 755	752 to 755
Digital inputs		
•Number of digital inputs	24	24
- which can be used as inputs for technological functions	16	16
Number of inputs that can be driven in parallel		
•vertical mounting positions		
- up to 40°C	18	18
- up to 50°C	12	12
•45°C mounting positions		
- up to 45°C	12	12
•horizontal mounting positions		
- up to 40°C	12	12
Length of cable		
- Length of cable shielded, max.	1,000 m; 100 m for technological functions	1,000 m; 100 m for technological functions
- Length of cable unshielded, max.	600 m	600 m
•Technological function		
- shielded, max.	50 m; at maximum count frequency	50 m; at maximum count frequency
- unshielded, max.	Unshielded cables are not allowed for technological functions	Unshielded cables are not allowed for technological functions
•Standard DI		
- shielded, max.	1,000 m	1,000 m
- unshielded, max.	600 m	600 m
•Input characteristic to comply with IEC 1131, Type 1	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"	15 to 30 V	15 to 30 V
Input current		
- for 1 signal, typical	7 mA	7 mA
Input delay (at rated value of the input voltage)		
•For standard inputs		
- Parameterizable	Yes; 0.1 / 0.5 / 3 / 5 ms	Yes; 0.1 / 0.5 / 3 / 15 ms
- Rated value	3 ms	3 ms
•for counters/technological functions		
- at 0 to 1, max.	8 µs	8 µs

	6ES7 635-2EC01-0AE3	6ES7 635-2EB01-0AE3
Digital outputs		
•Number of digital outputs	16	16
- of which fast outputs	4	4
•Length of cable shielded, max.	1,000 m	1,000 m
•Length of cable unshielded, max.	600 m	600 m
•Short-circuit protection of the output	Yes; clocking electronically	Yes; clocking electronically
•Short-circuit protection of the output, response threshold, typical	1 A	1 A
•Limitation of voltage induced on circuit interruption to	L+ (-48 V)	L+ (-48 V)
•Lamp load, max.	5 W	5 W
•Driving a digital input	Yes	Yes
Output voltage		
- for 1 signal	L+ (-0.8 V)	L+ (-0.8 V)
Output current		
- for 1 signal rated value	0.5 A	0.5 A
- permissible range for signal "1", min.	5 mA	5 mA
- permissible range for signal "1", max.	0.6 A	0.6 A
- for 1 signal minimum load current	5 mA	5 mA
- for 0 signal residual current, max.	0.5 mA	0.5 mA
Parallel switching of 2 outputs		
- to increase power	No	No
- to redundantly drive a load	Yes	Yes
Switching frequency		
- at resistive load, max.	100 Hz	100 Hz
- at inductive load, max.	0.5 Hz	0.5 Hz
- at lamp load, max.	100 Hz	100 Hz
- of pulse outputs, at resistive load, max.	2.5 kHz	2.5 kHz
Summation current of the outputs (per group)		
•vertical mounting positions		
- up to 40°C., max.	3 A	3 A
- up to 50°C., max.	2 A	2 A
•45°C mounting positions		
- up to 45°C, max.	2 A	2 A
•horizontal mounting positions		
- up to 40°C., max.	2 A	2 A
- up to 40 °C, max.	4 A	4 A
- up to 60 °C, max.	2 A	2 A
Load impedance range		
- lower limit	48 Ω	48 Ω
- upper limit	4 kΩ	4 kΩ

Technical specifications (continued)

