MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Amikon cover with selected official Siemens pages

VIPA MC 951

951-0KJ00

MC 951 512 KB FLASH EPROM MEMORY CARD

OFFICIAL SOURCES

Siemens official PDF. Selected pages retain their original content, color and aspect ratio.

SIMATIC S7-300

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Overview

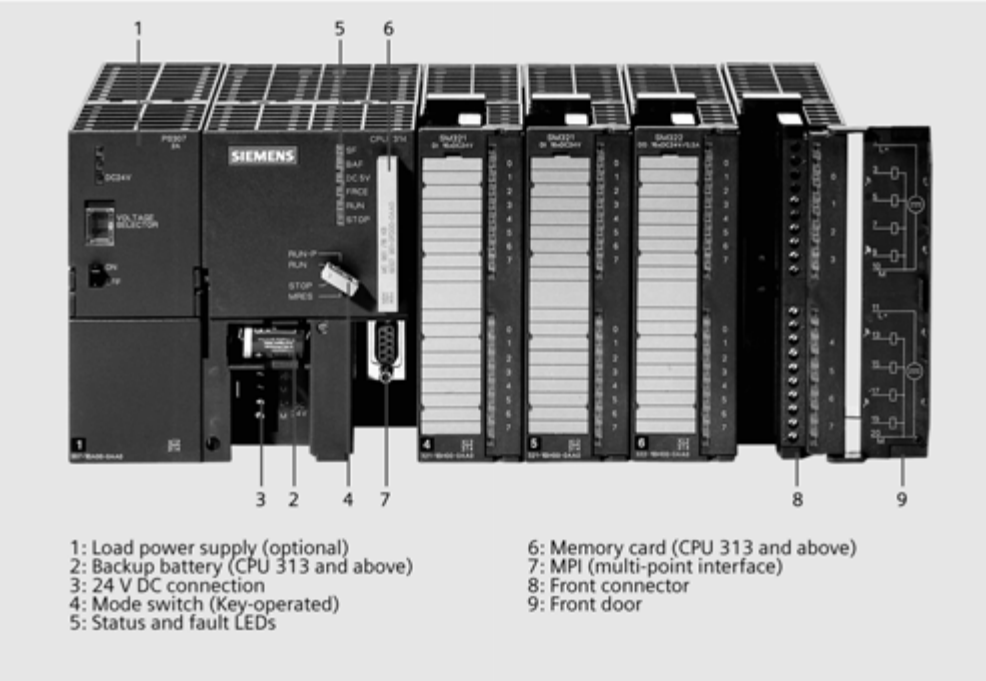


Fig. 4/1 Automation system SIMATIC S7-300

SIMATIC S7-300

- The modular mini PLC system for the low-end and mid performance ranges
- With a comprehensive range of modules for optimum adaptation to the automation task
- Flexible usage through the easy implementation of distributed structures and versatile networking capability
- User-friendly handling and uncomplicated, fan-free design
- Trouble-free expansion when your task grows
- Powerful thanks to a large number of integrated functions

SIMATIC S7-300F

- Failsafe automation system for installations in manufacturing with increased safety requirements
- Complies with safety requirements up to SIL 3 to IEC 61508, AK6 to DIN V 19250 and Cat. 4 acc. to EN 954-1
- Based on S7-300 with failsafe modules
- Standard modules for non-safety-related applications can also be used in the automation system

SIMATIC S7-300 Outdoor®

- The PLC for use in the harshest environmental conditions
- With extended temperature range from -25 to +60°C (+70°C in development)
- Occasional short-term condensation and increased mechanical loading permissible
- With the proven PLC technology of the S7-300
- Convenient handling, programming, maintenance and service
- Ideal for use in the automotive industry, environmental technology, mining, chemical plants, production technology, food industry etc.
- The alternative to expensive custom solutions

Technical specifications

General technical specifications S7-300, S7-300F	
Degree of protection	IP 20 to IEC 529
Ambient temperature	
• At horizontal installation	0 to 60 °C
• At vertical installation	0 to 40 °C
Relative humidity	5 to 95%, no condensation (RH degree of severity 2 to IEC 1131-2)
Atmospheric pressure	795 to 1080 hPa
Insulation	
• 24 V DC circuit	500 V DC test voltage
• 230 V AC circuit	1460 V AC test voltage
Electromagnetis compability	Complies with EMC requirements; Noise suppression to EN 50082-2, tested to: IEC 801-2, ENV 50140, IEC 801-4, ENV 50141, IEC 801-5; Noise emission to EN 50081-2, tested to EN 55011, Class A, Group 1
Mechanical load	
• Vibration, tests acc. to/tested with	IEC 68, Part 2-6/10 to 58 Hz; constant amplitude 0.075 mm; 58 to 150 Hz; constant acceleration 1 g; period of vibration: 10 frequency sweeps per axis in each of the three mutually perpendicular axes
• Shock, tests acc. to/tested with	IEC 68, Part 2-27/half-sine: Shock strength: 15 g (peak value), duration 11 ms

General technical specifications S7-300 Outdoor	
Climatic operating conditions	
Temperature	Horizontal installation: -25°C to 60°C (70°C under development) Vertical installation: -25°C to 40°C
Relative humidity	5 to 95%; short-term moisture condensation allowed, corresponds to relative humidity (RH) degree of severity 2 at IEC 1131-2 and IEC 721 3-3 Class 3K5
Temporary icing	-25°C to 0°C IEC 721 3-3 Class 3K5
Atmospheric pressure	1080 to 795 hPa Corresponds to a height of –1000 to 2000 m
Pollutant concentrations	SO_2: < 0.5 ppm; relative humidity <60% Test: 10 ppm, 4 days H_2S: < 0.1 ppm; relative humidity <60% Test: 1 ppm, 4 days (to IEC 721 3-3; class 3C3)
Mechanical operating conditions	
Vibration	Type of vibration: frequency sweeps with a change rate of 1 octave per minute. 2 Hz ≤ f ≤ 9 Hz, constant amplitude 3.0 mm 9 Hz ≤ f ≤ 150 Hz, constant acceleration 1 g period of vibration: 10 frequency sweeps per axis in each of the three mutually perpendicular axes; Vibration tests according to IEC 68 part 2-6 (sinusoidal) and IEC 721 3-3, class 3M4
Shock	Type of shock: half-sine Shock strength: 15 g peak value, 11 ms duration Shock direction: 3 shocks each in +/- direction in each of the three mutually perpendicular axes Shock test according to IEC 68 part 2-27

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Overview

- 20 different CPUs:
  - 6 compact CPUs (with integrated technology functions and I/O)
  - 3 redesigned standard CPUs (CPU 312, CPU 314, CPU 315-2 DP)
  - 5 standard CPUs (CPU 313, CPU 314, CPU 315, CPU 315-2 DP, CPU 316-2 DP); superseded in the medium-term by redesigned standard CPUs
  - CPU 315F-2 DP
  - 4 SIMATIC S7-300 Outdoor CPUs (CPU 312 IFM, CPU 314 IFM, CPU 315-2 DP)
  - CPU 318-2 DP
- Graded performance spectrum for a wide range of different applications

Overview
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

Overview
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

Overview
CPU 313C-2 PtP



- The compact CPU with integrated digital I/Os and second serial interface
- 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

Overview
CPU 313C-2 DP



- The compact CPU with integrated digital I/Os and PROFIBUS DP master/slave interface
- With process-related functions
- For tasks with special functions
- For the connection of standalone I/O devices

Micro memory card required to operate the CPU

Overview
CPU 314C-2 PtP



- The compact CPU with integrated digital and analog I/Os, as well as a second serial interface
- 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

Overview
CPU 314C-2 DP



- The compact CPU with integrated digital and analog I/Os and PROFIBUS DP master/slave interface
- With process-related functions
- For tasks with special functions
- For the connection of standalone I/O devices

Micro memory card required to operate the CPU

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Overview
CPU 312 new



- The starter CPU for Totally Integrated Automation (TIA).
- For small-scale applications with moderate requirements on the processing speed.

Micro memory card required to operate the CPU

Overview
CPU 314 new



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

Micro memory card required to operate the CPU

Overview
CPU 315-2 DP new



- 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 required to operate the CPU

Overview
CPU 313



- The low-cost CPU with extended program memory
- For small applications requiring high-speed processing

Overview
CPU 314



- The CPU for demanding tasks requiring high-speed processing and medium-sized I/O configurations
- Used in installations requiring medium-sized programs and mid-range instruction execution speeds

Overview
CPU 315



- The CPU with a mid-sized to large program memory
- For extensive I/O configurations

Overview
CPU 315-2 DP



- The CPU with medium to large program memory and PROFIBUS DP master/slave interface
- For extensive I/O configurations
- For setting up distributed I/O structures

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Overview
CPU 316-2 DP



- The CPU 316-2 DP with lots of program memory
- For extensive I/O configurations
- With PROFIBUS DP master/slave interface
- Is used in plants that contain both distributed and centralized I/O configurations

Overview
CPU 312 IFM Outdoor



- The compact CPU with integral digital I/O
- For small systems
- With special functions and special inputs for specific functions
- Can also be used under the harshest environmental conditions

Overview
CPU 314 IFM Outdoor



- The compact CPU with integral digital inputs/outputs and extended special functions
- For systems with high requirements in respect of response time and special functions
- With additional special functions and special inputs for more specific functions
- Can also be used under harsh environmental conditions

Overview
CPU 314 Outdoor



- The CPU for demanding tasks requiring high-speed processing and medium-sized I/O configurations
- Used in installations requiring medium-sized programs and mid-range instruction execution speeds
- Can also be used under harsh environmental conditions

Overview

CPU 318-2 DP



- The CPU with large program memory and PROFIBUS DP master/slave interface
- For extensive I/O configurations
- For setting up distributed I/O structures

Overview

CPU 315F



- The first S7-315F CPU based on the S7-300C devices with a PROFIBUS DP master/slave interface
- For configuring a failsafe automation system for installations with increased safety requirements
- Complies with safety requirements up to SIL 3 to IEC 61508, AK6 to DIN V 19250 and Cat. 4 acc. to EN 954-1
- Without additional wiring of the fail-safe I/O
- Safety-related communication using PROFIBUS DP with *PROFI*safe profile for distributed I/O stations
- ET 200M and ET 200S can be connected with failsafe digital modules
- Standard modules for non-safety-related applications can also be operated in the automation system

Micro memory card required to operate the CPU

Technical specifications compact CPUs

	CPU 312C	CPU 313C	CPU 313C-2 PtP	CPU 313C-2 DP	CPU 314C-2 PtP	CPU 314C-2 DP
Memory						
RAM						
• Integrated	16 KB for program and data	32 KB for program and data	32 KB for program and data	32 KB for program and data	48 KB for program and data	48 KB for program and data
• Expandable	No	No	No	No	No	No
Load memory						
• Integrated	-	-	-	-	-	-
• Upgradable FEPROM	With micro memory card (MMC) up to 4 MB	With micro memory card (MMC) up to 4 MB	With micro memory card (MMC) up to 4 MB	With micro memory card (MMC) up to 4 MB	With micro memory card (MMC) up to 4 MB	With micro memory card (MMC) up to 4 MB
Backup	Performed by MMC (maintenance free)	Performed by MMC (maintenance free)	Performed by MMC (maintenance free)	Performed by MMC (maintenance free)	Performed by MMC (maintenance free)	Performed by MMC (maintenance free)
• With battery	-	-	-	-	-	-
• Without battery	Program and data	Program and data	Program and data	Program and data	Program and data	Program and data
Execution times						
Processing times for						
• Bit operations, min.	0.2 µs to 0.4 µs	0.1 µs to 0.2 µs	0.1 µs to 0.2 µs	0.1 µs to 0.2 µs	0.1 µs to 0.2 µs	0.1 µs to 0.2 µs
• Word operations, min.	1 µs	0.5 µs	0.5 µs	0.5 µs	0.5 µs	0.5 µs
• Fixed-point addition, min.	2 µs	1 µs	1 µs	1 µs	1 µs	1 µs
• Floating-point addition, min.	30 µs	15 µs	15 µs	15 µs	15 µs	15 µs

Technical specifications compact CPUs (continued)

	CPU 312C	CPU 313C	CPU 313C-2 PtP	CPU 313C-2 DP	CPU 314C-2 PtP	CPU 314C-2 DP
Timers/counters and their retentivity						
S7 counters	128	256	256	256	256	256
• Retentivity selectable	From Z 0 to Z 128	From Z 0 to Z 256	From Z 0 to Z 256	From Z 0 to Z 256	From Z 0 to Z 256	From Z 0 to Z 256
• Counting range	1 to 999	1 to 999	1 to 999	1 to 999	1 to 999	1 to 999
IEC counters	Yes	Yes	Yes	Yes	Yes	Yes
• Type	SFB	SFB	SFB	SFB	SFB	SFB
S7 timers	128	256	256	256	256	256
• Retentivity selectable	From T 0 to T 128	From T 0 to T 256	From T 0 to T 256	From T 0 to T 256	From T 0 to T 256	From T 0 to T 256
• Range	10 ms to 9990 s	10 ms to 9990 s	10 ms to 9990 s	10 ms to 9990 s	10 ms to 9990 s	10 ms to 9990 s
IEC timers	Yes	Yes	Yes	Yes	Yes	Yes
• Type	SFB	SFB	SFB	SFB	SFB	SFB
Data ranges and their retentivity						
Bit memories	1024	2048	2048	2048	2048	2048
• Retentivity selectable	From MB 0 to MB 1024	From MB 0 to MB 2048	From MB 0 to MB 2048	From MB 0 to MB 2048	From MB 0 to MB 2048	From MB 0 to MB 2048
Blocks						
Max. block size	16 KB	16 KB	16 KB	16 KB	16 KB	16 KB
Number of						
• Watchdog interrupts	1	1	1	1	1	1
• Process alarms	1	1	1	1	1	1
• Time-of-day interrupts	1	1	1	1	1	1
• Delay interrupts	1	1	1	1	1	1
Nesting depth						
• Per priority class	8	8	8	8	8	8
• Additional within an error OB	4	4	4	4	4	4
FBs, max.	64	128	128	128	128	128
FCs, max.	64	128	128	128	128	128
Data blocks, max.	63 (DB 0 reserved)	127 (DB 0 reserved)	127 (DB 0 reserved)	127 (DB 0 reserved)	127 DB 0 reserved)	127 (DB 0 reserved)
Programming						
Programming language	STEP 7 V5.1 SP2 (LAD, FBD, STL); SCL, GRAPH, HiGraph	STEP 7 V5.1 SP2 (LAD, FBD, STL); SCL, GRAPH, HiGraph	STEP 7 V5.1 SP2 (LAD, FBD, STL); SCL, GRAPH, HiGraph	STEP 7 V5.1 SP2 (LAD, FBD, STL); SCL, GRAPH, HiGraph	STEP 7 V5.1 SP2 (LAD, FBD, STL); SCL, CFC, GRAPH, HiGraph	STEP 7 V5.1 SP2 (LAD, FBD, STL); SCL, CFC, GRAPH, HiGraph
Nesting levels	8	8	8	8	8	8
User program protection	Password protection	Password protection	Password protection	Password protection	Password protection	Password protection
Address areas (inputs/outputs)						
Total I/O address area	1024 / 1024 byte (freely adressable)	1024 / 1024 byte (freely adressable)	1024 / 1024 byte (freely adressable)	1024 / 1024 byte (freely adressable)	1024 / 1024 byte (freely adressable)	1024 / 1024 byte (freely adressable)
Process image	128 / 128 byte	128 / 128 byte	128 / 128 byte	128 / 128 byte	128 / 128 byte	128 / 128 byte
Digital channels	256 / 256 max.	Max. 992 / 992	Max. 992 / 992	Max. 992 / 992	Max. 992 / 992	Max. 992 / 992
Analog channels	64 / 32 max.	Max. 248 / 124	Max. 248 / 124	Max. 248 / 124	Max. 248 / 124	Max. 248 / 124

Technical specifications compact CPUs (continued)

	CPU 312C	CPU 313C	CPU 313C-2 PtP	CPU 313C-2 DP	CPU 314C-2 PtP	CPU 314C-2 DP
Design						
Central controllers/ expansion units, max.	1 / 0	1 / 3	1 / 3	1 / 3	1 / 3	1 / 3
Number of modules per system	8	31	31	31	31	31
Number of DP masters						
• Integrated	-	-	-	1	-	1
• Via CP	1	1	1	1	1	1
Suitable modules (recommendation)						
• FMs	4	8	8	8	8	8
• CPs, point-to-point	2	4	4	4	4	4
• CPs, LAN	1	2	2	2	2	2
Time-of-day						
Clock	Yes	Yes	Yes	Yes	Yes	Yes
• Backed up	No	Yes	Yes	Yes	Yes	Yes
Hours counter	1	1	1	1	1	1
Time-of-day synchronization	Yes	Yes	Yes	Yes	Yes	Yes
Communication functions						
Total number of connections usable for	6	8	8	8	12	12
• Programming devic communications	Yes	Yes	Yes	Yes	Yes	Yes
- reserved	1	1	1	1	1	1
- adjustable	1 to 5	1 to 7	1 to 7	1 to 7	1 to 11	1 to 11
• OP communications	Yes	Yes	Yes	Yes	Yes	Yes
- reserved	1	1	1	1	1	1
- adjustable	1 to 5	1 to 7	1 to 7	1 to 7	1 to 11	1 to 11
• S7 standard communication	Yes	Yes	Yes	Yes	Yes	Yes
- reserved	2	4	4	4	8	8
- adjustable	0 to 2	0 to 4	0 to 4	0 to 4	0 to 8	0 to 8
• Routing	-	-	-	4	-	4
S7 message functions						
Number of stations that can be defined for message functions (e.g. OS)	3	5	5	5	7	7
Interfaces						
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 link	No	No	Yes	No	Yes	No

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Technical specifications compact CPUs (continued)

	CPU 312C	CPU 313C	CPU 313C-2 PtP	CPU 313C-2 DP	CPU 314C-2 PtP	CPU 314C-2 DP
MPI						
Cable length (without repeater)	50 m	50 m	50 m	50 m	50 m	50 m
Transmission rates	Up to 187.5 kbit/s	Up to 187.5 kbit/s	Up to 187.5 kbit/s	Up to 187.5 kbit/s	Up to 187.5 kbit/s	Up to 187.5 kbit/s
Number of connections	6	8	8	8	12	12
Services						
• Programming device/ OP communications	Yes	Yes	Yes	Yes	Yes	Yes
• Global data communication	Yes	Yes	Yes	Yes	Yes	Yes
• Number of GD circuits						
- sender, max.	4	4	4	4	4	4
- receiver, max.	4	4	4	4	4	4
• Size of the GD packets, max.	22 byte	22 byte	22 byte	22 byte	22 byte	22 byte
S7 standard communication	Yes	Yes	Yes	Yes	Yes	Yes
• User data per job, max.	76 byte	76 byte	76 byte	76 byte	76 byte	76 byte
S7 Communication						
• As server	Yes	Yes	Yes	Yes	Yes	Yes
• As client	No	No	No	No	No	No
• User data per job, max.	64 KB	64 KB	64 KB	64 KB	64 KB	64 KB
2nd interface	-	-				
Functionality	-	-				
• MPI	-	-	No	No	No	No
• DP master	-	-	No	Yes	No	Yes
• DP slave	-	-	No	Yes	No	Yes
• Point-to-point link	-	-	Yes	No	Yes	No
• Electrical isolation	-	-	Yes	Yes	Yes	Yes
Point-to-point	-	-				
Transfer media	-	-	RS422 / RS485 (X.27)	-	RS422 / RS485 (X.27)	-
Transmission rate	-	-	19.2 kbit/s	-	19.2 kbit/s	-
Line length	-	-	1,200 m	-	1,200 m	-
Implemented protocols	-	-	ASCII, 3964 (R)	-	ASCII, 3964 (R), RK 512	-
DP-Master	-	-	-		-	
Number of connections	-	-	-	8 for PG/OP communication	-	12 for PG/OP communication
- Of these reserved	-	-	-	1 for PG, 1 for OP	-	1 for PG, 1 for OP
Services	-	-				
• Programming device/ OP communications	-	-	-	Yes	-	Yes
• Support for internode communications	-	-	-	Yes	-	Yes
• Equidistance	-	-	-	Yes	-	Yes
• SYNC/FREEZE	-	-	-	Yes	-	Yes

Technical specifications compact CPUs (continued)