	6ES7 635-2EC01-0AE3	6ES7 635-2EB01-0AE3
Analog inputs		
•Number of analog inputs	4	4
•Number of analog inputs for voltage/current measurement	4	4
•Number of analog inputs for resistance/temperature measurement	1	1
•Number of analog inputs for resistance measurement	1	1
•Length of cable shielded, max.	100 m	100 m
•Permissible input voltage for the voltage input (destruction limit), max.	30 V; permanent	30 V; permanent
•Permissible input voltage for the current input (destruction limit), max.	2.5 V; permanent, max. 24V transient	2.5 V; permanent, max. 24V transient
•Permissible input voltage for the voltage input (destruction limit), max.	0.5 mA; permanent	0.5 mA; permanent
•Permissible input voltage for the current input (destruction limit), max.	50 mA; permanent	50 mA; permanent
•Technical unit for temperature measurement, adjustable	Yes; degrees Celsius / degrees Fahrenheit / Kelvin	Yes; degrees Celsius / degrees Fahrenheit / Kelvin
Input ranges (rated values), voltages		
- 0 to +10 V	Yes	Yes
- -10 V to +10 V	Yes	Yes
Input ranges (rated values), currents		
- 0 to 20 mA	Yes	Yes
- -20 to +20 mA	Yes	Yes
- 4 to 20 mA	Yes	Yes
Input ranges (rated values), resistances		
- Open-circuit voltage (DC), type	2.5 V	2.5 V
- Current measurement, type.	1.8 mA to 3.3 mA	1.8 mA to 3.3 mA
- 0 to 600 ohms	Yes	Yes
Input ranges (rated values), resistance thermometer		
- Pt 100	Yes	Yes
Characteristic curve linearization		
- parameterizable	Yes; by the software	Yes; by the software
- for resistance thermometer	Pt 100	Pt 100
Temperature compensation		
- parameterizable	No	No

	6ES7 635-2EC01-0AE3	6ES7 635-2EB01-0AE3
Analog outputs		
•Number of analog outputs	2	2
•Length of cable shielded, max.	200 m	200 m
•Voltage output, short-circuit protection	Yes	Yes
•Voltage output, short-circuit current, max	55 mA	55 mA
•Current output, open-circuit voltage, max.	17 V	17 V
Output ranges, voltage		
- 0 to 10 V	Yes	Yes
- -10 to +10 V	Yes	Yes
Output ranges, current		
- 0 to 20 mA	Yes	Yes
- -20 to +20 mA	Yes	Yes
- 4 to 20 mA	Yes	Yes
Actuator connection		
- for voltage output 2-wire connection	Yes; without cable resistance compensation	Yes; without cable resistance compensation
- for voltage output 4-wire connection	No	No
- for current output 2-wire connection	Yes	Yes
Burden resistance (in the nominal output range)		
- at voltage outputs, min.	1 kΩ	1 kΩ
- at voltage outputs, capacitive load, max.	0.1 μF	0.1 μF
- at current outputs, max.	300 Ω	300 Ω
- at current outputs, inductive load, max.	0.1 mH	0.1 mH
Destruction limit against voltages and currents applied from outside		
- Voltages at the outputs against MANA	16 V; permanent	16 V; permanent
- Current (DC), max.	50 mA; permanent	50 mA; permanent
Analog value formation		
•Measuring principle	Encoding of instantaneous values (successive approximation)	Encoding of instantaneous values (successive approximation)
Integration and conversion time/triggering per channel		
- with over-range (bits incl. sign), max.	12 Bit	12 Bit
- Integration time parameterizable	Yes; 2.5 / 16.6 / 20 ms	Yes; 2.5 / 16.6 / 20 ms
- Permissible input frequency, max.	400 Hz	400 Hz
- Conversion time (per channel)	1 ms	1 ms
- Response time of the input filter	0.38 ms	0.38 ms
- Basic execution time of the module (all channels enabled)	1 ms	1 ms
Settling time		
- for resistive load	0.6 ms	0.6 ms
- for capacitive load	1 ms	1 ms
- for inductive load	0.5 ms	0.5 ms

Technical specifications (continued)

	6ES7 635-2EC01-0AE3	6ES7 635-2EB01-0AE3
Sensor		
Sensing element connection		
- for voltage measurement	Yes	Yes
- for current measurement, as 2-wire measuring transducer	Yes; with external power supply	Yes; with external power supply
- for current measurement, as 4-wire measuring transducer	Yes	Yes
- for resistance measurement, with 2-wire connection	Yes; without cable resistance compensation	Yes; without cable resistance compensation
- for resistance measurement, with 3-wire connection	No	No
- for resistance measurement, with 4-wire connection	No	No
Connectable encoders		
- 2-wire BEROs	Yes	Yes
- permissible closed-circuit current (2-wire BEROs), max.	1.5 mA	1.5 mA
Error/accuracies		
Operational limit in the entire temperature range		
- Relative to the output range, voltage	+/- 1 %	+/- 1 %
- Relative to the output range, current	+/- 1 %	+/- 1 %
- relative to the input range, voltage	+/- 1 %	+/- 1 %
- relative to the input range, current	+/- 1 %	+/- 1 %
- relative to the input range, resistance	+/- 5 %	+/- 5 %
Basic error limit (operational limit at 25 °C)		
- relative to the output range, voltage	+/- 0.7 %	+/- 0.7 %
- relative to the output range, current	+/- 0.7 %	+/- 0.7 %
- relative to the input range, voltage	+/- 0.7 %	+/- 0.7 %
- relative to the input range, current	+/- 0.7 %	+/- 0.7 %
- relative to the input range, resistance	+/- 3 %	+/- 3 %
- relative to the input range, resistance thermometer	+/- 3 %	+/- 3 %
Interference voltage suppression for $f = n \times (f_l \pm 1 \%)$		
- Series-mode interference (peak value of interference < rated value input range)	30 dB	30 dB
- Common-mode interference, min.	40 dB	40 dB
Integral functions		
•Number of counters	4	4
•Count frequency (counters) max.	60 kHz	60 kHz
•Frequency measurement	Yes	Yes
•Number of frequency sensors	Frequency meter up to max. 60 kHz	Frequency meter up to max. 60 kHz
•Controlled positioning	Yes	Yes
•Integrated function blocks (control)	Yes; PID controller	Yes; PID controller
•PID controller	Yes	Yes
•Number of pulse outputs	4; Pulse outputs up to max. 2.5 kHz	4; Pulse outputs up to max. 2.5 kHz
•Cut-off frequency (pulse)	2.5 kHz	2.5 kHz

	6ES7 635-2EC01-0AE3	6ES7 635-2EB01-0AE3
Status information/ interrupts/ diagnostics		
Interrupts		
- Interrupts	Yes	Yes
Operator control and monitoring		
•Process pictures	Yes	Yes
•Graphic objects	Yes	Yes
•Text elements	Yes	Yes
•Info texts	Yes	Yes
•Messages	Yes; Alarm messages, event messages (no buffer)	Yes; Alarm messages, event messages (no buffer)
•Number of process pictures	100	100
•Number of variables per picture, max.	50	50
•Number of variables in message text, max.	8	8
•Password protection	Yes	Yes
•Password levels	10	10
Keyboard		
- Type		Touch (resistive/analog)
- Number of operating cycle keys	1,000,000	1,000,000
- Number of function keys	10	
- Number of softkey keys	14	
Display		
- Type	STN, CCFL backlit, 5.7" Blue Mode (4 blue levels)	STN, CCFL backlit, 5.7" Blue Mode (4 blue levels)
- Background lighting MTBF (at 20°C)	50,000 h	50,000 h
Resolution (pixels)		
- Width	320	320
- Height	240	240
Event/alarm messages		
- Event messages	Yes	Yes
- Number of entries in process event buffer, max.	128; not retentive	128; not retentive
- Event messages, max.	2,000; total number of event and alarm messages	2,000; total number of event and alarm messages
- Alarm messages	Yes	Yes
- Number of alarm messages, max.	2,000; total number of event and alarm messages	2,000; total number of event and alarm messages
- Number of entries in the alarm message buffer, max.	128; not retentive	128; not retentive
Recipes		
- Number, max.	20	20
- Data records per recipe, max.	50; limited by storage medium	50; limited by storage medium
- Entries per data record, max.	60	60
- Recipe data memory, max	32 KByte; can be extended by a compact flash card (CF card)	32 KByte; can be extended by a compact flash card (CF card)

Technical specifications (continued)