	CPU 312C	CPU 313C	CPU 313C-2 PtP	CPU 313C-2 DP	CPU 314C-2 PtP	CPU 314C-2 DP
Services	-	-				
• Global data communication	-	-	-	No	-	No
• S7 basic communication	-	-	-	No	-	No
• S7 communication	-	-	-		-	
- as server	-	-	-	No	-	No
- as client	-	-	-	No	-	No
Transmission rates	-	-	-	Up to 12 Mbit/s	-	Up to 12 Mbit/s
Number of DP slaves, max.	-	-	-	32	-	32
Address range max. (I/O)	-	-	-	1024 / 1024 byte	-	1024 / 1024 byte
User data per DP slave, max. (I/O)	-	-	-	244 / 244 byte	-	244 / 244 byte
Voltages, currents						
Supply voltage						
Rated value	24 V DC	24 V DC	24 V DC	24 V DC	24 V DC	24 V DC
Permissible range	20.4 to 28.8 V	20.4 to 28.8 V	20.4 to 28.8 V	20.4 to 28.8 V	20.4 to 28.8 V	20.4 to 28.8 V
Current consumption typ.	0.5 A	0.7 A	0.9 A	0.9 A	0.8 A	1.0 A
Starting current, typ.	11 A	11 A	11 A	11 A	11 A	11 A
Power losses, typically	6 W incl. integrated I/Os	14 W	10 W	10 W	14 W	14 W
Dimensions						
Installation dimensions (W x H x D) in mm	80 x 125 x 130	120 x 125 x 130	120 x 125 x 130	120 x 125 x 130	120 x 125 x 130	120 x 125 x 130
Weight, approx.	410 g	660 g	570 g	570 g	680 g	680 g
Integrated digital inputs						
Number of inputs	10	24	16	16	24	24
Input voltage						
• Rated value	24 V DC	24 V DC	24 V DC	24 V DC	24 V DC	24 V DC
• For "1" signal	15 to 30 V	15 to 30 V	15 to 30 V	15 to 30 V	15 to 30 V	15 to 30 V
• For "0" signal	-3 to +5 V	-3 to +5 V	-3 to +5 V	-3 to +5 V	-3 to +5 V	-3 to +5 V
Electrical isolation	Yes	Yes	Yes	Yes	Yes	Yes
• In groups of	10	16 and 8	16	16	16	16
Input current						
• For "1" signal, min./typ.	8 mA	-/8 mA	2 mA / 8 mA	2 mA / 8 mA	-/8 mA	-/8 mA
Input delay (at rated value of the input voltage)						
• For standard inputs, typ./max.	0.1/0.3/3/15 ms	0.1 /0.3 /3 / 15 ms	0.1/0.3/3/15 ms	0.1/0.3/3/15 ms	0.1/0.3/3/15 ms	0.1/0.3/3/15 ms
• For process-related functions	50 µs	16 µs	8 µs	8 µs	8 µs	8 µs
Connection of 2-wire BERO						
• Acceptable quiescent current	1.5 mA	1.5 mA	1.5 mA	1.5 mA	1.5 mA	1.5 mA
Cable lengths						
• Unshielded	600 m	600 m	600 m	600 m	600 m	600 m
• Shielded	1000 m (100 m for process-related functions)	1000 m (100 m for process-related functions)	1000 m (100 m for process-related functions)	1000 m (100 m for process-related functions)	1000 m (100 m for process-related functions)	1000 m (100 m for process-related functions)

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Technical specifications compact CPUs (continued)

	CPU 312C	CPU 313C	CPU 313C-2 PtP	CPU 313C-2 DP	CPU 314C-2 PtP	CPU 314C-2 DP
Integrated digital outputs						
Number of inputs	6	16	16	16	16	16
Rated load voltage L+/L1	24 V DC	24 V DC	24 V DC	24 V DC	24 V DC	24 V DC
• Permitted range	20.4 to 28.8 V	20.4 to 28.8 V	20.4 to 28.8 V	20.4 to 28.8 V	20.4 to 28.8 V	20.4 to 28.8 V
Output voltage						
• At "1" signal, max.	L+ - 0.8 V	L+ - 0.8 V	L+ - 0.8 V	L+ - 0.8 V	L+ - 0.8 V	L+ - 0.8 V
Electrical isolation	Yes	Yes	Yes	Yes	Yes	Yes
• In groups of	6	8	8	8	8	8
Maximum output current						
• At "1" signal						
- rated value at 40 °C	0.5 A	0.5 A	0.5 A	0.5 A	0.5 A	0.5 A
- rated value at 60 °C	0.5 A	0.5 A	0.5 A	0.5 A	0.5 A	0.5 A
- min. current	5 mA	5 mA	5 mA	5 mA	5 mA	5 mA
• For "0" signal, max.	0.5 mA	0.5 mA	0.5 mA	0.5 mA	0.5 mA	0.5 mA
Total load capability						
• At 40 °C	100 %	100 %	100 %	100 %	100 %	100 %
• At 60 °C	50 %	50 %	50 %	50 %	50 %	50 %
Switching frequency of outputs						
• For resistive load	100 Hz	100 Hz	100 Hz	100 Hz	100 Hz	100 Hz
• For inductive load	0.5 Hz	0.5 Hz	0.5 Hz	0.5 Hz	0.5 Hz	0.5 Hz
Voltage induced on circuit interruption limited to	Type (L+) –48V	Type (L+) –48V	Type (L+) –48V	Type (L+) –48V	Type (L+) –48V	Type (L+) –48V
Short-circuit protection	Electronic, clocked	Electronic, clocked	Electronic, clocked	Electronic, clocked	Electronic, clocked	Electronic, clocked
Cable lengths						
• Unshielded	600 m	600 m	600 m	600 m	600 m	600 m
• Shielded	1000 m	1000 m	1000 m	1000 m	1000 m	1000 m
Integrated analog inputs (for resistance / temperature)	-		-	-		
• Number of inputs	-	4	-	-	4	4
• Resistance	-	±10 V, 0 to 10 V	-	-	±10 V, 0 to 10 V	±10 V, 0 to 10 V
Electrical isolation	-	±20 mA, 0/4 to 20 mA	-	-	±20 mA, 0/4 to 20 mA	±20 mA, 0/4 to 20 mA
Bipolar resolution	-	Common for analog I/O	-	-	Common for analog I/O	Common for analog I/O
Integration time (adjustable)	-	11 bit + sign	-	-	11 bit + sign	11 bit + sign
• Per channel	-		-	-		
• Integrated analog inputs (for resistance / temperature)	-	2.5 / 16.6 / 20ms	-	-	2.5 / 16.6 / 20ms	2.5 / 16.6 / 20ms
Basic error (operational limit at 25 °C, referred to output range), max.	-	±0.7%	-	-	±0.7%	±0.7%

Technical specifications compact CPUs (continued)

	CPU 312C	CPU 313C	CPU 313C-2 PtP	CPU 313C-2 DP	CPU 314C-2 PtP	CPU 314C-2 DP
Integrated analog inputs (for resistance / temperature)	-		-	-		
Number of inputs	-	1	-	-	1	1
Resistance	-	0 to 600 Ohm, Pt 100	-	-	0 to 600 Ohm, Pt 100	0 to 600 Ohm, Pt 100
Electrical isolation	-	Common for analog I/O	-	-	Common for analog I/O	Common for analog I/O
Bipolar resolution	-	11 bit + sign	-	-	11 bit + sign	11 bit + sign
Integration time (adjustable)	-		-	-		
• Per channel	-	2.5 / 16.6 / 20ms	-	-	2.5 / 16.6 / 20ms	2.5 / 16.6 / 20ms
Basic error threshold (operating error threshold at 25°C, referred to input range)	-	±3%	-	-	±3%	±3%
Integrated analog outputs	-		-	-		
Number of outputs	-	2	-	-	2	2
Output ranges (rated values)	-		-	-		
• Voltage	-	±10 V, 0 to 10 V	-	-	±10 V, 0 to 10 V	±10 V, 0 to 10 V
• Current	-	±20 mA, 0/4 to 20 mA	-	-	±20 mA, 0/4 to 20 mA	±20 mA, 0/4 to 20 mA
Electrical isolation	-	Common for analog I/O	-	-	Common for analog I/O	Common for analog I/O
Conversion time per channel	-	1ms	-	-	1ms	1ms
Basic error (operational limit at 25 °C, referred to output range), max.	-	±0.7%	-	-	±0.7%	±0.7%
• Required 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
• Integrated functions						
• Counter	2	3	3	3	4	4
• Counting speed max.	10 kHz	30 kHz	30 kHz	30 kHz	60 kHz	60 kHz
• Pulse outputs	2	3	3	3	4	4
• Switching frequency max.	2.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz
• Frequency measurement	Yes	Yes	Yes	Yes	Yes	Yes
• Open-loop positioning	-	-	-	-	Yes	Yes
• Integrated “Closed loop control” function blocks	-	PID	PID	PID	PID	PID

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Technical specifications innovated standard CPUs

	CPU 312 new	CPU 314 new	CPU 315-2 DP new
MLFB	6ES7312-1AD10-0AB0	6ES7314-1AF10-0AB0	6ES7315-2AG10-0AB0
Associated programming package	STEP7 from V 5.1 + SP 4 and higher	STEP 7 from V 5.1 + SP 4 **Optional:** • S7-SCL • S7-GRAPH	STEP 7 from V 5.1 + SP 4 **Optional:** • S7-SCL • S7-GRAPH • S7-HiGraph
Memory			
RAM			
• Integrated	16 KB	48 KB	128 KB
• Expandable	No	No	No
Load memory	Plug-in using MMC (4 MB max.)	Plug-in using MMC (8 MB max.)	Plug-in using MMC (8 MB max.)
Backup	Performed by MMC (maintenance free)	Performed by MMC (maintenance free)	Performed by MMC (maintenance free)
Execution times			
Processing times for			
• Bit operation, min.	0.2 µs	0.1 µs	0.1 µs
• Word operation, min.	0.4 µs	0.2 µs	0.2 µs
• Fixed-point addition, min.	5 µs	2.0 µs	2.0 µs
• Floating-point addition, min.	6 µs	6 µs	6 µs
Timers/counters and their retentivity			
S7 counters		256	256
• Retentivity	Variable	Variable	Variable
• Default	From Z 0 to Z 7	From Z 0 to Z 7	From Z 0 to Z 7
• Counting range	0 to 999	0 to 999	0 to 999
IEC counters	Yes	Yes	Yes
• Type	SFB	SFB	SFB
• Number of inputs	Unlimited (only restricted by working memory)	Unlimited (only restricted by working memory)	Unlimited (only restricted by working memory)
S7 timers	128	256	256
• Retentivity	Variable	Variable	Variable
• Default	No retentivity	No retentivity	No retentivity
• Range	10 ms to 9990 s	10 ms to 9990 s	10 ms to 9990 s
IEC timers	Yes	Yes	Yes
• Type	SFB	SFB	SFB
• Number of inputs	Unlimited (only restricted by working memory)	Unlimited (only restricted by working memory)	Unlimited (only restricted by working memory)
Data ranges and their retentivity			
Total retentive data storage (incl. bit memories; timers; counters)	All	All	All
Bit memories	128 byte	256 byte	2048 byte
• Retentivity	Yes	Yes	Yes
• Preset retentivity	From MB 0 to MB 15	MB 0 to MB15	MB 0 to MB15
Clock bit memory	8 (1 flag byte)	8 (1 flag byte)	8 (1 flag byte)

Technical specifications innovated standard CPUs (continued)

	CPU 312 new	CPU 314 new	CPU 315-2 DP new
Data blocks			
• Number	511	511	1023
• Size	16 KB	16 KB	16 KB
Local data per priority class, max.	256 byte	512 byte	1024 byte
Blocks			
Total	1024 (DBs, FCs, FBs)	1024 (DBs, FCs, FBs)	1024 (DBs, FCs, FBs)
OBs	See operation list	See operation list	See operation list
• Size, max.	16 KB	16 KB	16 KB
Nesting depth			
• Per priority class	8	8	8
• Additional within an error OB	4	4	4
FBs, max.		See operation list	See operation list
• Number	512	512	2048
• Size, max.	16 KB	16 KB	16 KB
FCs, max.		See operation list	See operation list
• Number	512	512	2048
• Size, max.	16 KB	16 KB	16 KB
Address areas (inputs/outputs)			
Total I/O address area	1024 / 1024 byte (freely addressable)	1024 /1024 byte (freely addressable)	2048 /2048 byte (freely addressable)
• Of these decentrally, max.	-	-	2000
Process image I/O	128 byte/ 128 byte	128 byte/128 byte	128 byte/128 byte
Digital channels, max.	256	1024	16384
• Of these centrally, max.	256	1024	1024
Analog channels, max.	64	256	1024
• Of these centrally, max.	64	256	256
Design			
Rack, max.	1	4	4
Modules per rack, max.	8	8	8
Number of DP masters			
• Integrated	None	None	1
• Using CP	1	1	1
Supported function modules and communications processors			
• FM, max.	8	8	8
• CP (point-to-point) , max.	8	8	8
• CP (LAN) , max.	4	10	10

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Technical specifications innovated standard CPUs (continued)

	CPU 312 new	CPU 314 new	CPU 315-2 DP new
Time-of-day			
Clock	Yes (SW clock)	Yes (HW clock)	Yes (HW clock)
• Backed up	No	Yes	Yes
• Accuracy		Typ. 6 weeks (at 40°C ambient temperature)	Typ. 6 weeks (at 40°C ambient temperature)
Hour counter	Deviation per day: < 15 s	Deviation per day: < 10 s	Deviation per day: < 10 S
• Number	1	1	1
• Range of values	0	0	0
• Selectivity	2^{31} (when using SFC 101)	2^{31} hours (when using SFC 101)	2^{31} hours (when using SFC 101)
• Retentive control relays	1 hour	1 hour	1 hour
Time-of-day synchronization	Yes; must be restarted on every restart	Yes; must be restarted on every restart	Yes; must be restarted on every restart
• In AS	Yes	Yes	Yes
• On MPI	Master	Master/ slave	Master
S7 message functions	Master/ slave	Slave	Master/ slave
Time-of-day			
Number of stations that can be defined for message functions (e.g. OS)	6 (depending on the links configured for PG/OP and S7 basic communication)	12 (depending on the links configured for PG/OP and S7 basic communication)	16 (depending on the links configured for PG/OP and S7 basic communication)
Process diagnostics messages	Yes	Yes	Yes
• Simultaneously active alarm S blocks, max.	20	40	40
Test and startup function			
Status/force variable	Yes	Yes	Yes
• Variable	Inputs, outputs, flags, DBs, timers, counters	Inputs, outputs, flags, DBs, timers, counters	Inputs, outputs, flags, DBs, timers, counters
• Number of variables	30	30	30
- of which status variables	30	30	30
- of which force variables	14	14	14
Force	Yes	Yes	
• Variable	Inputs, outputs	Inputs, outputs	Inputs, outputs
• Number of variables, max.	10	10	10
Status block	Yes	Yes	Yes
Single step	Yes	Yes	Yes
Breakpoint	2		2
Diagnostic buffer	Yes	Yes	Yes
• Number of entries (not adjustable), max.	100	100	100
Communication functions			
PG/OP communication	Yes	Yes	Yes
Global data communication	Yes	Yes	Yes
• Number of GD pakkets, max.	4	4	8
- sender, max.	4	4	8
- receiver, max.	4	4	8
• Size of the GD pakkets, max.	22 byte	22 byte	22 byte
- of which consistent	22 byte	22 byte	22 byte

Technical specifications innovated standard CPUs (continued)

	CPU 312 new	CPU 314 new	CPU 315-2 DP new
S7 basic communication	Yes	Yes	Yes
• Useful data per request, max.	76 byte	76 byte	76 byte
- of these consistent	76 byte (for X_SEND or X_RCV) 64 byte (for X_PUT or X_GET as server)	76 byte (for X_SEND or X_RCV) 64 byte (for X_PUT or X_GET as server)	76 byte (for X_SEND or X_RCV) 64 byte (for X_PUT or X_GET as server)
S7 communication		Yes	Yes
• As server	Yes	Yes	Yes
• As client		Yes (using CP and reloadable FC)	Yes (using CP and reloadable FC)
• Useful data per request, max.	180 byte (for PUT/GET)	180 byte (for PUT/GET)	180 byte (for PUT/GET)
- of these consistent	64 byte	64 byte	64 byte (as server)
S5-compatible communications	Yes (using CP and reloadable FC)	Yes (using CP and reloadable FC)	Yes (using CP and reloadable FC)
Number of connections, max.	6	12	16
Usable for			
• PG communication, max.	5		
- reserved (default)	1	1	1
- variable	From 1 to 5	From1 to 11	From1 to 15
• OP communication, max.	5		
- reserved (default)	1	1	1
- variable	From 1 to 5	From1 to 11	From1 to 15
• S7 standard communication			Yes
- reserved (default)	2	8	12
- variable	From 0 to 2	From 0 to 8	From 0 to 12
Routing	No	No	Yes
Interfaces			
1st interface			
Type of interface	Integrated RS 485 interface	Integrated RS 485 interface	Integrated RS 485 interface
Physical design	RS 485	RS 485	RS 485
Electrical isolation	No	No	No
Power supply at interface (15 to 30 V DC)	Max. 200 mA	200 mA	200 mA
Functionality			
MPI	Yes	Yes	Yes
PROFIBUS DP	No	No	No
Point-to-point link	No	No	No
MPI			
Number of connections	6	12	16
Services			
• PG/OP communication	Yes	Yes	Yes
• Routing	No	No	Yes
• Global data communication	Yes	Yes	Yes
• S7 basic communication	Yes	Yes	Yes
• S7 Communication		Yes	Yes
- as server	Yes	Yes	Yes
- as client	No	Yes (using CP and reloadable FB)	Yes (using CP and reloadable FB)
• Transmission rates	187.5 kbaud	187.5 kbaud	187.5 kbaud

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Technical specifications innovated standard CPUs (continued)

	CPU 312 new	CPU 314 new	CPU 315-2 DP new
2nd interface	-	-	
Type of interface	-	-	Integrated RS 485 interface
Physical design	-	-	RS 485
Electrical isolation	-	-	Yes
Type of interface	-	-	Integrated RS 485 interface
Power supply at interface (15 to 30 V DC), max.	-	-	200 mA
Number of connections	-	-	16
Functionality			
MPI	-	-	No
PROFIBUS DP	-	-	Yes
Point-to-point link	-	-	No
DP master			
Number of connections	-	-	16
Services			
• PG/OP communication	-	-	Yes
• Routing	-	-	Yes
• Global data communication	-	-	No
• S7 basic communication	-	-	No
• S7 communication	-	-	No
• Clock synchronism	-	-	Yes
• SYNC/FREEZE	-	-	Yes
• DPV1	-	-	Yes
Data transmission rate	-	-	Up to 12 Mbaud
Number of DP slaves per station	-	-	125
Address range, max.	-	-	244 KB
DP slave			
Number of connections	-	-	16
Services			
• PG/OP communication	-	-	Yes
• Routing	-	-	Yes (only when interface is active)
• Global data communication	-	-	No
• S7 basic communication	-	-	No
• S7 communication	-	-	No
• Direct data transfer	-	-	Yes
• Transmission rates	-	-	Up to 12 Mbaud
• Transfer memory	-	-	244 byte I/244 byte O
• Address areas, max.	-	-	32 with max. 32 byte each
• DPV1	-	-	No
GSD file	-	-	The latest GSD file is available at http://www.ad.siemens.com/support under Product Support
Programming			
Programming language	LAD/FBD/STL	LAD/FBD/STL	LAD/FBD/STL
Operation set	See operation list	See operation list	See operation list
Nesting levels	8	8	8

Technical specifications innovated standard CPUs (continued)

	CPU 312 new	CPU 314 new	CPU 315-2 DP new
System functions (SFCs)	See operation list	See operation list	See operation list
System function blocks (SFB)	See operation list	See operation list	See operation list
User program protection	Yes	Yes	Yes
Dimensions			
Mounting dimensions W x H x D (mm)	40 x 125 x 130	40 x 125 x 130	40 x 125 x 130
Weight	270 g	280 g	290 g
Voltages, currents			
Supply voltage (rated value)	24 V DC	24 V DC	24 V DC
• Permissible range	20.4 V to 28.8 V	20.4 V to 28.8 V	20.4 V to 28.8 V
Current input (no load)	60 mA	60 mA	60 mA
Inrush	2.5 A	2.5 A	2.5 A
I^2t	0.5 A^2s	0.5 A^2s	0.5 A^2s
External fuse protection for supply cables (recommended)	2 A	2 A	2 A
Power loss	2.5 W	2.5 W	2.5 W

Technical specifications standard CPUs

	CPU 313	CPU 314	CPU 315	CPU 315-2 DP	CPU 316-2 DP
RAM (1 statement corresponds to an average of 3 byte)	12 KB / 4 K statement RAM (built-in)	24 KB / 8K statement RAM (built-in)	48 KB / 16K statement RAM (built-in)	64 KB / 21K statement RAM (built-in)	128 KB / 42K statement RAM (built-in)
Load memory					
• Integrated	20 KB RAM	40 KB RAM	80 KB RAM	96 KB RAM	192 KB RAM
• Plug-in, as MC	4 MB flash EPROM	4 MB flash EPROM	4 MB flash EPROM	4 MB flash EPROM	4 MB Flash-EPROM
Backup					
• Without battery	72 byte	4 KB; Bit memories, counters, timers and data	4 KB; Bit memories, counters, timers and data	4 KB; Bit memories, counters, timers and data	4 KB; Bit memories, counters, timers and data
• With battery	All blocks	All blocks	All blocks	All blocks	All blocks
Real-time clock	-	Yes	Yes	Yes	Yes
Programming language	STEP® 7 V5.0	STEP 7 V5.0 Optional: S7-SCL S7-GRAPH	STEP 7 V5.0 **Optional:** • S7-SCL • S7-GRAPH • S7-HiGraph	**6ES7 315-2AF03-0AB0**: STEP 7 V5.0 **6ES7 315-2AF83-0AB0**[1]: STEP 7 V5.0 SP1 **Optional:** • S7-SCL • S7-GRAPH • S7-HiGraph	STEP 7 V5.0 **Optional:** • S7-SCL • S7-GRAPH • S7-HiGraph • CFC
Program organization	Linear, structured	Linear, structured	Linear, structured	Linear, structured	Linear, structured
Types of blocks	• Organization blocks (OBs) • Function blocks (FBs) • Functions (FC) • Data blocks (DBs) • System functions (SFBs, SFCs)	• Organization blocks (OBs) • Function blocks (FBs) • Functions (FC) • Data blocks (DBs) • System functions (SFBs, SFCs)	• Organization blocks (OBs) • Function blocks (FBs) • Functions (FC) • Data blocks (DBs) • System functions (SFBs, SFCs)	• Organization blocks (OBs) • Function blocks (FBs) • Functions (FC) • Data blocks (DBs) • System functions (SFBs, SFCs)	• Organization blocks (OBs) • Function blocks (FBs) • Functions (FC) • Data blocks (DBs) • System functions (SFBs, SFCs)

1) SIMATIC Outdoor with expanded temperature range

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Technical specifications standard CPUs (continued)

	CPU 313	CPU 314	CPU 315	CPU 315-2 DP	CPU 316-2 DP
Number/size of data blocks					
• OB	See operation list / max. 8 KBs	See operation list / max. 8 KBs	See operation list / max. 16 KBs	See operation list / max. 16 KBs	See operation list / max. 16 KBs
• FB	128 / max. 8 KBs	128 / max. 8 KBs	192 / max. 16 KBs	192 / max. 16 KBs	256 / max. 16 KBs
• FC	128 / max. 8 KBs	128 / max. 8 KBs	192 / max. 16 KBs	192 / max. 16 KBs	256 / max. 16 KBs
• DB	127 / max. 8 KBs	127 / max. 8 KBs	255 / max. 16 KBs	255 / max. 16 KBs	511 / max. 16 KBs
Program execution	• Free cycle (OB 1) • Time-driven (OB 35) • Real-time controlled (OB 10) • Interrupt-driven (OB 40) • Start (OB 100)	• Free cycle (OB 1) • Time-driven (OB 35) • Real-time controlled (OB 10) • Interrupt-driven (OB 40) • Start (OB 100)	• Free cycle (OB 1) • Time-driven (OB 35) • Real-time controlled (OB 10) • Interrupt-driven (OB 40) • Start (OB 100)	• Free cycle (OB 1) • Time-driven (OB 35) • Real-time controlled (OB 10) • Interrupt-driven (OB 40) • Start (OB 100)	• Free cycle (OB 1) • Time-driven (OB 35) • Real-time controlled (OB 10) • Interrupt-driven (OB 40) • Start (OB 100)
Block nesting depth	8 for each program execution level	8 for each program execution level	8 for each program execution level	8 for each program execution level	8 for each program execution level
Nesting levels	8	8	8	8	8
Operation set	Binary logic, parenthesis commands, result assignment, save, count, load, transfer, compare, shift, rotate, generate complement, call up blocks, fixed-point and floating point arithmetic functions, jump functions	Binary logic, parenthesis commands, result assignment, save, count, load, transfer, compare, shift, rotate, generate complement, call up blocks, fixed-point and floating point arithmetic functions, jump functions	Binary logic, parenthesis commands, result assignment, save, count, load, transfer, compare, shift, rotate, generate complement, call up blocks, fixed-point and floating point arithmetic functions, jump functions	Binary logic, parenthesis commands, result assignment, save, count, load, transfer, compare, shift, rotate, generate complement, call up blocks, fixed-point and floating point arithmetic functions, jump functions	Binary logic, parenthesis commands, result assignment, save, count, load, transfer, compare, shift, rotate, generate complement, call up blocks, fixed-point and floating point arithmetic functions, jump functions
User program protection	Password protection	Password protection	Password protection	Password protection	Password protection
System functions (SFCs)	Interrupt and error/ fault handling, data copying, real-time clock functions, diagnostic functions, module parameter assignment, operating mode transitions Operating state transitions	Interrupt and error/ fault handling, data copying, real-time clock functions, diagnostic functions, module parameter assignment, operating mode transitions Operating state transitions	Interrupt and error/ fault handling, data copying, real-time clock functions, diagnostic functions, module parameter assignment, operating mode transitions Operating state transitions	Interrupt and error/ fault handling, data copying, real-time clock functions, diagnostic functions, module parameter assignment, operating mode transitions Operating state transitions	Interrupt and error/ fault handling, data copying, real-time clock functions, diagnostic functions, module parameter assignment, operating mode transitions Operating state transitions
Execution times					
• Bit operations	0.6 µs to 1.2 µs	0.3 to 0.6 µs	0.3 to 0.6 µs	0.3 to 0.6 µs	0.3 to 0.6 µs
• Word operations, approx.	2 µs	1 µs	1 µs	1 µs	1 µs
• Timer-/counter operations	15 µs	12 µs	12 µs	12 µs	12 µs
• Fixed-point addition	3 µs	2 µs	2 µs	2 µs	2 µs
• Floating-point addition	60 µs	50 µs	50 µs	50 µs	50 µs
Cycle time monitoring	150 ms (preset), programmable 1 to 6000 ms	150 ms (preset), programmable 1 to 600 ms	150 ms (preset), programmable 1 to 6000 ms	150 ms (preset), programmable 1 to 6000 ms	150 ms (preset), programmable 1 to 6000 ms
Bit memories	2048	2048	2048	2048	2048
• Of these retentive with battery	0 to 576 (M 0.0 to M 71.7, selectable)	0 to 2048 (M 0.0 to M 255.7, selectable)	0 to 2048 (M 0.0 to M 255.7, selectable)	0 to 2048 (M 0.0 to M 255.7, selectable)	0 to 2048 (M 0.0 to M 255.7, selectable)
• Of these retentive without battery	0 to 576 (M 0.0 to M 71.7, selectable)	0 to 2048 (M 0.0 to M 255.7, selectable)	0 to 2048 (M 0.0 to M 255.7, selectable)	0 to 2048 (M 0.0 to M 255.7, selectable)	0 to 2048 (M 0.0 to M 255.7, selectable)
Counter	64	64	64	64	64
• Of these retentive with battery	0 to 35, selectable	0 to 63, selectable	0 to 63, selectable	0 to 63, selectable	0 to 63, selectable
• Of these retentive without battery	0 to 35, selectable	0 to 63, selectable	0 to 63, selectable	0 to 63, selectable	0 to 63, selectable
• Counting range	1 to 999	1 to 999	1 to 999	1 to 999	1 to 999

Technical specifications standard CPUs (continued)

	CPU 313	CPU 314	CPU 315	CPU 315-2 DP	CPU 316-2 DP
Timers	128	128	128	128	128
• Of these retentive with battery	0 to 35, adjustable	0 to 127, adjustable	0 to 127, adjustable	0 to 127, adjustable	0 to 127, adjustable
• Of these retentive without battery	-	0 to 127, adjustable	0 to 127, adjustable	0 to 127, adjustable	0 to 127, adjustable
• Range	10 ms to 9990 s	10 ms to 9990 s	10 ms to 9990 s	10 ms to 9990 s	10 ms to 9990 s
Integral functions	-	-	-	-	-
MPI interface					
• No. of stations, max.	32 stations on the MPI bus; PG/PC, OP, additional S7-300®/ S7-400®, C7; for each CPU, max. 4 static and 4 dynamic connections	32 stations on the MPI bus; PG/PC, OP, additional S7-300®/ S7-400®, C7; for each CPU, max. 4 static and 8 dynamic connections	32 stations on the MPI bus; PG/PC, OP, additional S7-300®/ S7-400®, C7; for each CPU, max. 4 static and 8 dynamic connections	32 stations on the MPI bus; PG/PC, OP, additional S7-300®/ S7-400®, C7; for each CPU, max. 4 static and 8 dynamic connections	32 stations on the MPI bus; PG/PC, OP, additional S7-300®/ S7-400®, C7; for each CPU, max. 4 static and 8 dynamic connections
• Communication functions	• Programming device/OP communications • Global data communications • S7 basic communication • S7 communication (server)	• Programming device/OP communications • Global data communications • S7 basic communication • S7 communication (server)	• Programming device/OP communications • Global data communications • S7 basic communication • S7 communication (server)	• Programming device/OP communications • Global data communications • S7 basic communication • S7 communication (server)	• Programming device/OP communications • Global data communications • S7 basic communication • S7 communication (server)
• Data transmission rate	187.5 kbit/s	187.5 kbit/s	187.5 kbit/s	187.5 kbit/s	19.2 kbit/s and 187.5 kbit/s
• Distance between 2 adjacent stations, max.	Without repeaters: 50 m With 2 repeaters: 1100 m With 10 repeaters in series: 9100 m Over fiber-optic cables: 23.8 km (with 16 star couplers or OLMs)	Without repeaters: 50 m With 2 repeaters: 1100 m With 10 repeaters in series: 9100 m Over fiber-optic cables: 23.8 km (with 16 star couplers or OLMs)	Without repeaters: 50 m With 2 repeaters: 1100 m With 10 repeaters in series: 9100 m Over fiber-optic cables: 23.8 km (with 16 star couplers or OLMs)	Without repeaters: 50 m With 2 repeaters: 1100 m With 10 repeaters in series: 9100 m Over fiber-optic cables: 23.8 km (with 16 star couplers or OLMs)	Without repeaters: 50 m With 2 repeaters: 1100 m With 10 repeaters in series: 9100 m Over fiber-optic cables: 23.8 km (with 16 star couplers or OLMs)
• PG/PCs with STEP® 7	Can be connedted using MPI interface	Can be connedted using MPI interface	Can be connedted using MPI interface	Can be connedted using MPI interface	Can be connedted using MPI interface
Onboard I/Os	-	-	-	-	-
Total address areas I/O	128/128 byte	512/512 byte	256/256 byte	1/1 KB	2/2 KB
Process image I/O	32/32 byte	128/128 byte	128/128 byte	128/128 byte	128/128 byte
Total no. of digital channels	Max. 256	Max. 1024	Max. 1024	Max. 8192	Max. 16384
• Of these central	Max. 64 I and 32 O		Max. 1024	Max. 1024	Max. 1024
Total no. of analog channels	8	Max. 256 E or 128 A	Max. 256	Max. 512	Max. 1024
• Of these central	1/0		Max. 256 E or Max. 128 A	Max. 256 E or max. 128 A	Max. 256 E or max. 128 A
No. of modules per system	-/1	32	32	32	32
No. of CCs/EUs	-/8	1/3	1/3	1/3	1/3
No. of DP lines per CPU (integral interface/CP 342-5)	64 byte	-/1	-/1	1/1	1/1
DP stations per master CPU (integral interface/CP 342-5)	8	-/16	-/32	64/64	124/64
Address area per DP station	64 byte	122 byte	122 byte	244 byte	244 byte
Modules per ET 200®M	8	8	4/8		
DP connection (master/slave)		1 (CP 342®-5)	1 (CP 342-5)	1 (CP 342-5)	1 (CP 342-5)

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Technical specifications standard CPUs (continued)

	CPU 313	CPU 314	CPU 315	CPU 315-2 DP	CPU 316-2 DP
Internode communication support				Yes; sender and receiver	Yes; sender and receiver
Support for clock synchronism				Yes	Yes
Activation/ deactivation of DP slaves				Yes	Yes
Communication functions using CPs					
• Programming device/OP communications	Yes	Yes	Yes	Yes	Yes
• Extended communications	Yes (server)	Yes (server)	Yes (server)	Yes	Yes (server)
• S5 compatible communi-cations	-	Yes (using reloadable blocks)	Yes (using reloadable blocks)	Yes (using reloadable blocks)	Yes (using reloadable blocks)
• Standard communication	-	Yes (using reloadable blocks)	Yes (using reloadable blocks)	Yes (using reloadable blocks)	Yes (using reloadable blocks)
No. of connections, static/dynamic	4/4	4/8	4/8	4/8	4/8
Supply voltage					
• Rated value	24 V DC	24 V DC	24 V DC	24 V DC	24 V DC
• Permitted range	20.4 to 28.8 V	20.4 to 28.8 V	20.4 to 28.8 V	20.4 to 28.8 V	20.4 to 28.8 V
Current consumption typ.	1 A	1 A	1 A	1 A	1 A
Starting current, typ.	8 A	8 A	8 A	8 A	8 A
Power losses, typ.	8 W	8 W	8 W	8 W	8 W
Dimensions (W x H x D) in mm	80 x 125 x 130	80 x 125 x 130	80 x 125 x 130	80 x 125 x 130	80 x 125 x 130
Weight					
• CPU	530 g	530 g	530 g	530 g	530 g
• Memory card	16 g	16 g	16 g	16 g	16 g
Suitable modules (recommendation)					
• FM		4	8	8	8
• CP, point-to-point		2	4	4	4
• CP, LAN, (C bus)		1	2	2	2
Suitable software					
• Software controllers		Dependent on required storage space and resulting runtime	Dependent on required storage space and resulting runtime	Dependent on required storage space and resulting runtime	Dependent on required storage space and resulting runtime
• Process diagnostics		Yes	Yes	Yes	Yes
• S7-GRAPH		-	Yes	Yes	Yes
• S7-HiGraph®		-	Yes	Yes	Yes
• S7-SCL		Yes	Yes	Yes	Yes
• CFC		-	Yes	Yes	Yes

Technical specifications outdoor CPUs

	CPU 312 IFM Outdoor	CPU 314 IFM Outdoor	CPU 314 Outdoor
Memory (1 statement corresponds to an average of 3 byte)	6 KB 2 K-statement RAM (built-in)	32 KB/10 K statements RAM (integrated)	24 KB / 8K statements RAM (integrated)
Load memory			
• Integrated	20 KB RAM / 20 KB FEPROM	48 KB RAM	40 KB RAM
• Plug-in, as MC	-	-	4 MB flash EPROM
Backup			
• Without battery	72 byte; Bit memories, counters, timers and data	144 byte; bit memories, counters, timers and data	4 KB; bit memories, counters, timers and data
• With battery	-	All blocks	All blocks
Real-time clock	-	Yes	Yes

Technical specifications Outdoor-CPUs (continued)

	CPU 312 IFM Outdoor	CPU 314 IFM Outdoor	CPU 314 Outdoor
Programming language	STEP 7 V5.0 SP1	STEP 7 V5.0 SP1 **Optional:** • S7-SCL • S7-GRAPH	STEP 7 V5.0 Optional: S7-SCL S7-GRAPH
Program organization	Linear, structured	Linear, structured	Linear, structured
Types of blocks	• Organization blocks (OBs) • Function blocks (FBs) • Functions (FC) • Data blocks (DBs) • System functions (SFBs, SFCs)	• Organization blocks (OBs) • Function blocks (FBs) • Functions (FC) • Data blocks (DBs) • System functions (SFBs, SFCs)	• Organization blocks (OBs) • Function blocks (FBs) • Functions (FC) • Data blocks (DBs) • System functions (SFBs, SFCs)
Number/size of data blocks			
• OB	See operation list / max. 6 KB	See operation list / max. 8 KBs	See operation list / max. 8 KBs
• FB	32 / max. 6 KBs	128 / max. 8 KBs	128 / max. 8 KBs
• FC	32 / max. 6 KBs	128 / max. 8 KBs	128 / max. 8 KBs
• DB	63 / max. 6 KBs	127 / max. 8 KBs	127 / max. 8 KBs
Program execution	• Free cycle (OB 1) • Interrupt-driven (OB 40) • Restart (OB 100)	• Free cycle (OB 1) • Time-driven (OB 35) • Real-time controlled (OB 10) • Interrupt-driven (OB 40) • Restart (OB 100)	• Free cycle (OB 1) • Time-driven (OB 35) • Real-time controlled (OB 10) • Interrupt-driven (OB 40) • Restart (OB 100)
Block nesting depth	8 for each program execution level	8 for each program execution level	8 for each program execution level
Nesting levels	8	8	8
Instruction set	Binary logic, parenthesis commands, result assignment, save, count, load, transfer, compare, shift, rotate, generate complement, call up blocks, fixed-point and floating point arithmetic functions, jump functions	Binary logic, parenthesis commands, result assignment, save, count, load, transfer, compare, shift, rotate, generate complement, call up blocks, fixed-point and floating point arithmetic functions, jump functions	Binary logic, parenthesis commands, result assignment, save, count, load, transfer, compare, shift, rotate, generate complement, call up blocks, fixed-point and floating point arithmetic functions, jump functions
User program protection	Password protection	Password protection	Password protection
System functions (SFCs)	Interrupt and error processing, copying data, clock functions, diagnostic functions, module initialization, status transitions	Interrupt and error processing, copying data, clock functions, diagnostic functions, module initialization, status transitions	Interrupt and error processing, copying data, clock functions, diagnostic functions, module initialization, status transitions
Processing times for			
• Bit operations	0,6 µs to 1,2 µs	0.3 to 0.6 µs	0.3 to 0.6 µs
• Word operations, approx.	2 µs	1 µs	1 µs
• Timer-/counter operations	15 µs	12 µs	12 µs
• Fixed-point addition	3 µs	2 µs	2 µs
• Floating-point addition	60 µs	50 µs	50 µs
Cycle time monitoring	150 ms (preset), selectable from 1 to 6000 ms	150 ms (preset), selectable from 1 to 6000 ms	150 ms (preset), selectable from 1 to 6000 ms
Bit memories	1024	2048	2048
• Of these retentive with battery	-	0 to 2048 (M 0.0 to M 255.7, selectable)	0 to 2048 (M 0.0 to M 255.7, selectable)
• Of these retentive without battery	0 to 576 (M 0.0 to M 71.7, selectable)	0 to 1152 (M 0.0 to M 143.7, selectable)	0 to 2048 (M 0.0 to M 255.7, selectable)
Counter	32	64	64
• Of these retentive with battery	-	0 to 63, programmable	0 to 63, programmable
• Of these retentive without battery	0 to 31, programmable	0 to 63, programmable	0 to 63, programmable
• Counting range	1to 999	1 to 999	1 to 999

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Technical specifications Outdoor-CPUs (continued)

	CPU 312 IFM Outdoor	CPU 314 IFM Outdoor	CPU 314 Outdoor
Timers	64	128	128
• Of these retentive with battery	-	0 to 71, selectable	0 to 127, selectable
• Of these retentive without battery	-	0 to 71, selectable	0 to 127, selectable
• Range	10 ms to 9990 s	10 ms to 9990 s	10 ms to 9990 s
Integral functions			-
• Counter	1 counter with 4 inputs, counter frequency 10 kHz; 32 bit (incl. sign); 2 direction-dependent comparators	1 counter with 4 inputs or 2 counters with 2 inputs and 2 direction-dependent comparators for each counter; counter frequency 10 kHz; 32-bit (incl. sign)	-
• Frequency measurement	1 channel to max. 10 kHz; sample times 0.1 s, 1 s, 10 s; measuring procedure: Calculation of pulse number per sample time	1 channel to max. 10 kHz; sample times 0.1 s, 1 s, 10 s; measuring procedure: Calculation of pulse number per sample time	-
• Open-loop positioning	-	1 channel; position detection using a 24 V asymmetric incremental encoder; 3 digital inputs are occupied by the encoder (track A, track B, reference point); single interpretation of count pulses (10 kHz)	-
• Integral "Closed loop control" function blocks	-	PID control function blocks • Continuous-action manipulated variable outputs • Binary manipulated variable outputs • Automatic/manual mode • Manipulated variable limitation	-
MPI interface			
• No. of stations, max.	32 bus nodes on the MPI bus; PG/PC, OP, other S7-300®/400®, C7; per CPU max. 4 static and 2 dynamic connections	32 bus nodes on the MPI bus; PG/PC, OP, other S7-300®/400®, C7; per CPU max. 4 static and 8 dynamic connections	32 bus nodes on the MPI bus; PG/PC, OP, other S7-300®/400®, C7; per CPU max. 4 static and 8 dynamic connections
• Communication functions	• PG/OP communication • Global data communication • S7 basic communication • S7 communication	• PG/OP communication • Global data communication • S7 basic communication • S7 communication	• PG/OP communication • Global data communication • S7 basic communication • S7 communication
• Data transmission rate	187.5 kbit/s	187.5 kbit/s	187.5 kbit/s
• Distance between 2 adjacent stations, max.	With 10 repeaters in row: 9100 m, using fiber-optic cables: 23.8 km (with 16 hubs or OLM)	Without repeaters: 50 m with 2 repeaters: 1100 m with 10 repeaters in row: 9100 m using fiber-optic cables: 23.8 km (with 16 hubs or OLM)	Without repeaters: 50 m with 2 repeaters: 1100 m with 10 repeaters in row: 9100 m using fiber-optic cables: 23.8 km (with 16 hubs or OLM)
PG/PCs with STEP® 7	Can be connected using MPI interface	Can be connected using MPI interface	Can be connected using MPI interface
Onboard I/Os			-
• Digital inputs	10; 24 V DC of which, 4 channels can be used for process interrupts or integrated functions	20; 24 V DC of which, 4 channels can be used for process interrupts or integrated functions	-
• Digital outputs	6; 24 V DC; 0.5 A	16; 24 V DC; 0.5 A	-
• Analog inputs; resolution (bit)	-	4; ±10 V, ±20 mA / 11 + sign	-
• Analog outputs; resolution (bit)	-	1; ±10 V, ±20 mA / 11 + sign	-
Real-time clock		Yes	
Total address areas I/O	128/128 byte	512/512 byte	512/512 byte
Process image I/O	32/32 byte	128/128 byte	128/128 byte
Total no. of digital channels	Max. 256	Max. 992	Max. 1024
Total no. of analog channels	Max. 64 inputs or 32 outputs	Max. 248 inputs or 124 outputs	Max. 256 inputs or 128 outputs

Technical specifications Outdoor CPUs (continued)

	CPU 312 IFM Outdoor	CPU 314 IFM Outdoor	CPU 314 Outdoor
No. of modules per system	8	31	32
No. of CCs/EUs	1/0	1/3	1/3
No. of DP lines per CPU (integral interface/CP 342-5)	-/1	-/1	-/1
DP stations per master CPU (integrated interface/ CP 342-5)	-/8	-/16	-/16
Address area per DP station	64 byte	122 byte	122 byte
Modules per ET 200M	8	8	8
DP connection (master/slave)	1 (CP 342-5)	1 (CP 342-5)	1 (CP 342-5)
Communications functions using CPs			
• Programming device/OP communications	Yes	Yes	Yes
• Extended communications	Yes (server)	Yes (server)	Yes (server)
• S5-compatible communi-cations	-	Yes (using reloadable blocks)	Yes (using reloadable blocks)
• Standard communication	-	Yes (using reloadable blocks)	Yes (using reloadable blocks)
Number of connections, static/dynamic	4/4	4/8	4/8
Supply voltage			
• Rated value	24 V DC	24 V DC	24 V DC
• Permissible range	20.4 to 28.8 V	20.4 to 28.8 V	20.4 to 28.8 V
Current consumption typ.	0.8 A + 0.5 A per fully loaded output	1 A	1 A
Starting current, typ.	8 A	8 A	8 A
Power losses, typ.	9 W incl. integral inputs/outputs	16 W	8 W
Required front connector	1 x 20-pin	2 x 40-pin	-
Dimensions (W x H x D) in mm	80 x 125 x 130	160 x 125 x 130	80 x 125 x 130
Weight	450 g		
• CPU		900 g	530 g
• Memory card		-	16 g
Suitable modules (recommendation)			
• FM		4	4
• CP, point-to-point		2	2
• CP, LAN, (C bus)		1	1
Suitable software			
• Software controllers		Dependent on required storage space and resulting runtime	Dependent on required storage space and resulting runtime
• Process diagnostics		Yes	Yes
• S7-GRAPH		-	-
• S7-HiGraph		-	-
• S7-SCL		Yes	Yes
• CFC		-	-
On-board digital inputs	**10**	**20**	-
Input voltage			
• Rated value	24 V DC	24 V DC	-
• At "1" signal	15 to 30 V	15 to 30 V	-
• At "0" signal	-3 to +5 V	-3 to +5 V	-
Electrical isolation	No		-
• Special inputs/in groups of	No/10	No / 4	-
• Inputs / in groups of		Yes / 16	-