	6ES7 635-2EC01-0AE3	6ES7 635-2EB01-0AE3
Insulation		
• Insulation tested with	500 V DC	500 V DC
Potentials/ electrical isolation		
Analog output functions		
- Electrical isolation, analog output functions	Yes; common for analog I/O	Yes; common for analog I/O
- between the channels	No	No
- between the channels and the backplane bus	Yes	Yes
Analog input functions		
- Electrical isolation, analog inputs	Yes; common for analog I/O	Yes; common for analog I/O
- between the channels	No	No
- between the channels and the backplane bus	Yes	Yes
Digital output functions		
- between the channels	Yes	Yes
- between the channels, in groups of	8	8
- between the channels and the backplane bus	Yes	Yes
Digital input functions		
- between the channels	No	No
- between the channels, in groups of	16	16
- between the channels and the backplane bus	Yes	Yes
Permissible potential difference		
• between different circuits	75 V DC / 60 V AC	75 V DC / 60 V AC

	6ES7 635-2EC01-0AE3	6ES7 635-2EB01-0AE3
Environmental requirements		
• Environmental conditions	Not suitable for open air use	Not suitable for open air use
Operating temperature		
- 45 degree mounting, min.	0 °C	0 °C
- 45 degree mounting, max.	45 °C	45 °C
- vertical mounting, min.	0 °C	0 °C
- vertical mounting, max.	50 °C	50 °C
- horizontal mounting, min.	0 °C	0 °C
- horizontal mounting, max.	40 °C	40 °C
Storage/transportation temperature		
- min.	-20 °C	-20 °C
- max.	70 °C	70 °C
Air pressure		
- Operation, min.	795 hPa	795 hPa
- Operation, max.	1,080 hPa	1,080 hPa
- Storage/transportation, min.	660 hPa	660 hPa
- Storage/transportation, max.	1,080 hPa	1,080 hPa
Relative humidity		
- Operation, min.	5 %	5 %
- Operation, max.	95 %	95 %
- Storage/transportation, min.	5 %	5 %
- Storage/transportation, max.	95 %	95 %
Degree of protection and class of protection		
IP 20	Yes; Housing	Yes; Housing
IP 65	Yes; Front	Yes; Front
Dimensions and weight		
• Weight, approx.	1.500 g	1.380 g
• Width	260 mm	260 mm
• Height	274 mm	199 mm
• Depth	80 mm	79 mm
• Installation cutout, width	231 mm	231 mm
• Installation cutout, height	257 mm	183 mm
Online languages		
• Number	3	3

Ordering data	Order No.	Order No.
Control system C7-635 Keys^{E)} 64 KB RAM (PLC) 24 DI, 16 DO, 5 AI, 2 AO integrated; with integrated operator panel: 512 KB Flash-EPROM for HMI data, STN LC display, CCFL backlit (320 x 240 pixels); with mounting accessories	6ES7 635-2EC01-0AE3	Accessories SIMATIC C7 Simulator with integral 16 DI and 16 DO; with switches and LEDs for simulating 16 DI and 16 DO I/O set For expanding the C7-613/C7-635/C7-636 with up to 4 modules; piggy-back mounting for 2 modules, flat mounting for 4 modules, deep mounting I/O expansion cable For external expansion of the SIMATIC C7-613/C7-635/C7-636 with up to 4 modules; length 1,5 m SIMATIC Manual Collection^{B)} Electronic manuals on CD-ROM, multilingual SIMATIC Manual Collection update service for 1 year^{B)} Up-to-date Manual Collection CD as well as the three subsequent updates Replacement parts Service package 3 seals, 10 holders, for all SIMATIC C7-613, C7-635 and C7-636 Earthing rail With shield terminals for analog I/O
Control system C7-635 Touch^{E)} 64 KB RAM (PLC) 24 DI, 16 DO, 5 AI, 2 AO integrated; with integrated touch panel: 512 KB Flash-EPROM for HMI data, STN LC display, CCFL backlit (320 x 240 pixels); with mounting accessories	6ES7 635-2EB01-0AE3	6ES7 620-0AA00-4AA0 6ES7 635-0AA00-6AA0 6ES7 635-0AA00-6BA0 6ES7 635-0AA00-6CA0
Micro memory card Essential for operation 64 KB 128 KB 512 KB 2 MB 4 MB 8 MB	6ES7 953-8LF11-0AA0 6ES7 953-8LG11-0AA0 6ES7 953-8LJ11-0AA0 6ES7 953-8LL11-0AA0 6ES7 953-8LM11-0AA0 6ES7 953-8LP11-0AA0	6ES7 998-8XC01-8YE0 6ES7 998-8XC01-8YE2
Connector set for I/O and power supply; essential for operation with screw-type terminals with spring-loaded terminals	6ES7 635-0AA00-4AA0 6ES7 635-0AA00-4BA0	6ES7 635-0AA00-3AA0
CF card, 16 MB	6AV6 574-2AC00-2AA0	6ES7 635-0AA00-6EA0
C7-635 manual package C7-635 manual, S7-300 manual and OP 170B hardware manual German English French Spanish Italian	6ES7 635-1EA00-8AA0 6ES7 635-1EA00-8BA0 6ES7 635-1EA00-8CA0 6ES7 635-1EA00-8DA0 6ES7 635-1EA00-8EA0	
C7-635 manual German English French Spanish Italian	6ES7 635-1AA00-8AA0 6ES7 635-1AA00-8BA0 6ES7 635-1AA00-8CA0 6ES7 635-1AA00-8DA0 6ES7 635-1AA00-8EA0	