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Technical specifications Outdoor CPUs (continued)

	CPU 312 IFM Outdoor	CPU 314 IFM Outdoor	CPU 314 Outdoor
Input current			
• At "1" signal, min./typ.	2 mA/7 mA	2 mA / 7 mA	-
Input delay (at rated value of the input voltage)			
• For standard inputs, typ./ max.	3 ms/5 ms	3 ms/5 ms	-
• For interrupt inputs, max.	50 µs	50 µs	-
• For counter, max.	50 µs	50 µs	-
Connection of 2-wire BERO			
• Acceptable quiescent current	1.5 mA	1,5 mA	-
Cable lengths			
• Unshielded	600 m	600 m	-
• Shielded	1000 m (100 m for interrupt and counter inputs)	1000 m (100 m for interrupt and counter inputs)	-
Integrated digital outputs	**6**	**16**	**-**
Rated load voltage L+/L1	24 V DC	24 V DC	-
• Permitted range	20.4 to 28.8 V	20.4 to 28.8 V	-
Output voltage			
• For "1" signal, max.	L+ - 0,8 V	L+ - 0.8 V	-
Electrical isolation	No/6	Yes / 8	-
Maximum output current			
• At "1" signal			
- Rated value at 40 °C	0.5 A	0.5 A	-
- Rated value at 60 °C	0.5 A	0.5 A	-
- Min. current	5 mA	5 mA	-
• At "0" signal , max.	0.5 mA	0.5 mA	-
Total load capability			
• At 40 °C	100%	50%	-
• At 60 °C	100%	25%	-
Switching frequency of outputs			
• For resistive load	100 Hz	100 Hz	-
• For inductive load	0.5 Hz	0.5 Hz	-
Voltage induced on circuit interruption limited to	30 V	30 V	-
Short-circuit protection	Electronic, clocked	Electronic, clocked	-
Cable lengths			
• Unshielded	600 m	600 m	-
• Shielded	1000 m	1000 m	-
Integrated analog inputs	-	**4**	-
Input ranges (rated values)/ input resistance			
• Voltage	-	±10 V/50 kΩ	-
• Current	-	±20 mA/105,5 kΩ	-
Electrical isolation / in grp-ups of	-	Ja / 4	-
Bipolar resolution	-	11 bit + sign	-
Conversion time			
• Per channel	-	100 µs	-
• Per module	-	400 µs	-

Technical specifications CPU 318-2 DP (continued)

	CPU 312 IFM Outdoor	CPU 314 IFM Outdoor	CPU 314 Outdoor
Basic error threshold (operating error threshold at 25°C, referred to input range)	-	±0.9%	-
Integrated analog outputs	-	**1**	-
Output ranges (rated values)			
• Voltage	-	±10 V	-
• Current	-	±20 mA	-
Isolation / in groups of		Yes / 1	
Conversion time per channel	-	40 µs	-
Basic error (operational limit at 25 °C, referred to output range), max.	-	±0.9%	-

Technical specifications CPU 318-2 DP (continued)

Memory (1 statement corresponds to an average of 3 byte)	512 KB of which max. 256 KB are code and max. 256 KB are data
Load memory	
• Integrated	64 KB RAM
• Plug-in as MC, max.	4 MB Flash-EPROM/RAM
Backup	
• Without battery	8 KB; bit memories, counters, timers and data
• With battery	All blocks
Real-time clock	Yes
Programming language	STEP 7 V5.0 **Optional:** • S7-SCL • S7-GRAPH • S7-HiGraph • CFC
Program organization	Linear, structured
Types of blocks	• Organization blocks (OBs) • Function blocks (FBs) • Functions (FC) • Data blocks (DBs) • System functions (SFBs, SFCs)
Number/size of data blocks	
• OB	See operation list / max. 64 KBs
• FB	1024 / max. 64 KBs
• FC	1024 / max. 64 KBs
• DB	2047 / max. 64 KBs

Program execution	• TOD interrupts (OB 10, 11) • Delay interrupts (OB 20, 21) • Time interrupts (OB 32, 35) • Process alarms (OB 40, 41) • Background OB (OB 90) • Restart (OB 100) • Asynchronous errors (OB 80, 81, 82, 84 to 87) • Synchronous errors (OB 121, 122)
Block nesting depth	20 for each program execution level (except synchronization error OB); 1 additional synchronization error OB
Nesting levels	8
Instruction set	Binary logic, parenthesis commands, result assignment, save, count, load, transfer, compare, shift, rotate, generate complement, call up blocks, fixed-point and floating point arithmetic functions, jump functions
User program protection	Password protection
System functions (SFCs)	Interrupt and error processing, copying data, clock functions, diagnostic functions, module initialization, status transitions
Execution times	
• Bit operations	0.1 µs
• Word operations, approx.	0.1 µs
• Timer-/counter operations	0.1 µs
• Fixed-point addition	0.1 µs
• Floating-point addition	0.6 µs

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Technical specifications CPU 318-2 DP (continued)

Cycle time monitoring	150 ms (preset), selectable from 1 to 6000 ms
Bit memories	8192
• Of which retentive with battery	0 to 8191 (M 0.0 to M 1023.7, programmable)
• Of these, retentive without battery bakkup	0 to 8191 (M 0.0 to M 1023.7, programmable)
Counter	512
• Of these retentive with battery	0 to 511, programmable
• Of these, retentive without battery bakkup	0 to 511, programmable
• Counting range	1 to 999
Timers	512
• Of these retentive with battery	0 to 511, programmable
• Of these, retentive without battery bakkup	0 to 511, programmable
• Range	10 ms to 9990 s
Integral functions	-
MPI interface	
• No. of stations, max.	32 bus nodes on the MPI bus; PG/PC, OP, other S7-300®/400®, C7; each CPU 32 connections max.
• Communication functions	• Programming device/OP communications • Global data communication • S7 basic communication • S7 communication
• Transmission rate, max.	12 Mbit/s
• Max. distance between 2 adjacent nodes at 12 Mbit/s	Without repeaters: 100 m; with 2 repeaters: 1100 m with 10 repeaters in series: 9100 m using fiber-optic cables: 23.8 km (with 16 hubs or OLM)
PG/PCs with STEP® 7	Can be connected using MPI interface
Onboard I/Os	-
Total address areas I/O	8/8 KB
Process image I/O	256/256 byte, expandable to 2048
Total no. of digital channels	Max. 65536
• Of these, central	Max. 1024
Total no. of analog channels	Max. 4096
• Of these, central	Max. 256 I or 128 O

No. of modules per system	32
No. of CCs/EUs	1/3
No. of DP lines per CPU (integrated interface/CP 342-5)	2/2
DP master stations per CPU (integrated interface/CP 342-5)	32 (MPI interface), 125 (DP interface)/64
Address area per DP station	244 byte
DP connection (Master/Slave)	1 (CP 342-5); 2 (integrated, master/slave)
Internode communication support	Yes; sender and receiver
Support for clock synchronism	Yes
Communications functions using CPs	
• Programming device/OP communications	Yes
• Extended communications	Yes (server)
• S5-compatible communications	Yes (using reloadable blocks)
• Standard communication	Yes (using reloadable blocks)
Number of connections	32
Supply voltage	
• Rated value	24 V DC
• Permitted range	20.4 to 28.8 V
Current consumption typ.	1.2 A
Starting current, typ.	12 A
Power loss	12 W
Dimensions (W x H x D) in mm	160 x 125 x 130
Weight	
• CPU	900 g
• Memory card	16 g
Suitable modules	
• FMs	16
• CP, point-to-point	8
• CP, LAN, (C bus)	2
Suitable software	
• Software controllers	Dependent on required storage space and resulting runtime
• Process diagnostics	Yes
• S7-GRAPH	Yes
• S7-HiGraph	Yes
• S7-SCL	Yes
• CFC	Yes

Technical specifications CPU 315F-2 DP

Main memory, integrated	128 KB[1)]
Load memory, plug-in	64 KB to 4 MB
Command runtime	≥ 0.1 µs
Alarm response time	400 µs
Flags/timers/counters	2048, 256, 256
Total address areas I/O	1024 byte each

Number of digital I/O	1000/1000
Number of analog I/O	248/124
MPI interface	187,5 kbit/s, 32 nodes max.
PROFIBUS DP interface	12 Mbits/s, 32 stations max., master/slave changeover
Dimensions (W x H x D) in mm	120 x 125 x 130

1) The number of F instructions in contrast to a standard program is limited due to the F-specific overhead; depending on the type of programming, approximately 24 K F statements are possible.

Ordering data	Order No.
CPU 312C Compact CPU, main memory 16 KB, power supply 24 V DC, 10 DI/6 DO integrated, integrated functions, MPI; including slot number labels and 2 keys; MMC required	**6ES7 312-5BD00-0AB0**
CPU 313C Compact CPU, main memory 32 KB, power supply 24 V DC, 24 DI/16 DO, 4 AI/2 AO integrated, integrated functions, MPI; MMC required	**6ES7 313-5BE00-0AB0**
CPU 313C-2 PtP Compact CPU, main memory 32 KB, power supply 24 V DC, 16 DI/16 DO integrated, integrated functions, MPI, RS 422/485 interface; MMC required	**6ES7 313-6BE00-0AB0**
CPU 313C-2 DP Compact CPU, main memory 32 KB, power supply 24 V DC, 16 DI/16 DO integrated, integrated functions, MPI, PROFIBUS DP master/slave interface; MMC required	**6ES7 313-6CE00-0AB0**
CPU 314C-2 PtP Compact CPU, main memory 48 KB, power supply 24 V DC, 24DI/16DO/4AI/2AO integrated, integrated functions, MPI, RS 422/485 interface; MMC required	**6ES7 314-6BF00-0AB0**
CPU 314C-2 DP Compact CPU, main memory 48 KB, power supply 24 V DC, 24DI/16DO/4AI/2AO integrated, integrated functions, MPI, PROFIBUS DP master/slave interface; MMC required	**6ES7 314-6CF00-0AB0**
CPU 312 new Main memory 16 KB, power supply 24 V DC, MPI; MMC required	**6ES7 312-1AD10-0AB0**
CPU 314 new Main memory 48 KB, power supply 24 V DC, MPI; MMC required	**6ES7 314-1AF10-0AB0**
CPU 315-2 DP new Main memory 128 KB, power supply 24 V DC, MPI, PROFIBUS DP master/slave interface; MMC required	**6ES7 315-2AG10-0AB0**
CPU 313 Main memory 12 KB, power supply 24 V DC, MPI, slot for memory card, compartment for backup battery, including slot number labels and 2 keys	**6ES7 313-1AD03-0AB0**

	Order No.
CPU 314 Main memory 24 KB, power supply 24 V DC, MPI, slot for memory card, compartment for backup battery; including slot number labels and 2 keys	**6ES7 314-1AE04-0AB0**
CPU 315 Main memory 48 KB, power supply 24 V DC, MPI, slot for memory card, compartment for backup battery; including slot number labels and 2 keys	**6ES7 315-1AF03-0AB0**
CPU 315-2 DP Main memory 64 KB, power supply 24 V DC, PROFIBUS DP master/slave interface, MPI, slot for memory card, compartment for backup battery; including slot number labels and 2 keys	
• Standard temperature range	**6ES7 315-2AF03-0AB0**
• Outdoor version	**6ES7 315-2AF83-0AB0**
CPU 316-2 DP Main memory 128 KB, power supply 24 V DC, PROFIBUS DP master/slave interface, MPI, slot for memory card, compartment for backup battery; including slot number labels and 2 keys	**6ES7 316-2AG00-0AB0**
CPU 312 IFM Outdoor Compact CPU for extended temperature range; main memory 6 KB, power supply 24 V DC, 10 DI/6 DO integrated, integrated functions, MPI; including slot number labels and 2 keys	**6ES7 312-5AC82-0AB0**
CPU 314 IFM Outdoor Compact CPU for extended temperature range; main memory 32 KB, power supply 24 V DC, 20DI/16DO/4AI/1AO integrated, integrated functions, MPI; including slot number labels and 2 keys	**6ES7 314-5AE83-0AB0**
CPU 314 Outdoor CPU for extended temperature range; main memory 24 KB, power supply 24 V DC, MPI, slot for memory card, compartment for backup battery; including slot number labels and 2 keys	**6ES7 314-1AE84-0AB0**

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Ordering data (continued)

	Order No.
CPU 318-2 DP Main memory 512 KB, power supply 24 V DC, PROFIBUS DP master/slave interface, MPI, slot for memory card, compartment for backup battery; including slot number labels and 2 keys	**6ES7 318-2AJ00-0AB0**
CPU 315F-2 DP CPU for SIMATIC S7-300F; main memory 128 KB, power supply 24 V DC, PROFIBUS DP master/slave interface, MPI; including slot number labels and 2 keys; MMC required	**6ES7 315-6FF00-0AB0**
S7 F Distributed Safety option package for generating fail-safe programs for S7-300F	**6ES7 833-1FC00-0YX0**
FEPROM memory card For standard and outdoor CPUs as well as CPU 318-2 DP	
16 KB	**6ES7 951-0KD00-0AA0**
32 KB	**6ES7 951-0KE00-0AA0**
64 KB	**6ES7 951-0KF00-0AA0**
128 KB	**6ES7 951-0KG00-0AA0**
256 KB	**6ES7 951-1KH00-0AA0**
512 KB	**6ES7 951-0KJ00-0AA0**
1 MB	**6ES7 951-1KK00-0AA0**
2 MB	**6ES7 951-1KL00-0AA0**
4 MB	**6ES7 951-1KM00-0AA0**
For outdoor CPUs	
16 KB, ext. temperature range	**6ES7 951-0KD80-0AA0**
32 KB, ext. temperature range	**6ES7 951-0KE80-0AA0**
64 KB, ext. temperature range	**6ES7 951-0KF80-0AA0**
RAM memory card for CPU 318-2 DP	
128 KB	**6ES7 951-0AG00-0AA0**
256 KB	**6ES7 951-1AH00-0AA0**
512 KB	**6ES7 951-1AJ00-0AA0**
1 MB	**6ES7 951-1AK00-0AA0**
2 MB	**6ES7 951-1AL00-0AA0**
Micro memory card for compact CPUs, innovated standard CPUs and CPU 315F-2 DP	
64 KB	**6ES7 953-8LF00-0AA0**
128 KB	**6ES7 953-8LG00-0AA0**
512 KB	**6ES7 953-8LJ00-0AA0**
2 MB	**6ES7 953-8LL00-0AA0**
4 MB	**6ES7 953-8LM00-0AA0**
8 MB	**6ES7 953-8LP10-0AA0**
Programming adapter for micro memory cards for PG 720 and PG 740	**6ES7 798-0BA00-0XA0**
MPI cable for connecting SIMATIC S7 and PG using MPI; 5 m long	**6ES7 901-0BF00-0AA0**

	Order No.
Point-to-point connecting cable for connection to CPU 31xC-2 PtP; 5 m long	
5 m	**6ES7 902-3AB00-0AA0**
10 m	**6ES7 902-3AC00-0AA0**
50 m	**6ES7 902-3AG00-0AA0**
Sub-D connector for connection to the 2nd serial interface of the CPU 31xC-2 PtP 15-pin, male	**6ES5 750-2AA21**
Backup battery for standard CPUs, outdoor CPUs and CPU 318-2 DP; 3.6 V, 850 mA	**6ES7 971-1AA00-0AA0**
Front connector (1 unit) For CPU 312 IFM 20-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AJ00-0AA0**
• 100 units	**6ES7 392-1AJ00-1AB0**
20-pin, with spring-loaded terminals	**6ES7 392-1BJ00-0AA0**
For compact CPUs, CPU 314 IFM (2 units required here) and CPU 315F-2 DP 40-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AM00-0AA0**
• 100 units	**6ES7 392-1AM00-1AB0**
40-pin, with spring-loaded terminals	**6ES7 392-1BM01-0AA0**
Spare keys for CPU 2 units (spare part)	**6ES7 911-0AA00-0AA0**
Slot number labels	**6ES7 912-0AA00-0AA0**
S7-300 manual Design, CPU data, module data, instruction 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**
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**
Manual: integrated functions for CPUs 312 IFM, 314 IFM	
German	**6ES7 398-8CA00-8AA0**
English	**6ES7 398-8CA00-8BA0**
French	**6ES7 398-8CA00-8CA0**
Spanish	**6ES7 398-8CA00-8DA0**
Italian	**6ES7 398-8CA00-8EA0**
Instruction list for standard and outdoor CPUs as well as CPU 318-2 DP	
German	**6ES7 398-8AA03-8AN0**
English	**6ES7 398-8AA03-8BN0**
French	**6ES7 398-8AA03-8CN0**
Spanish	**6ES7 398-8AA03-8DN0**
Italian	**6ES7 398-8AA03-8EN0**

Ordering data (continued)	Order No.
Operation list	
for compact CPUs, innovated standard CPUs and CPU 315F-2 DP	
German	**6ES7 398-8AA10-8AN0**
English	**6ES7 398-8AA10-8BN0**
French	**6ES7 398-8AA10-8CN0**
Spanish	**6ES7 398-8AA10-8DN0**
Italian	**6ES7 398-8AA10-8EN0**
SIMATIC Manual Collection	**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 updating service for 1 year	**6ES7 998-8XC01-8YE2**
Current Manual Collection CD as well as the three following updates	
Technical overview "S7-300 programmable controller - design and application"	
German	**6ES7 031-0AA00-8AB0**
English	**6ES7 031-0AA00-8BB0**
French	**6ES7 031-0AA00-8CB0**
Spanish	**6ES7 031-0AA00-8DB0**
Italian	**6ES7 031-0AA00-8EB0**
Technical overview "From SIMATIC S5 to SIMATIC S7"	
German	**6ES7 398-8AA01-8AB0**
English	**6ES7 398-8AA01-8BB0**
French	**6ES7 398-8AA01-8CB0**
Spanish	**6ES7 398-8AA01-8DB0**
Italian	**6ES7 398-8AA01-8EB0**
Manual "Communication for SIMATIC S7-300/-400"	
German	**6ES7 398-8EA00-8AA0**
English	**6ES7 398-8EA00-8BA0**
French	**6ES7 398-8EA00-8CA0**
Spanish	**6ES7 398-8EA00-8DA0**
Italian	**6ES7 398-8EA00-8EA0**
SIMATIC S7 demonstration pack	**6ES7 910-3AA00-0XA0**
with components for mounting S7-200 and S7-300	
Rechargeable battery for real-time clock	**6ES7 971-5BB00-0AA0**
for backup of real-time clock in CPU 314 or better	
Power supply plug	**6ES7 391-1AA00-0AA0**
for compact CPUs, innovated standard CPUs and CPU 315F-2 DP (10 units, spare part)	

	Order No.
Labelling strips	
For compact CPUs, innovated standard CPUs, CPU 312 IFM Outdoor, CPU 314 IFM Outdoor and CPU 315F-2 DP (10 units, spare part)	**6ES7 392-2XX00-0AA0**
For CPU 314 IFM Outdoor (10 units, spare part)	**6ES7 392-2XX10-0AA0**
Labelling cover	**6ES7 392-2XY00-0AA0**
For compact CPUs, innovated standard CPUs, CPU 312 IFM Outdoor, CPU 314 IFM Outdoor and CPU 315F-2 DP (10 units, spare part)	
For CPU 314 IFM Outdoor (10 units, spare part)	**6ES7 392-2XY10-0AA0**
S7-SmartLabel	**2XV9 450-1SL00-0YX0**
Software for machine labelling of modules directly from the STEP 7 project	
Labelling sheets for machine labelling	See page 4/123
PROFIBUS DP RS 485 bus connector	
• With 90° outgoing feeder cable, max. transmission rate 12 Mbit/s	
- Without PG interface	**6ES7 972-0BA12-0XA0**
- With PG interface	**6ES7 972-0BB12-0XA0**
• With 90° outgoing feeder cable for FastConnect system, max. transmission rate 12 Mbit/s	
- Without PG interface	**6ES7 972-0BA50-0XA0**
- With PG interface	**6ES7 972-0BB50-0XA0**
• With axial outgoing feeder cable for SIMATIC OP, for connecting to PPI, MPI, PROFIBUS	**6GK1 500-0EA02**
PROFIBUS FastConnect bus cable	**6XV1 830-0EH10**
Standard type with special design for fast mounting, 2-core, shielded, sold by the meter; max. delivery unit 1000 m, minimum ordering length 20 m	
RS 485 repeater for PROFIBUS	**6ES7 972-0AA01-0XA0**
Max. transmission rate 12 Mbit/s; 24 V DC; housing IP 20	
PROFIBUS bus components	See Catalogs IK PI, CA 01
for configuring MPI/PROFIBUS communication	

SM 321 digital input modules

Overview



- Digital I/O for the SIMATIC® S7-300®
- For connecting switches and 2-wire proximity switches (BERO)

Technical specifications

6ES7 321-	1BH02-0AA0 1BH82-0AA0 [1]	1BH50-0AA0	1BL00-0AA0 1BL80-0AA0 [1]	1CH00-0AA0	1CH80-0AA0 [1)2)]
Number of inputs	16	16; source input	32	16	16
Interrupts	-	-	-	-	-
Diagnostics	-	-	-	-	-
Rated load voltage L+/L1					
• Rated value	24 V DC	24 V DC	24 V DC	24 to 48 V AC/DC	48 to 125 V DC
• Permitted range	20.4 V to 28.8 V			-	-
Input voltage					
• Rated value	24 V DC	24 V DC	24 V DC	24 to 48 V DC 24 to 48 V AC	48 to 125 V DC
• At "1" signal	13 to 30 V	-13 to -30 V	13 to 30 V	14 to 60 V AC	30 to 146 V DC
• At signal "0"	-30 to +5 V	-5 to +30 V	-30 to +5 V	-5 to 5 V AC	-30 to 15 V DC
• Frequency	-	-	-	0 to 63 Hz	-
Isolation (to backplane bus)	Optocoupler			Optocoupler	Optocoupler
• In groups of	16	16	16	1	8
Input current					
• At "1" signal, typ.	9.0 mA	7.0 mA	7.0 mA	8 mA	2.6 mA
Input delay					
• Configurable	-	-	-	-	-
• At rated input voltage	1.2 to 4.8 ms	1.2 to 4.8 ms	1.2 to 4.8 ms	Max. 15 ms	1 to 3 ms
No. of simultaneously controllable inputs					
• Up to 40 °C	16	16	32	16 (horizontal and vertical mounting)	16 (at 120 V DC)
• Up to 60 °C	16	16	16	16 (vertical mounting)	16 (at 60 V DC) or 10 (at 140 V DC)
• Up to 70 °C	-	-	-	-	16 (at 60 V DC) or 6 (at 140 V DC)
Connection of 2-wire BERO	Possible	Possible	Possible	Possible	Possible
• Permissible quiescent current, max.	1.5 mA	1.5 mA	1.5 mA	1.0 mA	1.0 mA
Line length					
• Unshielded	600 m	600 m	600 m	600 m	600 m
• Shielded	1000 m	1000 m	1000 m	1000 m	1000 m

1) SIMATIC Outdoor with expanded temperature range -25 to +60 °C
2) Available exclusively with expanded temperature range

Technical specifications (continued)

6ES7 321-	1BH02-0AA0 1BH82-0AA0 [1]	1BH50-0AA0	1BL00-0AA0 1BL80-0AA0 [1]	1CH00-0AA0	1CH80-0AA0 [1][3]
Current consumption					
From backplane bus, max.	10 mA	10 mA	15 mA	100 mA	40 mA
• From L+, max.	25 mA	-	-	-	-
Power losses, typ.	3.5 W	3.5 W	6.5 W	1.5 W at 24 V 2.8 W at 48 V	4.3 W
Isolation tested at	500 V DC	500 V DC	500 V DC	2500 V DC	1500 V DC
Dimensions (W x H x D) in mm	40 x 125 x 120			40 x 125 x 120 mm	40 x 125 x 120
Required front connector	20-pin	20-pin	40-pin	20-pin	20-pin
Weight, approx.	200 g	200 g	260 g	260g	200 g

Technical specifications (continued)

6ES7 321-	7BH00-0AB0 7BH80-0AB0[1]	1FH00-0AA0	1EL00-0AA0	1FF01-0AA0 1FF81-0AA0[1]	1FF10-0AA0
Number of inputs	16	16	32	8	8
Interrupts	Process interrupt diagnostic alarm		-	-	-
Diagnostics	internal/external error		-	-	-
Rated load voltage L+/L1					
• Rated value	24 V DC	-	-	-	-
• Permitted range	20.4 V at 28.8 V	-	-	-	-
Input voltage					
• Rated value	24 V DC	120/230 V AC	120 V AC	120 / 230V AC	120 / 230V AC
• For "1" signal	13 to 30 V	79 to 264 V	74 to 132 V	79 to 264 V	79 to 264 V
• For signal "0"	-30 to +5 V	0 to 40 V	0 to 20 V	0 to 40 V	0 to 40 V
• Frequency	-	47 to 63 Hz	47 to 63 Hz	47 to 63 Hz	47 to 63 Hz
Isolation (to backplane bus)	Optocoupler		Optocoupler	Optocoupler	Optocoupler
• In groups of	16	4	8	2	1
• Input current at "1" signal, typ.	7.0 mA	17.3 mA at AC 264 V	21 mA	6.5 mA (120 V); 11mA (230V)	7.5 mA (120V) 17.3 mA (230V)
Input delay					
• Configurable	Yes	-	-	-	-
• At rated input voltage	0.1/0.5/3/15/20 ms[2]	25 ms	25 ms	25 ms	25 ms
No. of simultaneously controllable inputs					
• Up to 40 °C	16	16	32	8	8
• Up to 60 °C	16	16	24	8	8
Connection of 2-wire BERO	Possible	Possible	Possible	Possible	Possible
• Permissible quiescent current, max.	1.5 mA	2 mA	4 mA	2 mA	2 mA
Line length					
• Unshielded	600 m	600 m	600 m	600 m	600 m
• Shielded	1000 m	1000 m	1000 m	1000 m	1000 m
Current consumption					
• From backplane bus, max.	55 mA	43 mA	16 mA	29 mA	100 mA
• From L+, max.	40 mA	-	-	-	-
Power losses, typ.	4 W	4.1 W	4.0 W	4.9 W	4.9 W
Isolation tested at	500 V DC	1500 V AC	1500 V AC	1500 V AC	1500 V AC
Dimensions (W x H x D) in mm	40 x 125 x 120	40 x 125 x 120	40 x 125 x 120	40 x 125 x 120	40 x 125 x 120
Required front connector	20-pin	20-pin	40-pin	20-pin	20-pin
Weight, approx.	200 g	275 g	300 g	240 g	240 g

1) SIMATIC Outdoor with expanded temperature range -25 to +60 °C
2) In addition, a regeneration time of 0.25 ms must be added before the signal can be forwarded on the backplane bus
3) Available exclusively with expanded temperature range

SM 321 digital input modules

4

Ordering data	Order No.
SM 321 digital input modules	
including labelling strips, bus connector	
16 inputs, 24 V DC	**6ES7 321-1BH02-0AA0**
16 inputs, 24 V DC, extended temperature range	**6ES7 321-1BH82-0AA0**
16 inputs, 24 V DC, source input	**6ES7 321-1BH50-0AA0**
32 inputs, 24 V DC	**6ES7 321-1BL00-0AA0**
32 inputs, 24 V DC, extended temperature range	**6ES7 321-1BL80-0AA0**
16 inputs, 24 to 48 V DC	**6ES7 321-1CH00-0AA0**
16 inputs, 48 to 120 V DC, extended temperature range	**6ES7 321-1CH80-0AA0**
16 inputs, 24 V DC, diagnostics capability	**6ES7 321-7BH00-0AB0**
16 inputs, 24 V DC, diagnostics capability, extended temperature range	**6ES7 321-7BH80-0AB0**
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, extended temperature range	**6ES7 321-1FF81-0AA0**
8 inputs, 120/230 V AC, common reference potential	**6ES7 321-1FF10-0AA0**
16 inputs, 120/230 V AC	**6ES7 321-1FH00-0AA0**
Front connector	
20-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AJ00-0AA0**
• 100 units	**6ES7 392-1AJ00-1AB0**
20-pin, with spring-loaded terminals	**6ES7 392-1BJ00-0AA0**
40-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AM00-0AA0**
• 100 units	**6ES7 392-1AM00-1AB0**
40-pin, with spring-loaded terminals	**6ES7 392-1BM01-0AA0**
Front door, improved version	**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 4/114
Bus connector	**6ES7 390-0AA00-0AA0**
1 unit (spare part)	

	Order No.
Labelling strips	
10 units (spare part)	
For signal modules (except 32-channel), function modules, CPU 312 IFM and CPU 314 IFM	**6ES7 392-2XX00-0AA0**
For 32-channel signal modules	**6ES7 392-2XX10-0AA0**
Labelling cover	
10 units (spare part)	
For signal modules (except 32-channel), function modules, CPU 312 IFM and CPU 314 IFM	**6ES7 392-2XY00-0AA0**
For 32-channel signal modules	**6ES7 392-2XY10-0AA0**
S7-SmartLabel	**2XV9 450-1SL00-0YX0**
Software for machine labelling of modules directly from the STEP 7 project	
Labelling sheets for machine labelling	See page 4/123
SIMATIC Manual Collection	**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 software, SIMATIC DP (distributed I/O), SIMATIC HMI (human machine interface), SIMATIC NET (industrial communication)	
SIMATIC Manual Collection updating service for 1 year	**6ES7 998-8XC01-8YE2**
Current S7 Manual Collection CD as well as the three following updates	
S7-300 manual	
Design, CPU data, module data, instruction 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**

Overview



- Digital outputs for the SIMATIC® S7-300®
- For connection of solenoid valves, contactors, low-power motors, lamps and motor starters

Technical specifications

6ES7 322-	1BH01-0AA0 1BH81-0AA0 [1]	1BL00-0AA0	8BF00-0AB0 [2] 8BF80-0AB0 [1]	5GH00-0AB0	1CF80-0AA0 [1][3]	1BF01-0AA0
Number of outputs	16	32	8	16	8	**8**
Interrupts	-	-	Yes	-	-	-
Diagnostics	-	-	Configurable: diagnostic alarm channel-wise, short-circuit, wire break, missing load voltage	Parameters can be assigned	-	-
Load voltage L+/L1	24 V DC	24 V DC	24 V DC	24/48 V DC	48 to 125 V DC	24 V DC
• Permitted range	20.4 to 28.8V	20.4 to 28.8V	20.4 to 28.8 V	-	40 to 140 V DC	20.4 to 28.8V
Output voltage						
• At "1" signal	L+ -0.8 V	L+ -0.8 V	L+ -0.8 to -1.6 V	L+ (-0.25 V)	L-1.1 V	L+ -0.8 V
Electrical isolation to backplane bus	Optocoupler	Optocoupler	Optocoupler	Optocoupler	Optocoupler	Optocoupler
• In groups of	8	8	8	1	4	4
Output current						
• At "1" signal						
- rated value at 40 °C	-	-	-	-	1.5 A	
- rated value at 60 °C	0.5 A	0.5 A	0.5 A	0.5 A	-	2 A
- minimum current	5 mA	5 mA	10 mA		10 mA	5 mA
- permitted range				1.5 A (for 50 ms) 1 A^2s (einmalig)	10 mA	
• At "0" signal	0.5 mA	0.5 mA	0.5 mA	10 µA	10 mA	0.5 mA
Total current of the outputs (per group)						
• Up to 40 °C	4 A	4 A	2 A		4.0 A	
• Up to 60 °C (horiz. mounting)	3 A	3 A	2 A	0.5 A	4.0 A	4 A
Lamp load, max.	5 W	5 W	5 W	5 W	15 W (48 V) or 40 W (120 V)	10 W
Switching frequency of outputs						
• Resistive load, max.	100 Hz	100 Hz	100 Hz	0.5 Hz	20 Hz	100 Hz
• Inductive loads, max.	0.5 Hz	0.5 Hz	2 Hz	-	0.5 Hz	0.5 Hz
• Lamp load, max.	100 Hz	100 Hz	100 Hz	-	10 Hz	100 Hz
• Mechanical, max.	-	-	-	-	-	-
Switching capacity of contacts						
• Resistive load, max.	-	-	-	-	-	-
• Inductive loads, max.	-	-		-	-	-
• Lamp load, max.	-	-	-	-	-	-

1) SIMATIC Outdoor with expanded temperature range -25 to +60 °C
2) The module can hold the last value at CPU stop or switch off a substitute value on the output. Diagnostics using CPU analysis and red LED per channel.
3) Available as SIMATIC Outdoor module with extended temperature range only

SM 322 digital output modules

Technical specifications (continued)

6ES7 322-	1BH01-0AA0 1BH81-0AA0 [1]	1BL00-0AA0	8BF00-0AB0 [2] 8BF80-0AB0 [1]	5GH00-0AB0	1CF80-0AA0 [1][3]	1BF01-0AA0
Service life of contacts to VDE 0660, Part 200						
• AC 15	-	-	-	-	-	-
• DC 13	-	-	-	-	-	-
Voltage induced on current interruption limited to	L+ - 48 V	L+ - 48 V	L+ - 45 V	-	-	L+ - 48 V
Short-circuit protection	Electronic	Electronic	Electronic	Provide externally	Electronic	Electronic
Line length						
• Unshielded	600 m	600 m	600 m	600 m	600 m	600 m
• Shielded	1000 m	1000 m	1000 m	1000 m	1000 m	1000 m
Current consumption						
• From backplane bus, max.	80 mA	110 mA	70 mA	100 mA	100 mA	40 mA
• From L+/L1, max. (without load)	120 mA	200 mA	90 mA	200 mA	40 mA	60 mA
Supply voltage L+/ current consumption of relays	-	-	-	-	-	-
Power losses, typ.	4,9 W	5 W	5 W	2.8 W	6.5 W	6.8 W
Isolation tested at	500 V DC	500 V DC	500 V DC		1500 V DC	500 V DC
Dimensions (W x H x D) in mm	40x125x120	40x125x120	40x125x120	40x125x120	40x125x120	40x125x120
Required front connector	20-pin	40-pin	20-pin	40-pin	20-pin	20-pin
Weight, approx.	190 g	210 g	210 g	260 g	250 g	190 g

1) SIMATIC Outdoor with expanded temperature range -25 to +60 °C
2) The module can hold the last value at CPU stop or switch off a substitute value on the output. Diagnostics using CPU analysis and red LED per channel.
3) Available as SIMATIC Outdoor module with extended temperature range only

Technical specifications (continued)

6ES7 322-	1FF01-0AA0	5FF00-0AB0	1FH00-0AA0	1EL00-0AA0	1HF01-0AA0
Number of outputs	8	8	16	32	8 (relay)
Interrupts	-	-	-	-	-
Diagnostics	Red LED for fuse or missing L1/N	Off, last value/ substitute value	Red LED for fuse	Red LED for fuse	-
Load voltage L+/L1	120 V/230 V AC	120/230 V AC	120/230 V AC	120 V AC	Up to 230 V AC 24 V DC
• Permitted range	93 to 132 V/187 to 264 V	79 to 264 V	79 to 264 V	93 to 132 V	-
Output voltage					
• At "1" signal	L1 - 1.5 V	-	-	L1 - 1.5 V	-
Electrical isolation to backplane bus	Optocoupler	Optocoupler	Optocoupler	Optocoupler	Optocoupler
• In groups of	4	1	8	8	2
Output current					
• At "1" signal					
- rated value at 40 °C					
- rated value at 60 °C	1 A	1 A	1 A	1 A	-
- minimum current	10 mA	10 mA	10 mA	10 mA	-
- max. permissible range					
• At "0" signal	2 mA	3 mA at 264 V	3 mA at 264 V	3 mA	-
Total current of the outputs (per group)					
• Up to 40 °C					
• Up to 60 °C (horiz. mounting)	2 A	1 A	2 A	3 A	-

Technical specifications (continued)

6ES7 322-	1FF01-0AA0	5FF00-0AB0	1FH00-0AA0	1EL00-0AA0	1HF01-0AA0
Lamp load, max.	50 W	50 W	25 W	25 W	-
Switching capacity of contacts					
• Resistive load, max.	10 Hz	10 Hz	10 Hz	10 Hz	2 Hz
• Inductive loads, max.	0.5 Hz	0.5 Hz	0.5 Hz	0.5 Hz	0.5 Hz
• Lamp load, max.	1 Hz	1 Hz	1 Hz	1 Hz	2 Hz
• mechanisch, max.	-	-	-	-	10 Hz
Switching capacity of contacts					
• Resisitive load, max.	-	-	-	-	2 A (230 V AC), 2 A (24 V DC)
• Inductive loads, max.	-	-	-	-	2 A (230 V AC), 2 A (24 V DC)
• Lamp load, max.	-	-	-	-	-
Service life of contacts to VDE 0660, Part 200					
• AC 15	-				
• DC 13	-				
Life of the contacts to IEC 947-5-1 DC 13/AC 15					
• 24 V DC		-	-	-	At 2 A: 0.3×10^6
• 120 V AC		-	-	-	At 2 A: 0.2×10^6
• 230 V AC		-	-	-	At 2 A: 0.1×10^6
Voltage induced on current interruption limited to	-	-	-	-	-
Short-circuit protection	Fuse	Provide externally	Back-up in groups to 8	Fuse	-
Line length					
• Unshielded	600 m	600 m	600 m	600 m	600 m
• Shielded	1000 m	1000 m	1000 m	1000 m	1000 m
Current consumption					
• From backplane bus, max.	100 mA	100 mA	184 mA	100 mA	40 mA
• From L+/L1, max. (without load)	2 mA	3 mA	3 mA	275 mA	110 mA
Supply voltage L+/ current consumption of relays	-	-	-	-	24 V DC/110 mA
Power losses, typ.	8.6 W	8.6 W	8.6 W	25 W	2.2 W
Isolation tested at	1500 V AC		1500 V AC	1500 V AC	1500 V AC
Dimensions (W x H x D) in mm	40x125x120	40 x 125 x 120	40 x 125 x 120	80x125x120	40x125x120
Required front connector	20-pin	40-pin	20-pin	20-pin	20-pin
Weight, approx.	275 g	275 g	275 g	500 g	190 g

SM 322 digital output modules

Technical specifications (continued)

6ES7 322-	1HF10-0AA0 1HF80-0AA0 [1]	5HF00-0AB0	1HH01-0AA0
Number of outputs	8 (relays)	8 (relays)	16 (relays
Interrupts	-		-
Diagnostics	-	Off, last value/substitute value	-
Load voltage L+/L1	24 to 230 V AC 24 to 120 V DC	24 to 230 V AC 24 to 120 V DC	24 to 230 V AC 24 to 120 V DC
• Permitted range	-	-	-
Output voltage			
• At "1" signal	-	-	-
Electrical isolation to backplane bus	Optocoupler	Optocoupler	Optocoupler
• In groups of	1	1	8
Total current of the outputs (per group)			
• Up to 60 °C (horiz. mounting)	Max. 5 A	5 A	Max. 8 A
Lamp load, max.	-	1500 W AC 230 V)	-
Switching frequency of outputs			
• For resisitve load, max.	2 Hz	2 Hz	1 Hz
• For inductive loads, max.	0.5 Hz	0.5 Hz	0.5 Hz
• For lamp load, max.	2 Hz	2 Hz	1 Hz
• Mechanical, max.	10 Hz	10 Hz	10 Hz
Switching capacity of contacts			
• For resisitive load, max.	8 A (230 V AC), 5 A(24 V DC)	5 A	2 A (230 V AC), 2 A (24 V DC)
• For inductive load	3 A (230 V AC), 2 A(24 V DC)	5 A	2 A (230 V AC), 2 A (24 V DC)
• For lamp load, max.	-	-	-
Life of the contacts to IEC 947-5-1 DC 13/AC 15			
• 24 V DC	At 2 A: 0.3 x 10^6	At 5 A[2]: 0.1 x 10^6	At 2 A: 0.05 x 10^6
• 120 V AC	At 3 A: 0.2 x 10^6	-	At 2 A: 0.7 x 10^6
• 230 V AC	At 3 A: 0.1 x 10^6	At 5 A[2]: 0.1 x 10^6	At 2 A 0.1 x 10^6
Voltage induced on current interruption limited to	-		-
Short-circuit protection	-	Provide externally	-
Line length			
• Unshielded	600 m	600 m	600 m
• Shielded	1000 m	1000 m	1000 m
Current consumption			
• From backplane bus, max.	40 mA	100 mA	100 mA
• From L+/L1, max. (without load)	125 mA	160 mA	250 mA
Supply voltage L+/ current consumption of relays	-	-	-
Power losses, typ.	4.2 W	3.5 W	4.5 W
Isolation tested at	2000 V AC	1500 V AC	1500 V AC
Dimensions (W x H x D) in mm	40x125x120	40 x 125 x 120	40x125x120
Required front connector	40-pin	40-pin	20-pin
Weight, approx.	320 g	320 g	250 g

1) SIMATIC Outdoor with expanded temperature range -25 to +60 °C
2) Increased life of the contacts with selected RC attenuation network

Ordering data	Order No.
SM 322 digital output modules	
including labelling 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, extended temperature range	**6ES7 322-1BH81-0AA0**
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**
8 outputs, 24 V DC, 0.5 A, diagnostics capability, extended temperature range	**6ES7 322-8BF80-0AB0**
16 outputs, 24/48 V DC, 0.5 A	**6ES7 322-5GH00-0AB0**
8 outputs, 48 to 125 V DC, 1.5 A, only available with extended temperature range	**6ES7 322-1CF80-0AA0**
8 outputs, 120/230 V AC, 1 A	**6ES7 322-1FF01-0AA0**
8 outputs, 120/230 V AC, 2 A	**6ES7 322-5FF00-0AB0**
16 outputs, 120/230 V AC, 0.5 A	**6ES7 322-1FH00-0AA0**
32 outputs, 120 V AC, 1 A	**6ES7 322-1EL00-0AA0**
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, extended temperature range	**6ES7 322-1HF80-0AA0**
8 outputs, relay contacts, 5 A, with RC filter for overvoltage protection	**6ES7 322-5HF00-0AB0**
16 outputs, relay contacts, 8 A	**6ES7 322-1HH01-0AA0**
Front connector	
20-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AJ00-0AA0**
• 100 units	**6ES7 392-1AJ00-1AB0**
20-pin, with spring-loaded terminals	**6ES7 392-1BJ00-0AA0**
40-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AM00-0AA0**
• 100 units	**6ES7 392-1AM00-1AB0**
40-pin, with spring-loaded terminals	**6ES7 392-1BM01-0AA0**
Front door, improved version	**6ES7 328-0AA00-7AA0**
e.g. for 32-channel modules; permits connection of 1.3 mm^2/16 AWG conductors	