B) Subject to export regulations: AL: N and ECCN: EAR99S

E) Subject to export regulations: AL: N and ECCN: 5D002ENC3

Overview



- Compact units for comprehensive applications
- The CPU with medium to large program memory and quantity framework for the use, if required, of SIMATIC Engineering Tools
- High processing performance in binary and floating-point arithmetic
- Full graphics 5.7" STN display, color (256 colors)
- 36 system keys, 24 user-configurable function keys which can be labeled as required (18 with an LED)
- With onboard I/O for use at machine level
- With integrated PROFIBUS DP connection for distributed structures
- Graphical and color visualization and operator support for particularly user-friendly use

A micro memory card and connector set are required for C7 operation.

Technical specifications

	6ES7 636-2EC00-0AE3
Supply voltages	
Rated value	
- 24 V DC	Yes
- permissible range, lower limit (DC)	20.4 V
- permissible range, upper limit (DC)	28.8 V
Current consumption	
• Inrush current, max.	3 A; 3 A for 10 ms, then 2 A for 70 ms
• Current consumption, max.	1.3 A
• Current consumption, typical	450 mA; idling
Digital outputs	
• Power dissipation, typical	19 W
Back-up battery	
- Backup battery (optional)	Yes
Memory/backup	
Memory	
- Micro memory card	Yes
• Working memory	
- integral	128 KByte
- expandable	No
• Load memory	
- pluggable (MMC)	Yes
- pluggable (MMC), max.	8 MByte
• User memory	
- integral	2 MByte; (Flash) for configuring the panel
Backup	
- available	Yes; guaranteed by MMC (maintenance-free)
- with battery	Yes; Option for the panel
- without battery	Yes; CPU program and data

	6ES7 636-2EC00-0AE3
CPU/blocks	
DB	
- Number, max.	1,023; DB 0 reserved
- Size, max.	16 KByte
FB	
- Number, max.	2,048; see instruction list
- Size, max.	16 KByte
FC	
- Number, max.	2,048; see instruction list
- Size, max.	16 KByte
OB	
- Number, max.	see instruction list
- Size, max.	16 KByte
Nesting depth	
- per priority class	8
- additional levels within an error OB	4
CPU/processing times	
• for bit instruction, min.	0.1 µs
• for word instruction, min.	0.2 µs
• for integer math, min.	2 µs
• for floating-point math, min.	6 µs
Timers/counters and their retentive characteristics	
S7 counter	
- Number	256
• of which retentive without battery	
- adjustable	Yes
- lower limit	0
- upper limit	256
• Retentivity	
- adjustable	Yes
- preset	Z 0 to Z 7
• Counting range	
- lower limit	0
- upper limit	999