	Order No.
SIMATIC TOP connect	See page 4/114
Bus connector	**6ES7 390-0AA00-0AA0**
1 unit (spare part)	
Labelling strips	
10 units (spare part)	
For signal modules (except 32-channel), function modules and CPU 312 IFM	**6ES7 392-2XX00-0AA0**
For 32-channel signal modules	**6ES7 392-2XX10-0AA0**
Labelling cover	
10 units (spare part)	
For signal modules (except 32-channel), function modules and CPU 312 IFM	**6ES7 392-2XY00-0AA0**
For 32-channel signal modules	**6ES7 392-2XY10-0AA0**
S7-SmartLabel	**2XV9 450-1SL00-0YX0**
Software for machine labelling of modules directly from the STEP 7 project	
Labelling sheets for machine labelling	See page 4/123
Fuse for SM 322	**6ES7 973-1HD00-0AA0**
10 fuses, 8 A fast-action, 2 fuse holders	
SIMATIC Manual Collection	**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 software, SIMATIC DP (distributed I/O), SIMATIC HMI (human machine interface), SIMATIC NET (industrial communication)	
SIMATIC Manual Collection updating service for 1 year	**6ES7 998-8XC01-8YE2**
Current S7 Manual Collection CD as well as the three following updates	
S7-300 manual	
Design, CPU data, module data, instruction 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**

SM 323 digital I/O modules

Overview



- Digital I/O for the SIMATIC® S7-300®
- For connecting switches, 2-wire BERO proximity switches, solenoid valves, contactors, small motors, lamps and motor starters

Technical specifications

6ES7 323-	1BH01-0AA0 1BH81-0AA0 [1]	1BL00-0AA0
Inputs		
• Number of inputs	8	16
Interrupts	-	-
Diagnostics	-	-
Rated load voltage		
• Rated value	24 V DC	24 V DC
• Permitted range	20.4 to 28.8 V	20.4 to 28.8 V
Input voltage		
• Rated value	24 V DC	24 V DC
• At “1” signal	13 to 30 V	13 to 30 V
• At “0” signal	-30 to + 5 V	-30 to + 5 V
• Frequency	-	-
Isolation to backplane bus	Optocoupler	Optocoupler
• In groups of	8	16
Input current		
• At "1" signal, typ.	7 mA	7 mA
Input delay		
• Configurable	-	-
• At rated input voltage, typ.	1.2 to 4.8 ms	1.2 to 4.8 ms
No. of simultaneously controllable inputs		
• Up to 40°C	8	16
• Up to 60 °C	8	8
Connection of 2-wire BERO	Possible	Possible
• Permissible quiescent current, max.	2 mA	1.5 mA
Outputs		
• Number of inputs	8	16
Interrupts	-	-
Diagnostics	-	-
Rated load voltage L+/L1	24 V DC	24 V DC
• Permitted range	20.4 to 28.8 V	20.4 to 28.8 V

6ES7 323-	1BH01-0AA0 1BH81-0AA0 [1]	1BL00-0AA0
Output voltage		
• At "1" signal	L+ - 0.8 V	L+ - 0.8 V
Electrical isolation	Optocoupler	Optocoupler
• In groups of	8	8
Maximum output current		
• At "1" signal		
- rated value at 60 °C	0.5 A	0.5 A
- minimum current	5 mA	5 mA
• At signal “0”, max.	0.5 mA	0.5 mA
Total current of the outputs (per group)		
• Up to 40°C	4 A	4 A
• Up to 60°C (horizontal installation)	4 A	3 A
Lamp load, max.	5 W	5 W
Switching frequency of outputs		
• For resistive load, max.	100 Hz	100 Hz
• For inductive loads, max.	0.5 Hz	0.5 Hz
• For a lamp load	100 Hz	100 Hz
Voltage induced on circuit interruption limited to	L+ - 48 V	L+ - 48 V
Short-circuit protection	Electronic	Electronic
General		
Line length		
• Unshielded	600 m	600 m
• Shielded	1000 m	1000 m
Current consumption		
• From backplane bus, max.	40 mA	80 mA
• From L+/L1 (without load)	20 mA	100 mA
Power losses, typically	4.5 W	6.5 W
Isolation tested at	500 V DC	600 V DC
Dimensions (W x H x D) in mm	40 x 125 x 120	40 x 125 x 120
Required front connector	20-pin	40-pin
Weight, approx.	220 g	260 g

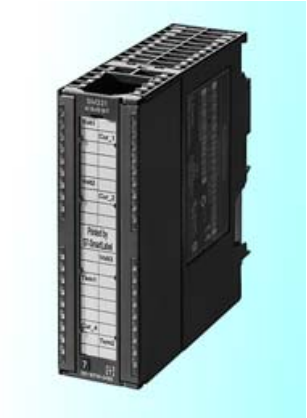
1) SIMATIC Outdoor with expanded temperature range -25 to +60 °C

Ordering data	Order No.
SM 323 digital input/output modules	
including labelling strips, bus connector	
8 inputs, 8 outputs	**6ES7 323-1BH01-0AA0**
8 inputs, 8 outputs, extended temperature range	**6ES7 323-1BH81-0AA0**
16 inputs, 16 outputs	**6ES7 323-1BL00-0AA0**
Front connector	
20-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AJ00-0AA0**
• 100 units	**6ES7 392-1AJ00-1AB0**
20-pin, with spring-loaded terminals	**6ES7 392-1BJ00-0AA0**
40-pin, with screw-type terminals (for SM 323-1BL)	
• 1 unit	**6ES7 392-1AM00-0AA0**
• 100 units	**6ES7 392-1AM00-1AB0**
40-pin, with spring-loaded terminals (for SM 323-1BL)	**6ES7 392-1BM01-0AA0**
Front door, improved version	**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 4/114
Bus connector	**6ES7 390-0AA00-0AA0**
1 unit (spare part)	
Labelling strips	
10 units (spare part)	
For signal modules (except 32-channel), function modules and CPU 312 IFM	**6ES7 392-2XX00-0AA0**
For 32-channel signal modules	**6ES7 392-2XX10-0AA0**

	Order No.
Labelling cover	
10 units (spare part)	
For signal modules (except 32-channel), function modules and CPU 312 IFM	**6ES7 392-2XY00-0AA0**
For 32-channel signal modules	**6ES7 392-2XY10-0AA0**
S7-SmartLabel	**2XV9 450-1SL00-0YX0**
Software for machine labelling of modules directly from the STEP 7 project	
Labelling sheets for machine labelling	See page 4/123
SIMATIC Manual Collection	**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 software, SIMATIC DP (distributed I/O), SIMATIC HMI (human machine interface), SIMATIC NET (industrial communication)	
SIMATIC Manual Collection updating service for 1 year	**6ES7 998-8XC01-8YE2**
Current S7 Manual Collection CD as well as the three following updates	
S7-300 manual	
Design, CPU data, module data, instruction 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**

SM 331 analog input modules

Overview



- Analog inputs for the SIMATIC® S7-300®
- For the connection of voltage and current sensors, thermocouples, resistors and resistance thermometers

Technical specifications

6ES7 331-	7KF02-0AB0	1KF00-0AB0	7KB02-0AB0 7KB82-0AB0 1)
Number of inputs	8	8	2
• For resistance measurement	4	8	1
Interrupts			
• Limit value interrupt	Configurable	No	Configurable
• Diagnostics interrupt	Configurable channels 0 and 2	No	Configurable channels 0
Diagnostics	Red LED for indicating group errors; diagnostic info can be read out	No	Red LED for indicating group errors; diagnostic info can be read out
Rated load voltage L+	24 V DC	-	24 V DC
• Polarity reversal protection	Yes	-	Yes
Input resistance/ input ranges			
• Voltage	+/- 80 mV /10 MΩ, +/- 250 mV/10 MΩ +/- 500 mV/10 MΩ +/- 1 V/10 MΩ +/- 2,5 V/100 kΩ +/- 5 V/100 kΩ 1 to 5 V/ 100 kΩ +/- 10 V/100 kΩ	+/- 50 mV /10 MΩ +/- 500 mV /10 MΩ +/- 1 V /10 MΩ +/- 5 V /100 kΩ 1 to 5 V /100 kΩ +/- 10 V /100 kΩ 0 to 10 V /100 kΩ	+/- 80 mV /10 MΩ, +/- 250 mV/10 MΩ +/- 500 mV/10 MΩ +/- 1 V/10 MΩ +/- 2,5 V/100 kΩ +/- 5 V/100 kΩ 1 to 5 V/ 100 kΩ +/- 10 V/100 kΩ
• Current	+/- 10 mA/25 Ω +/- 3,2 mA/25 Ω +/- 20 mA/25 Ω 0 to 20 mA/25 Ω 4 to 20 mA/25 Ω	+/- 20 mA /50 Ω 0 to 20 mA /50 Ω 4 to 20 mA /50 Ω	+/- 10 mA/25 Ω +/- 3,2 mA/25 Ω +/- 20 mA/25 Ω 0 to 20 mA/25 Ω 4 to 20 mA/25 Ω
• Resistance	150 Ω /10 MΩ 300 Ω /10 MΩ 600 Ω /10 MΩ	0 to 6kΩ /10 MΩ 0 to 600Ω /10 MΩ	150 Ω /10 MΩ 300 Ω /10 MΩ 600 Ω /10 MΩ
• Thermocouples	Type E, N, J, K/10 MΩ	-	Type E, N, J, K/10 MΩ
• Resistance thermometer	Pt 100 standard/10 MΩ Ni 100 standard	Pt 100-Standard /10 MΩ Pt 100 climate /10 MΩ	Pt 100 standard/ 10 MΩ Ni 100 standard
Permissible input voltage for voltage input, max.	20 V	30 V	20 V
Permissible input current for current input, max.	40 mA	40 mA Delete protection available	40 mA
Connection of signal sen sors			
• For current measurement			
- as 2-wire transmitter	Yes	Yes, with external supply	Yes
- as 4-wire transmitter	Yes	Yes	Yes

1) SIMATIC Outdoor with expanded temperature range -25 to +60 °C

Technical specifications (continued)

6ES7 331-	7KF02-0AB0	1KF00-0AB0	7KB02-0AB0 7KB82-0AB0 [1]
Connection of signal sen sors			
• For impedance measure ment			
- with 2 conductor connections	Yes	Yes	Yes
- with 3 conductor connections	Yes	Yes, With 3-line compensation	Yes
- with 4 conductor connections	Yes	Yes	Yes
Isolation to backplane bus	Yes	Yes	Yes
Characteristic linearization			
• For thermocouples	Type N, E, J, K	-	Type N, E, J, K
• For resistance thermometers	Pt 100 (standard range) Ni 100 (standard range)	PT 100 standard PT 100 climate	PT 100 (standard range) NI 100 (standard range)
Temperature ompensa tion	Configurable	No	Configurable
• Internal	Possible	-	Possible
• External with compensation socket	Possible	-	Possible
• External with Pt 100	-	-	-
Conversion time[2]/ reso lution (per channel)			
• Integration time	2.5/16 $^2/_3$/20/100 ms	16 $^2/_3$ / 20 ms	2.5/16 $^2/_3$/20/100 ms
• Resolution			
- unipolar	9/12/12/14 bit	13 / 13 bit	9/12/12/14 bit
- bipolar	9+sign/12+sign/12+sign/ 14+sign bit	12+sign / 12+sign	9+sign/12+sign/12+sign/ 14+sign bit
• Interference voltage suppression for interference frequency	400/60/50/10 Hz	60 / 50 Hz	400/60/50/10 Hz
Operational limit (in entire temperature range, referred to input range), max.	+/-1%	+/-0.6%, +/-1.2K	+/-1%
Basic error (operational limits at 25°C, referred to input range), max.	+/-0.6%	+/-0.4%, +/-1K	+/-0.6%
Cable length (shielded), max.	200 m (50 m at 80 mV)	200 m (50 m at 50 mV)	200 m (50 m at 80 mV)
Current consumption			
• From backplane bus, max.	50 mA	90 mA	50 mA
• From L+, max.	200 mA	-	80 mA
Power losses, typically	1.3 W	0.4 W	1.3 W
Isolation tested at	600 V DC	600 V DC	500 V DC
Dimensions (W x H x D) in mm	40 x 125 x 120	40 x 125 x 120	40 x 125 x 120
Required front connector	20-pin	40-pin	20-pin
Weight	250 g	250 g	250 g

1) SIMATIC Outdoor with expanded temperature range -25 to +60 °C
2) Other details have to be heeded to calculate the scan time. These can be found in the manual "Configuring a "S7-300® ".

4

Technical specifications (continued)

SM 331 6ES7 331-	7PF00-0AB0	7PF10-0AB0	7NF00-0AB0	7NF10-0AB0
Number of inputs	8	8	8	8
• For resistance measurement	8	-	-	-
Interrupts				
• Limit value interrupt	Configurable	Configurable	Configurable channels 0 and 2	all channels configurable[3]
• Diagnostics interrupt	Configurable per group	Configurable per group	Configurable	Configurable
Diagnostics	Red LED for indicating group errors; diagnostic info can be read out	Red LED for indicating group errors; diagnostic info can be read out	Red LED for indicating group errors; diagnostic info can be read out	Red LED for indicating group errors; diagnostic info can be read out
Rated load voltage L+	24 V DC	24 V DC	-	-
• Polarity reversal protection	Yes	Yes	-	-
Input range				
• Voltage	-	-	± 5 V/2 MΩ 1 to 5 V/2 MΩ ± 10 V/2 MΩ	± 5 V/10 MΩ 1 to 5 V/10 MΩ ± 10 V/10 MΩ
• Current	-	-	±20 mA/250 Ω 0 to 20 mA/ 250 Ω 4 to 20 mA/ 250 Ω	±20 mA/250 Ω 0 to 20 mA/ 250 Ω 4 to 20 mA/ 250 Ω
• Resistance	0 to 150 Ω 0 to 300 Ω 0 to 600 Ω	-	-	-
• Thermocouples	-	Typ B, E, J, K, L, N, R, S. T, U	-	-
• Resistance thermometer	Pt 100, Pt 200, Pt 500, Pt 1000, Ni 100, Ni 120, Ni 200, Ni 500, Ni 1000, Cu 10	-	-	-
Permissible input voltage for voltage input, max.	50 V	50 V	50 V	75 V
Permissible input current for current input, max.	-	-	32 mA	40 mA
Isolation to backplane bus	Yes (4 groups of 2 channels each)	Yes (4 groups of 2 channels each)	Yes	Yes
Connection of signal sensors				
• For current measurement				
- as 2-wire transmitter	-	-	Yes with external transmitter	Yes, with external transducer, power pack
- as 4-wire transmitter	-	-	Yes	Yes
• For impedance measurement				
- with 2 conductor connections	Yes	-	-	-
- with 3 conductor connections	Yes	-	-	-
- with 4 conductor connections	Yes	-	-	-
Characteristic linearization				
• For thermocouples	-	Type B, E, J, K, L, N, R, S. T, U	-	-
• For resistance thermometers	Pt 100, Pt 200, Pt 500, Pt 1000, Ni 100, Ni 120, Ni 200, Ni 500, Ni 1000, Cu 10 (standard and airconditioning applications)	-	-	-
Temperature compensation	Internal	Configurable	-	-
• Internal	-	Possible	-	-
• External with compensation socket	-	Possible	-	-
• External with Pt 100	-	Yes		

3) Clock alarms are also supported in the modules

Technical specifications (continued)

SM 331 6ES7 331-	7PF00-0AB0	7PF10-0AB0	7NF00-0AB0	7NF10-0AB0
Conversion time[2]/ resolution (per channel)				
• Integrationszeit			2.5/16 2/3/20/100 ms	23/72/83/95 ms for all 8 channels of the module. For more information see manual [4]
• Basic conversion time				
- up to 4 channels (1channel per group)	10 ms per module	10 ms per module		
- 5 channels or more (>1channel per group)	190 ms per module	190 ms per module		
• Resolution				
- unipolar			15/15/15/15 bit	15/15/15/15 bit
- bipolar			15+sign/15+sign/15+sign/ 15+sign bit	15+sign/15+sign/15+sign/ 15+sign bit
• Resolution in bit	16, two's complement	16, two's complement		
• Resolution in bit (internal)	24, Sigma-Delta-principle	24, Sigma-Delta-principle		
• Noise suppression for noise frequency	400/60/50 Hz	400/60/50 Hz	400/60/50/10 Hz	400/60/50 Hz, combinations from 400, 60, 50 Hz
Operational limit (in entire temperature range, referred to input range), max.	+/- 0.1% +/-1 K	+/- 0.1% +/-1 K	± 0.1% (voltage) ± 0.3% (current)	± 0.1% (voltage) ± 0.1% (current)
Basic error (operational limits at 25°C, referred to input range), max.	+/-0.05% +/-0.5 K	+/-0.05% +/-0.5 K	± 0.05% (voltage) ± 0.05% (current)	± 0.05% (voltage) ± 0.05% (current)
Cable length (shielded), max.	200 m	200 m	200 m	200 m
Current consumption				
• From backplane bus, max.	100 mA	100 mA	130 mA	100 mA
• From L+, approx.	200 mA	200 mA	-	-
Power losses, typically	4 W	4 W	0.6 W	3.0 W
Isolation tested at	500 V AC	1500 V AC	500 V AC	500 V AC
Dimensions (W x H x D) in mm	40 x 125 x 120	40 x 125 x 120	40 x 125 x 120	40 x 125 x 120
Required front connector	40-pin	40-pin	40-pin	40-pin
Weight, approx.	260 g	270 g	270 g	270 g

2) Other details have to be heeded to calculate the scan time. These can be found in the manual "Configuring a "S7-300® ".
4) In the 4-channel mode the basic execution time for all channels is 10 ms

SM 331 analog input modules

Ordering data	Order No.
SM 331 analog input modules	
incl. labelling strips, bus connector, range cards	
8 inputs, resolution 13 bit	**6ES7 331-1KF00-0AB0**
8 inputs	**6ES7 331-7KF02-0AB0**
2 inputs	**6ES7 331-7KB02-0AB0**
2 inputs, extended temperature range	**6ES7 331-7KB82-0AB0**
8 inputs, enhanced resolution	**6ES7 331-7NF00-0AB0**
8 inputs, enhanced resolution, 4-channel mode	**6ES7 331-7NF10-0AB0**
8 inputs, for thermal resistances	**6ES7 331-7PF00-0AB0**
8 inputs, for thermocouples	**6ES7 331-7PF10-0AB0**
Range card for analog inputs	**6ES7 974-0AA00-0AA0**
1 card for 2 analog inputs; 2 cards (spare part)	
Front connector	
1 unit	
20-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AJ00-0AA0**
• 100 units	**6ES7 392-1AJ00-1AB0**
20-pin, with spring-loaded terminals	**6ES7 392-1BJ00-0AA0**
40-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AM00-0AA0**
• 100 units	**6ES7 392-1AM00-1AB0**
40-pin, with spring-loaded terminals	**6ES7 392-1BM01-0AA0**
Front door, improved version	**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 4/114
Bus connector	**6ES7 390-0AA00-0AA0**
1 unit (spare part)	
Shield connecting element	**6ES7 390-5AA00-0AA0**
80 mm wide, with 2 rows for 4 terminal elements each	

	Order No.
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**
Labelling cover	**6ES7 392-2XY00-0AA0**
10 units for signal modules (except 32-channel), function modules and CPU 312 IFM	
Labelling strips	**6ES7 392-2XX00-0AA0**
10 units for signal modules (except 32-channel), function modules and CPU 312 IFM	
S7-SmartLabel	**2XV9 450-1SL00-0YX0**
Software for machine labelling of modules directly from the STEP 7 project	
Labelling sheets for machine labelling	See page 4/123
SIMATIC Manual Collection	**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 software, SIMATIC DP (distributed I/O), SIMATIC HMI (human machine interface), SIMATIC NET (industrial communication)	
SIMATIC Manual Collection updating service for 1 year	**6ES7 998-8XC01-8YE2**
Current S7 Manual Collection CD as well as the three following updates	
S7-300 manual	
Design, CPU data, module data, instruction 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**

Overview



- Analog outputs for the SIMATIC® S7-300®
- For connecting analog actuators

Technical specifications

6ES7 332-	5HB01-0AB0 5HB81-0AB0 [1]	5HD01-0AB0	5HF00-0AB0	7ND00-0AB0
Number of outputs	2	4	8	4
Interrupts				
• Diagnostics interrupt	Yes	Yes	Yes	Yes
Diagnostics	Red LED for indicating group errors; diagnostic info can be read out	Red LED for indicating group errors; diagnostic info can be read out	Red LED for indicating group errors; diagnostic info can be read out	Red LED for indicating group errors; diagnostic info can be read out
Rated load voltage	24 V DC	24 V DC	24 V DC	24 V DC
Output ranges				
• Voltage outputs	0 to 10 V; +/- 10 V; 1 to 5 V	0 to 10 V; +/- 10 V; 1 to 5 V	0 to 10 V; +/- 10 V; 1 to 5 V	0 to 10 V; +/- 10 V; 1 to 5 V
• Current outputs	4 to 20 mA; +/- 20 mA; 0 to 20 mA	4 to 20 mA; +/- 20 mA; 0 to 20 mA	4 to 20 mA; +/- 20 mA; 0 to 20 mA	4 to 20 mA; +/- 20 mA; 0 to 20 mA
Load impedance				
• For voltage outputs, min.	1 kΩ	1 kΩ	1 kΩ	1 kΩ
• For current outputs, max.	500 Ω	500 Ω	500 Ω	500 Ω
• For capacitive load, max.	1 µF	1 µF	1 µF	1 µF
• For inductive loads, max.	10 mH	10 mH	10 mH	1 mH
Voltage output				
• Short-circuit protection	Yes	Yes	Yes	Yes
• 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
Isolation to backplane bus	Yes	Yes	Yes	Yes
Resolution	11 bit + sign (at +/- 10 V; +/- 20mA) 12 bit (at 0 to 10 V; 0 to 20 mA), 4 to 20 mA, 1 to 5 V	11 bit + sign (at +/- 10 V; +/- 20mA) 12 bit (at 0 to 10 V; 0 to 20 mA), 4 to 20 mA, 1 to 5 V	11 bit + sign (at +/- 10 V; +/- 20mA) 12 bit (at 0 to 10 V; 0 to 20 mA), 4 to 20 mA, 1 to 5 V	15 Bit + sign
Conversion time per channel, max.	0.8 ms	0.8 ms	0.8 ms	1.5 ms
Transient recovery time				
• For resistive load	0.2 ms	0.2 ms	0.2 ms	0.2 ms
• For capacitive loads	3.3 ms	3.3 ms	3.3 ms	3.3 ms
• For inductive loads	0.5 ms	0.5 ms	0.5 ms	0.5 ms
Substitute values assignable	Configurable	Configurable	Configurable	Configurable
Operating error limit (0 to 60°C, referred to the output range)				
• Voltage	+/- 0.5%	+/- 0.5%	+/- 0.5%	+/- 0.12%
• Current	+/- 0.6%	+/- 0.6%	+/- 0.6%	+/- 0.18%

1) SIMATIC Outdoor with expanded temperature range -25 to +60 °C

4

Technical specifications (continued)

6ES7 332-	5HB01-0AB0 5HB81-0AB0 [1]	5HD01-0AB0	5HF00-0AB0	7ND00-0AB0
Basic error threshold (operating error threshold at 25 °C, with reference to output range)				
• Voltage	+/- 0.4%	+/- 0.4%	+/- 0.4%	+/- 0.01%
• Current	+/- 0.5%	+/- 0.5%	+/- 0.5%	+/- 0.01%
Cable length (shielded), max.	200 m	200 m	200 m	200 m
Current consumption				
• From backplane bus, max.	60 mA	60 mA	100 mA	60 mA
• From L+, max.	240 mA	240 mA	340 mA	240 mA
Power loss typ.	3 W	3 W	6 W	3 W
Isolation tested at	500 V DC	500 V DC	500 V DC	500 V DC
Dimensions (W x H x D) in mm	40 x 125 x 120	40 x 125 x 120	40 x 125 x 120	40 x 125 x 120
Required front connector	20-pin	20-pin	40-pin	20-pin
Weight, approx.	220 g	220 g	272 g	220 g

1) SIMATIC Outdoor with expanded temperature range -25 to +60 °C

Ordering data

	Order No.
SM 332 analog output modules	
incl. labelling strips, bus connector	
4 outputs	**6ES7 332-5HD01-0AB0**
4 outputs, 15 bit	**6ES7 332-7ND00-0AB0**
2 outputs	**6ES7 332-5HB01-0AB0**
2 outputs, extended temperature range	**6ES7 332-5HB81-0AB0**
8 outputs	**6ES7 332-5HF00-0AB0**
Front connector	See page 4/48
Front door, improved version	**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 4/114
Bus connector	**6ES7 390-0AA00-0AA0**
1 unit (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**
Labelling cover	**6ES7 392-2XY00-0AA0**
10 units for signal modules (except 32-channel), function modules and CPU 312 IFM	

	Order No.
Labelling strips	**6ES7 392-2XX00-0AA0**
10 units for signal modules (except 32-channel), function modules and CPU 312 IFM	
S7-SmartLabel	**2XV9 450-1SL00-0YX0**
Software for machine labelling of modules directly from the STEP 7 project	
Labelling sheets for machine labelling	See page 4/123
SIMATIC Manual Collection	**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 software, SIMATIC DP (distributed I/O), SIMATIC HMI (human machine interface), SIMATIC NET (industrial communication)	
SIMATIC Manual Collection updating service for 1 year	**6ES7 998-8XC01-8YE2**
Current S7 Manual Collection CD as well as the three following updates	
S7-300 manual	
Design, CPU data, module data, instruction 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**

Overview



- Analog I/O for the SIMATIC® S7-300®
- For connection of analog sensors and actuators

Technical specifications

6ES7 334-	0CE01-0AA0	0KE00-0AB0 0KE80-0AB0 1)
Inputs	**4**	**4**
• For voltage measurement	4	2
• For resistance measurement	-	4
Interrupts		
• Limit value interrupt	-	-
• Diagnostics interrupt	-	-
Diagnostics	-	-
Rated load voltage L+	24 V DC	24 V DC
Input ranges / input resistance	0 to 10 V/ 100 kΩ; 0 to 20 mA/ 50 Ω	0 to 10 V/ 100 kΩ; resistance 10 kΩ; Pt 100 (climatic range only)
Permissible input range for voltage input, max.	20 V	-
Permissible input current for current input, max.	20 mA	-
Connection of signal sensors		
• For current measurement		
- as 2-wire transmitter	-	-
- as 4-wire transmitter	Yes	-
• For impedance measurement		
- with 2-line compensation	-	Yes
- with 3-line compensation	-	Yes
- with 4-line compensation	-	Yes
Isolation to backplane bus	No	Yes
Conversion time/ resolution per channel		
• Integration time (all channels)		85 ms
• Resolution	8 bit	12 bit

SM 334-	0CE01-0AA0	0KE00-0AB0 0KE80-0AB0 1)
Operational limit (in the entire temperature range, referred to input range)		
• Voltage	+/- 0.9%	+/- 0.7%
• Current	+/- 0.8%	-
• 10 kΩ	-	+/- 3.5%
• Pt 100	-	+/- 1.0%
Basic error (operational error at 25 °C, referred to output range)		
• Voltage	+/- 0.7%	+/- 0.5%
• Current	+/- 0.6%	-
• 10 kΩ	-	+/- 2.8%
• Pt 100	-	+/- 0.8%
Outputs	**2**	**2**
Interrupts		
• Diagnostics interrupt	-	-
Diagnostics	-	-
Output ranges		
• Current output	0 to 10 V	0 to 10 V
• Current outputs	0 to 20 mA	-
Load resistor		
• For voltage outputs, min.	5 kΩ	2.5 kΩ
• For current outputs, max.	300 Ω	-
• For capacitive load, max.	1 µF	1 µF
• For inductive loads, max.	1 mH	-
Voltage output		
• Short-circuit protection	Yes	Yes
• Short-circuit current, max.	11 mA	10 mA
Current output		
• Open-circuit voltage, max.	15 V	-
Isolation to backplane bus	No	Yes
Resolution	8 bit	12 bit

1) SIMATIC Outdoor with expanded temperature range -25 to +60 °C

4

Technical specifications (continued)

6ES7 334-	0CE01-0AA0	0KE00-0AB0 0KE80-0AB0 [1]
Scan time (all channels/AI + AO)	5 ms	85 ms
Transient recovery time		
• For resistive load, max.	0.3 m	0.8 ms
• For capacitive load, max.	3 ms	0.8 ms
• For inductive load, max.	0.3 ms	-
Substitute values assignable	-	-
Operational limits (referred to output range)		
• Voltage	+/- 0.6%	+/- 1.0%
• Current	+/- 1.0%	-
Basic error (operational error at 25 °C, referred to output range)		
• Voltage	+/- 0.4%	+/- 0.85%
• Current	+/- 0.8%	-

6ES7 334-	0CE01-0AA0	0KE00-0AB0 0KE80-0AB0 [1]
General		
Cable length (shielded), max.	200 m	100 m
Current consumption		
• From backplane bus, max.	55 mA	60 mA
• From L+	110 mA	80 mA
Isolation		500 V DC
Power losses, typically	2.6 W	2 W
Dimensions (W x H x D) in mm	40 x 125 x 120	40 x 125 x 120
Required front connector	20-pin	20-pin
Weight	285 g	200 g

Ordering data

	Order No.
SM 334 analog input/output modules	
incl. labelling strips, bus connector	
4 inputs, 2 outputs	**6ES7 334-0CE01-0AA0**
4 inputs, 2 outputs; resistance measurement, Pt 100	**6ES7 334-0KE00-0AB0**
4 inputs, 2 outputs; resistance measurement, Pt 100; extended temperature range	**6ES7 334-0KE80-0AB0**
Front connector	
1 unit	
20-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AJ00-0AA0**
• 100 units	**6ES7 392-1AJ00-1AB0**
20-pin, with spring-loaded terminals	**6ES7 392-1BJ00-0AA0**
Front door, improved version	**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 4/114
Bus connector	**6ES7 390-0AA00-0AA0**
1 unit (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**

	Order No.
Labelling cover	**6ES7 392-2XY00-0AA0**
10 units for signal modules (except 32-channel), function modules and CPU 312 IFM	
Labelling strips	**6ES7 392-2XX00-0AA0**
10 units for signal modules (except 32-channel), function modules and CPU 312 IFM	
S7-SmartLabel	See page 4/50
Labelling sheets for machine labelling	See page 4/123
SIMATIC Manual Collection	**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 software, SIMATIC DP (distributed I/O), SIMATIC HMI (human machine interface), SIMATIC NET (industrial communication)	
SIMATIC Manual Collection updating service for 1 year	**6ES7 998-8XC01-8YE2**
Current S7 Manual Collection CD as well as the three following updates	
S7-300 manual	
Design, CPU data, module data, instruction 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**

Highlights



- 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 operating modes:

- **Comparator:** In this mode the SM 335 compares a set-point 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)

Further information can be found in the SM 335 Handbook (free download through Internet under:
http://www.siemens.com/automation/mc/html_00/products/index.htm

4

Technical specifications

Module-specific data	
Number of channels	4
Number of outputs	4
Cable length, shielded	200 m
With wire-break monitoring in range 0 V to 10 V	30 m
Voltages, currents, potentials	
Rated load voltage	24 V DC
Polarity reversal protection	Yes
Electrical 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 µs
• Basic conversion time for 4 channels, max.	1 ms
Resolution	
• Bipolar	13 bit + sign
• 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	± 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)	± 0.1 % (with 14-bit resolution)
Linearity error (referred to input range)	± 0.015 %
Repeatability (under steady-state conditions, at 25 °C, referred to input range)	± 0.05 %
Encoder selection data	
Input range (rated values)/input resistance	
• Voltage	± 1 V; ± 10 V; ± 2,5 V; 0 V to 2 V; 0 V to 10 V: 10 MΩ
• Current	± 10 mA; 0 mA to 20 mA; 4 mA to 20 mA: 100 Ω
Permissible input voltage for voltage input (destruction limit)	± 30 V

SM 335 fast analog I/O module

Technical specifications (continued)

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
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 bit + sign
• From 0 V to 10 V	12 bit
Conversion time per channel, max.	800 µs
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)	± 0.05 %
Repeatability (under steady-state conditions, at 25 °C, referred to output range)	± 0.05 %
Output ripple (referred to output range)	± 0.05 %
Actuator selection data	
Input ranges (rated values)	± 10 V and 0 V to 10 V (switchover)
Load impedance	
• For voltage outputs, min.	3 kΩ
• For capacitive load, max.	1 µF
• 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**
English	**6ES7 335-7HG00-8BA1**

	Order No.
Front connector	
20-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AJ00-0AA0**
• 100 units	**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**

SM 326 F digital input - Safety Integrated

Overview



- Digital inputs for the SIMATIC S7-400F/FH and SIMATIC S7-300F
- For connecting:
  - Switches and two-wire proximity switches (BEROs)
  - NAMUR-compliant encoders and wired mechanical contacts even for signals from the area with danger of explosion
- With integrated safety functions for fail-safe operation
- Suitable for use only in the ET 200M distributed I/O or in S7-300F modules
- Suitable for use in standard operation in the same way as S7-300® module

Technical specifications

6ES7 326-	1RF00-0AB0	1BK00-0AB0
Number of inputs	8 (single-channel) 4 (two-channel)	24
Interrupts	Diagnostic interrupt	Diagnostic interrupt
Diagnostics	Group error display, fail-safe operation indication; Diagnostic information selectable	Group error display, fail-safe operation indication; Diagnostic information selectable
Maximum achievable safety class during safety operation		
• According to IEC 61508	SIL 2 (single-chanel) SIL 3 (two-channel)	SIL 3
• According to DIN VDE 0801	AK 4 (single-channel) AK 5 and 6 (two-channel)	AK 6
• According to EN 954	Cat. 3 (single-chanel) Cat. 4 (two-channel)	Cat. 4
Type of protection	II(2)G [EEx ib] IIC acc. to EN 50020	-
Test number KEMA	99 ATEX 2671 X	-
Nominal supply voltage of electronics and sensors 1L+/2L+	24 V DC	24 V DC
Input voltage	Acc. to DIN 19234 or NAMUR	
• Rated value		24 V DC
• At "1" signal		11 to 30 V
• Or signal "0"		-30 to +5 V
• Frequency		-
Electrical isolation		
• To backplane bus		Yes
- in groups of		12
- input current for "1" signal, typ.		10 mA
• Between channels and backplane bus	Yes	Yes
• Between channels and Spannungsversorgung der Elektronik	Yes	
• Between channels	Yes	75 V DC, 60 V AC
Input current		
• At "1" signal, min.	2.1 mA to 7 mA	10 mA
• At "0" signal , max..	0.35 to 1.2 mA	2 mA

6ES7 326-	1RF00-0AB0	1BK00-0AB0
Input delay		
• For "0" to "1", typ.	1.2 to 3 ms	3 ms
• For "1" to "0", typ.	1.2 to 3 ms	3 ms
No. of simultaneously controllable inputs		
• Horizontal arrangement		
- up to 40 °C		24
- up to 60 °C	8	24 (at 24 V) 18 (at 28.8 V)
• Vertical arrangement		
- up to 40 °C	9	24
Connection type of the sensors	Two-wire connection	
Highest values of input circuits (per channel)	(per circuit)	(per circuit)
• U0, max.	10.0 V	-
• I0, max.	13.9 mA	-
• P0, max.	33.1 mW	-
• Permissible external inductance L0, max.	80 mH	-
• Permissible external capacitance C0, max.	3 µF	-
• Fault voltage Um, max.	60 V DC 30 V AC	-
• Permissible ambient temperature Ta, max.	60 °C	60 °C
Connection of 2-wire BERO		Possible
• Permissible quiescent current, max.		2 mA
Encoder supply	8.2 V DC	400 mA
• Number of outputs	8	4, isolated
Cable length		
• Unshielded	200 m	100 m
• Shielded	100 m	200 m
Current consumption		
• From backplane bus, typ.	Max. 90 mA	90 mA
• From 1L+, 2L+ (no load), typ.	Max. 160 mA	350 mA
Power losses, typ.	4.5 W	9.0 W

SM 326 F digital input - Safety Integrated

Technical specifications (continued)

6ES7 326-	1RF00-0AB0	1BK00-0AB0
Isolation tested at		75 V DC
• Channels to backplane bus and load voltage L+	1500 V AC	-
• Load voltage L+ against backplane bus	500 V DC or 350 V AC	-
• Channels horizontally	1500 V AC	-

6ES7 326-	1RF00-0AB0	1BK00-0AB0
Dimensions (W x H x D) in mm	80 X 125 x 120	80 x 125 x 120
Required front connector	40-pin	40-pin
Weight	482 g	442 g

Ordering data

	Order No.
SM 326 fail-safe digital input modules	
24 inputs, 24 V DC	**6ES7 326-1BK00-0AB0**
8 inputs, 24 V DC, NAMUR	**6ES7 326-1RF00-0AB0**
Labelling sheet with strips for 10 electronics blocks for	
• 16-channel electronics blocks incl. supplementary terminals	**6ES7 193-1BH00-0XA0**
• 32-channel electronics blocks incl. supplementary terminals	**6ES7 193-1BL00-0XA0**
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**
Bus connector for PROFIBUS	
• 90° outgoing feeder cable, terminating resistor with isolating function, without PG socket, up to 12 Mbit/s	**6ES7 972-0BA12-0XA0**
• Slanting outgoing feeder cable, barrel contacts, without bus terminating resistor, without PG socket, up to 1.5 Mbit/s	**6ES7 972-0BA30-0XA0**
• 90° outgoing feeder cable, terminating resistor with isolating function, with PG socket, up to 12 Mbit/s	**6ES7 972-0BB12-0XA0**
DIN rail for active bus modules for max. 5 active bus modules for hot swapping function	
• 483 mm long	**6ES7 195-1GA00-0XA0**
• 530 mm long	**6ES7 195-1GF30-0XA0**
• 620 mm long	**6ES7 195-1GG30-0XA0**
• 2000 mm long	**6ES7 195-1GC00-0XA0**
Active bus module BM 1 x 80 for one 80-mm wide module	**6ES7 195-7HC00-0XA0**
SITOP power supply module for ET 200M 120/230 V AC, 24 V DC, 5 A Type PS 307-1E	**6ES7 307-1EA00-0AA0**
Front connector 40-pin, with screw-type terminals	
• 1 unit ▶	**6ES7 392-1AM00-0AA0**
• 100 units ▶	**6ES7 392-1AM00-1AB0**

	Order No.
Labelling strips for fail-safe modules (spare part) 10 units	**6ES7 392-2XX20-0AA0**
Labelling cover for fail-safe modules (spare part) 10 units	**6ES7 392-2XY20-0AA0**
LK 393 cable duct for fail-safe modules; L+ and M connections 5 units	**6ES7 393-4AA10-0AA0**
S7-300 manual Design, CPU data, module data, instruction 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**
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**
Manual S7-400F/FH programmable controller Paper version	
German	**6ES7 988-8FA10-8AA0**
English	**6ES7 988-8FA10-8BA0**
SIMATIC Manual Collection 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**
SIMATIC Manual Collection updating service for 1 year Current S7 Manual Collection CD as well as the three following updates	**6ES7 998-8XC01-8YE2**

Overview



- Digital outputs for the SIMATIC S7-400F/FH or SIMATIC S7-400F/FH
- For connection of solenoid valves, DC contactors and indicator lights
- With integrated safety functions for fail-safe operation
- Suitable for use in S7-300 F modules or in the ET 200M distributed I/O
- Suitable for use in standard operation in the same way as S7-300 modules

Technical specifications

Number of outputs	**10**
Interrupts	Diagnostic interrupt
Diagnostics	Group error display, fail-safe operation indication; diagnostic information selectable
Maximum achievable safety class during safety operation	
• According to IEC 61508	SIL 3
• According to DIN VDE 0801	AK 5 and 6
• According to EN 954	Cat. 4
Load voltage 1L+, 2L+, 3L+	24 V DC
Output voltage	
• At "1" signal	
- without series diode, min.	L+ -1.0 V
- with series diode, min.	L+ -1.8 V
Electrical isolation	
• Between channels and backplane bus	Yes
• Between channels and power supply of the electronics	Yes
• Between channels	Yes
• In groups of	5
Output current	
• At "1" signal	
- rated value	2 A
- permissible range up to 40°C, horizontal arrangement	7 mA to 2 A
- permissible range up to 40°C, vertical arrangement	7 mA to 1 A
- permissible range to 60 °C, horizontal arrangement	7 mA to 1 A
• At "0" signal, max.	0.5 mA
Total current of the outputs (per group)	
• Horizontal arrangement	
- up to 40°C, max.	7.5 A (without series diode) 5 A (with series diode)
- up to 60 °C	5 A (without series diode) 4 A (with series diode)

Total current of the outputs (per group)	
• Vertical arrangement	
- Up to 40 °C	5 A (without series diodes) 4 A (with series diodes)
Lamp load, max.	5 W
Switching frequency of outputs	
• For resistive load, max.	100 Hz
• For inductive load, max.	0.5 Hz
• For lamp load, max.	100 Hz
• Mechanical, max.	-
Switching capacity of contacts	
• For resistive load, max.	30 Hz
• For inductive load, max.	2 Hz
• For lamp load, max.	10 Hz
Limitation of voltage induced on circuit interruption to typically.	L+ - 53 V (without series diodes) L+ - 33 V (with series diodes)
Short-circuit protection	Electronic
Cable length	
• Unshielded, max.	600 m
• Shielded, max.	1000 m
• At SIL 3, AK 5 and 6, Cat. 4, max.	200 m
Current consumption	
• From backplane bus, max.	100 mA
• From 1L+, max.	70 mA
• From 2L+, 3L+, max. (no load)	100 mA
Power losses, typ.	12 W
Isolation tested at	75 V DC
Dimensions (W x H x D) in mm	80 x 125 x 120
Front connector required	40-pin
Weight, approx.	465 g

SM 326 F digital output - Safety Integrated

Ordering data	Order No.
SM 326 fail-safe digital output module	
10 inputs, 24 V DC, 2 A	**6ES7 326-2BF00-0AB0**
Labelling sheet with strips for 10 electronics blocks for	
• 16-channel electronics blocks incl. supplementary terminals	**6ES7 193-1BH00-0XA0**
• 32-channel electronics blocks incl. supplementary terminals	**6ES7 193-1BL00-0XA0**
Connecting cable for PROFIBUS	**6ES7 901-4BD00-0XA0**
12 Mbit/s, for PG connection to PROFIBUS DP, preassembled with 2x9-pin Sub-D plug, 3 m long	
Bus connector for PROFIBUS	
• 90° outgoing feeder cable, terminating resistor with isolating function, without PG socket, up to 12 Mbit/s	**6ES7 972-0BA12-0XA0**
• Slanting outgoing feeder cable, barrel contacts, without bus terminating resistor, without PG socket, up to 1.5 Mbit/s	**6ES7 972-0BA30-0XA0**
• 90° outgoing feeder cable, terminating resistor with isolating function, with PG socket, up to 12 Mbit/s	**6ES7 972-0BB12-0XA0**
DIN rail for active bus modules	
for max. 5 active bus modules for hot swapping function	
• 483 mm long	**6ES7 195-1GA00-0XA0**
• 530 mm long	**6ES7 195-1GF30-0XA0**
• 620 mm long	**6ES7 195-1GG30-0XA0**
• 2000 mm long	**6ES7 195-1GC00-0XA0**
Active bus module	**6ES7 195-7HC00-0XA0**
BM 1 x 80 for one 80-mm wide module	
SITOP power supply module	**6ES7 307-1EA00-0AA0**
for ET 200M 120/230 V AC, 24 V DC, 5 A Type PS 307-1E	
Front connector	
40-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AM00-0AA0**
• 100 units	**6ES7 392-1AM00-1AB0**

	Order No.
Labelling strips	**6ES7 392-2XX20-0AA0**
for fail-safe modules (spare part) 10 units	
Labelling cover	**6ES7 392-2XY20-0AA0**
for fail-safe modules (spare part) 10 units	
LK 393 cable duct	**6ES7 393-4AA10-0AA0**
for fail-safe modules; L+ and M connections 5 units	
S7-300 manual	
Design, CPU data, module data, instruction 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**
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**
Manual S7-400F/FH programmable controller	
Paper version	
German	**6ES7 988-8FA10-8AA0**
English	**6ES7 988-8FA10-8BA0**
SIMATIC Manual Collection	**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 software, SIMATIC DP (distributed I/O), SIMATIC HMI (human machine interface), SIMATIC NET (industrial communication)	
SIMATIC Manual Collection updating service for 1 year	**6ES7 998-8XC01-8YE2**
Current S7 Manual Collection CD as well as the three following updates	

Overview



- Analog input modules for the SIMATIC® S7-400®F/FH or SIMATIC S7-400F/FH
- For connection of analog sensors with voltage and current signals
- With integrated safety functions for fail-safe operation
- Suitable for use in S7-300F module or in the ET 200M distributed I/O
- Suitable for use in standard operation in the same way as S7-300® modules

Technical specifications

Number of inputs	6
• For voltage measurement, max.	4
Interrupts	
• Diagnostic interrupt	Programmable
Diagnostics	Green LED for indicating fail-safe operation, green LED for monitoring sensor power supply, red LED for group error display; diagnostic information selectable
Maximum achievable safety class during safety operation	
• According to IEC 61508	Max. SIL 3
• According to IEC 19250	Max. AK 6
• According to EN 954-1	Max. Kat. 4
Rated load voltage L+	24 V DC
• Polarity reversal protection	Yes
Input impedance/ input ranges in standard operation	
• Voltage	0 to 10 V/59 kΩ
• Current	0 to 20 mA/107 Ω 4 to 20 mA/107 Ω
Input impedance/ input ranges in safety operation	
• Current	4 to 20 mA/107 Ω
Permissible input voltage for voltage input, max.	30 V
Permissible input current for current input, max.	40 mA
Connection of signal sensors	
• For current measurement	
- as 2-wire transmitter	Yes
- as 4-wire transducer	Yes

Electrical isolation	
• Between channels and backplane bus	Yes
• Between channels and power supply of the electronics	Yes (only with external supply of sensors)
• Between channels	No
Conversion time[1]/resolution (per channel)	
• Integration time	20 ms (at 50 Hz) 16.66 ms (at 60 Hz)
• Resolution	13 bit + sign
• Noise suppression, min.	38 dB
Operational limit (in the entire temperature range, referred to input range), max.	
• Current input	±0.45%
• Voltage input	±0.45%
Basic error (operational limits at 25 °C, referred to input range), max.	
• Current input	±0.35%
• Voltage input	±0.35%
Cable length (shielded), max.	200 m
Current consumption	
• From backplane bus, max.	90 mA
• From L+, typ.	160 mA
Power losses, typ.	4.25 W
Isolation tested at	600 V DC
Dimensions (W x H x D) in mm	80 x 125 x 120
Required front connector	40-pin
Weight	480 g

1)Other details have to be heeded to calculate the scan time. These can be found in the manual "Configuring a "S7-300® ".

SM 336 F analog input - Safety Integrated

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Ordering data	Order No.
SM 326 fail-safe analog input module	
6 inputs, 14 bit	**6ES7 336-1HE00-0AB0**
Labelling sheet with strips for 10 electronics blocks for	
• 16-channel electronics blocks incl. supplementary terminals	**6ES7 193-1BH00-0XA0**
• 32-channel electronics blocks incl. supplementary terminals	**6ES7 193-1BL00-0XA0**
Connecting cable for PROFIBUS	**6ES7 901-4BD00-0XA0**
12 Mbit/s, for PG connection to PROFIBUS DP, preassembled with 2x9-pin Sub-D plug, 3 m long	
Bus connector for PROFIBUS	
• 90° outgoing feeder cable, terminating resistor with isolating function, without PG socket, up to 12 Mbit/s	**6ES7 972-0BA12-0XA0**
• Slanting outgoing feeder cable, barrel contacts, without bus terminating resistor, without PG socket, up to 1.5 Mbit/s	**6ES7 972-0BA30-0XA0**
• 90° outgoing feeder cable, terminating resistor with isolating function, with PG socket, up to 12 Mbit/s	**6ES7 972-0BB12-0XA0**
DIN rail for active bus modules	
for max. 5 active bus modules for hot swapping function	
• 483 mm long	**6ES7 195-1GA00-0XA0**
• 530 mm long	**6ES7 195-1GF30-0XA0**
• 620 mm long	**6ES7 195-1GG30-0XA0**
• 2000 mm long	**6ES7 195-1GC00-0XA0**
Active bus module	**6ES7 195-7HC00-0XA0**
BM 1 x 80 for one 80-mm wide module	
SITOP power supply module	**6ES7 307-1EA00-0AA0**
for ET 200M 120/230 V AC, 24 V DC, 5 A Type PS 307-1E	
Front connector	
40-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AM00-0AA0**
• 100 units	**6ES7 392-1AM00-1AB0**

	Order No.
Labelling strips	**6ES7 392-2XX20-0AA0**
for fail-safe modules (spare part) 10 units	
Labelling cover	**6ES7 392-2XY20-0AA0**
for fail-safe modules (spare part) 10 units	
LK 393 cable duct	**6ES7 393-4AA10-0AA0**
for fail-safe modules; L+ and M connections 5 units	
S7-300 manual	
Design, CPU data, module data, instruction 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**
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**
Manual S7-400F/FH programmable controller	
Paper version	
German	**6ES7 988-8FA10-8AA0**
English	**6ES7 988-8FA10-8BA0**
SIMATIC Manual Collection	**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 software, SIMATIC DP (distributed I/O), SIMATIC HMI (human machine interface), SIMATIC NET (industrial communication)	
SIMATIC Manual Collection updating service for 1 year	**6ES7 998-8XC01-8YE2**
Current S7 Manual Collection CD as well as the three following updates	

Overview



- Digital 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 installation of non-intrinsically safe circuits of the automation system and the intrinsically-safe circuits from the process

Technical specifications

Ex digital input	6ES7 321-7RD00-0AB0
Number of inputs	4 (NAMUR)
Electrical isolation	Yes
in groups of	1
Load voltage	24 V DC
Input voltage	
• Rated value	8.2 V DC (from internal circuit supply)
Input current	
• At signal “1”, min.	2.1 mA to 7 mA
• At signal “0”, max.	0.35 to 1.2 mA
• On short-circuit, min.	8.5 mA
• At wirebreak, max.	0.1 mA
Delay time	
• At “0” following “1”, typ.	0.1/0.5/3/15/20 ms (configurable, plus 0.25 ms conditioning time)
Input frequency, max.	2 kHz
Connection type for signal encoders	Two-wire connection
Cable length (unshielded), max.	200 m
Encoder supply	Via the inputs
Fault message ”Short-circuit”	Red LED (group error indicator), red LED per channel

Ex digital input	6ES7 321-7RD00-0AB0
Type of protection	[EEx ib] IIC
PTB no.	Ex-96.D.2094X
FMs	CL.2, DIV 2, GP A,B,C,D T4
Input circuit maximum values	(per circuits)
• U_0	10.0 V
• I_K	14.1 mA
• P	33.7 mW
• Permissible ext. inductance L_a, max.	100 mH
• Permissible ext. capacitance C_a, max.	3 µF
Ambient temperature, max.	60 °C
Current consumption	
• Internal (backplane bus), max.	80 mA
• External (load voltage), max.	50 mA
Power loss	1.1 W
Required front connector	20-pin
Weight, approx.	230 g

Ex digital I/O modules

Technical specifications

Ex digital outputs 6ES7 322-	5SD00-0AB0	5RD00-0AB0
Number of inputs	4	4
Electrical isolation	Yes	Yes
• In groups of	1	1
Supply voltage U_P (for load)		
• Rated value	24 V DC	15 V DC
Output current		
• At signal "1", max.	10 mA +/- 10%	20 mA +/- 10%
• On short-circuit, min.	10 mA + 10%	20.5 mA + 10%
Short-circuit protection	Electronic	Electronic
Fault diagnostics	Yes	Yes
Switching frequency, max.	100 Hz	100 Hz
Load	390 Ω	200 Ω
Connection type for load	Two-wire connection	Two-wire connection
Cable length (unshielded), max.	200 m	200 m
Fault message "Short-circuit" (group fault message, additionally per channel)	Red LED, CPU message	Red LED, CPU message
Type of protection	[EEx ib] IIC	[EEx ib] IIC
PTB no.	Ex-96.D.2093X	Ex-96.D.2102X

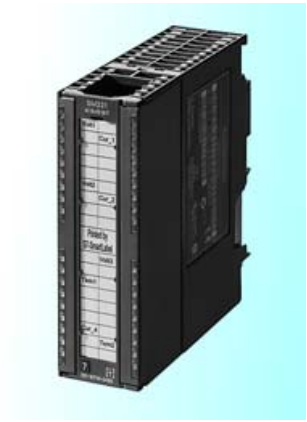
Ex digital outputs 6ES7 322-	5SD00-0AB0	5RD00-0AB0
FMs	CL I, DIV 2, GP A,B,C,D T4	AIS CL.1, DIV 1, GP A,B,C,D CL.I, DIV 2, GP A,B,C,D T4
Highest values of the output circuits	(per circuits)	
• U_0	25.2 V	15.75 V
• I_K	70 mA	85 mA
• P	440 mW	335 mW
• Permissible ext. Induktivität L_a, max.	6.7 mH	5 mH
• Permissible ext. Kapazität C_a, max.	90 nF	500 nF
Ambient temperature, max.	60 °C	60 °C
Current consumption		
• Internal (backplane bus), max.	70 mA	70 mA
• External (load voltage), max.	160 mA	160 mA
Power losses, typ.	3 W	3 W
Required front connector	20-pin	20-pin
Weight, approx.	230 g	230 g

Ordering data

	Order No.
Ex digital input module	
4 inputs, electrically isolated, NAMUR	**6ES7 321-7RD00-0AB0**
Ex digital output modules	
4 outputs, electrically isolated, 24 V DC, 10 mA	**6ES7 322-5SD00-0AB0**
4 outputs, electrically isolated, 15 V DC, 20 mA	**6ES7 322-5RD00-0AB0**
Front connector	
20-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AJ00-0AA0**
• 100 units	**6ES7 392-1AJ00-1AB0**
Front door, improved version	**6ES7 328-0AA00-7AA0**
e.g. for 32-channel modules; permits connection of 1.3 mm^2/ 16 AWG conductors	
LK 393 cable duct	**6ES7 393-4AA00-0AA0**
Mandatory requirement for Ex operation	

	Order No.
Labelling strips	**6ES7 392-2XX00-0AA0**
10 units (spare part) for signal modules (except 32-channel), function modules, CPU 312 IFM and CPU 314 IFM	
Labelling cover	**6ES7 392-2XY00-0AA0**
10 units for signal modules (except 32-channel), function modules and CPU 312 IFM	
S7-SmartLabel	**2XV9 450-1SL00-0YX0**
Software for machine labelling of modules directly from the STEP 7 project	
Labelling sheets for machine labelling	See page 4/123
SIMATIC Manual Collection	**6ES7 998-8XC01-8YE0**
SIMATIC Manual Collection updating service for 1 year	**6ES7 998-8XC01-8YE2**
Reference manual: S7-300 Ex I/O modules, ET 200M	
German	**6ES7 398-8RA00-8AA0**
English	**6ES7 398-8RA00-8BA0**

Overview



- Analog 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 installation of non-intrinsically safe circuits of the automation system and the intrinsically-safe circuits from the process

Technical specifications

Ex analog input	6ES7 331-7RD00-0AB0	6ES7 331-7SF00-0AB0
Input range	0 to 20 mA 4 to 20 mA	8 x thermocouples, 4 x RTD resistance thermometers.
Number of inputs	**4**	**8/4**
Electrical isolation	Yes	Yes
Input resistance	50 Ω	10 MΩ
Connection of signal sensors	2-wire	2-wire
	4-wire	4-core; thermocouples type T, U, E, J, L, K, N, R, S, B; resistance thermometers Pt 100, Pt 200, Ni 100
Digital representation of the input signal	10 to 15 bit + sign	10 to 15 bit + sign
Principle of measurement	SIGMA-DELTA	SIGMA-DELTA
Integration time (adjustable for optimum noise voltage suppression)	2.5 to 100 ms	2.5 to 100 ms
Permissible voltage		
• Between the inputs, max.	60 V DC	60 V DC
• Inputs to grounding point, (destruction limit), max.	60 V DC	30 V DC
Permissible input current, max. (destruction limit)	40 mA	-
Fault indication	Message, red LED	Message, red LED
Fault message at		
• Overflow	Message, red LED	Message, red LED
• Wirebreak on the signal encoder line	Message	Message
• Short-circuit of the signal encoder line	Message	Message
Noise suppression for noise frequency	10 to 400 Hz	10 to 400 Hz
• Common-mode noise, min.	130 dB	130 dB
• Series-mode noise, min. (peak value of the noise < rated value of the range)	60 dB	60 dB

Ex analog input	6ES7 331-7RD00-0AB0	6ES7 331-7SF00-0AB0
Basic error limits, bei 25 °C	+/- 0.1%	0.1%
Operating error limits	+/- 0.45%	0.09 to 0.04%; temperature error: 0.001 to 0.02%/K
Type of protection	[EEx ib] IIC	[EEx ib] IIC
PTB no.	Ex-96.D.2092X	Ex-96.D.2108X
FMs	CL.I, DIV 2, GP A,B,C,D T4	CL.I, DIV 2, GP A,B,C,D T4
Input circuit maximum values	(per circuits)	
• U_0	25.2 V	5.9 V
• I_K	68.5 mA	28.8 mA
• P	431 mW	41.4 mW
• R_i	50 Ω	
• Permissible ext. inductance L_a, max.	7.5 mH	40 mH
• Permissible ext. capacitance C_a, max.	90 nF	60 µF
Ambient temperature, max.	60 °C	60 °C
Cable length (shielded), max.	200 m	200 m, HTC:50 m
Supply voltage from module (for 2-wire transducer)		
• No-load voltage	25.2 V DC	-
• rRted value	13 V at 22 mA	-
Current consumption		
• Internal (backplane bus), max.	60 mA	120 mA
• External (24 V DC), max.	150 mA	
Power losses, typ.	3 W	0.6 W
Required front connector	20-pin	20-pin
Weight, approx.	290 g	210 g

Ex analog I/O modules

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Technical specifications

Ex analog output	6ES7 332-5RD00-0AB0
Output range (nominal value)	0/4 to 20 mA
Number of outputs	**4**
Electrical isolation	Yes
Load resistance, min.	500 MΩ
Connection of signal sensors	Two-wire connection
Digital representation of output signal	15 bit
Conversion time	2.5 ms
Short-circuit protection	Yes
Short-circuit current, e.g.	70 mA
Idle voltage, approx.	14 V
Permissible voltage	
• Between the outputs, max.	30 V AC/60 V DC
• Outputs to grounding point, max.	30 V AC/60 V DC
Basic error limits at 25 °C	± 0.2 %
Operating error limits (0° C to 60 °C)	± 0.55 %
Cable length (shielded), max.	200 m
Fault message "Short-circuit"	Group fault message, additionally per channel

Ex analog output	6ES7 332-5RD00-0AB0
Fault message at	
• Wirebreak on the actuator line	Yes
• Overflow	Yes
Type of protection	[EEx ib] IIC
PTB no.	Ex-96.D.2026X
FMs	CL.I, DIV 2, GP A,B,C,D T4
Highest values of the input circuits (per channel)	
• U_0, max.	14 V
• I_K	70 mA
• P	440 mW
• Permissible ext. inductance L_a, max.	6.6 mH
• Permissible ext. capacitance C_a, max.	850 nF
Ambient temperature, max.	60 °C
Current consumption	
• Internal (backplane bus), max.	80 mA
• External, max.	180 mA
Power losses, typ.	4 W
Required front connector	20-pin
Weight, approx.	280 g

Ordering data

	Order No.
Ex analog input modules	
4 inputs, electrically isolated, 0/4 to 20 mA, 15 bit	**6ES7 331-7RD00-0AB0**
8/4 inputs, electrically isolated, for thermocouples and Pt 100, Pt 200, Ni 100	**6ES7 331-7SF00-0AB0**
Ex analog output module	
4 outputs, electrically isolated, 0/4 to 20 mA	**6ES7 332-5RD00-0AB0**
Front connector	
20-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AJ00-0AA0**
• 100 units	**6ES7 392-1AJ00-1AB0**
Front door, improved version	**6ES7 328-0AA00-7AA0**
e.g. for 32-channel modules; permits connection of 1.3 mm²/16 AWG conductors	
LK 393 cable duct	**6ES7 393-4AA00-0AA0**
Mandatory requirement for Ex operation	

	Order No.
Labelling strips	**6ES7 392-2XX00-0AA0**
10 units (spare part) for signal modules (except 32-channel), function modules, CPU 312 IFM and CPU 314 IFM	
Labelling cover	**6ES7 392-2XY00-0AA0**
10 units for signal modules (except 32-channel), function modules and CPU 312 IFM	
S7-SmartLabel	**2XV9 450-1SL00-0YX0**
Software for machine labelling of modules directly from the STEP 7 project	
Labelling sheets for machine labelling	See page 4/123
SIMATIC Manual Collection	**6ES7 998-8XC01-8YE0**
SIMATIC Manual Collection updating service for 1 year	**6ES7 998-8XC01-8YE2**
Reference manual: S7-300 Ex I/O modules, ET 200M	
German	**6ES7 398-8RA00-8AA0**
English	**6ES7 398-8RA00-8BA0**

Overview



- One-channel intelligent counter module for simple counting tasks
- For direct connection of incremental encoders
- Comparison function with 2 specifiable 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:
We offer incremental encoders and preassembled connecting cables for counting and positioning functions under SIMODRIVE Sensors or Motion Connect 500 (see also www.siemens.de/simatic-technologie).

Technical specifications

Number of counters	1
Counting range	32 bit or +/- 31 bit
Connectable incremental encoders:	• 5-V RS422, symmetrical with two 90°-offset pulse trains; • 24 V asymmetric • 24-V direction sensor (1 pulse train, 1 direction level); • 24 V initiator
Counting frequency if selected with	
• 5-V RS422, max.	500 kHz
• 24-V encoder, max.	200 kHz
Digital inputs	1 for gate start
	1 for gate stop
	1 to set counter
Digital outputs	2
Electrical isolation	
• Between digital inputs, outputs and S7 bus	Yes (optocoupler)
• Between digital inputs, outputs and counter inputs	Yes (optocoupler)
Permissible potential difference	75 V DC, 60 V AC
Supply voltage for encoders	
• At 5.2 V, max.	5.2 V +/- 2%
• At 24 V, max.	$1L_+$ -3 V
• Output current for encoders	
• At 5.2 V, max.	300 mA
• At 24 V, max.	300 mA
Auxiliary voltage $1L_+$, load voltage 2 L_+	
• Rated value	24 V DC
• Permissible range (including ripple)	
- static	20.4 to 28.8 V
- dynamic	18.5 to 30.2 V

Auxiliary voltage $1L_+$, load voltage 2 L_+	
• Non-periodic skip	
- value	35 V
- duration	500 ms
- recovery time	50 s
• Current consumption	40 mA
5 V DC counter inputs	According to RS422
Terminating resistor, approx.	220 Ω
Differential input voltage, min.	0.5 V
24 V DC counter inputs, digital inputs	
• Low level	-28.8 to +5 V
• High level	+11 to +28.8 V
• Input current, typ.	9 mA
• Minimum pulse width/interpulse period	2.5 µs or 25 µs
Output voltage	
• At "0" signal, max.	3 V
• At "1" signal , min.	$2L_+$ - 1.5 V
Output current at "1" signal	
• Rated value	0.5 A
• Range	5 mA to 0.6 A
Switching time, max.	300 µs
Circuit interruption voltage	Limited to $2L_+$ - 39 V
Short-circuit protection	Yes (electronic, clocked)
Current consumption	
• From S7-300® bus, typ.	160 mA
Power losses, typically	4.5 W
Isolation tested at	500 V
Allocated binary addresses	16 byte
Required front connector	1 x 20-pin
Dimensions (W x H x D) in mm	40 x 125 x 120
Weight, approx.	250 g

FM 350-1 counter module

Technical specifications (continued)

Standard function block	FC CNT_CTRL (FC 0)	FC DIAG_INF (FC 1)
• Memory requirements		
• FB length in memory	522 byte	262 byte
• DB length in the memory	67 byte	67 byte
Runtimes in S7-300/C7	With CPU 314 approx. 0.85 ms	With CPU 314 approx. 2.50 ms
Runtimes in S7-400	On request	On request
Target system	S7-300 (CPU 314 and higher), SIMATIC S7-400, SIMATIC C7	S7-300 (CPU 314 and higher), SIMATIC S7-400, SIMATIC C7

Ordering data

	Order No.
FM 350-1 counter module with 1 channel, max. 500 kHz; for incremental encoders	**6ES7 350-1AH02-0AE0**
Coding connector - range card for analog inputs Spare part	**6ES7 974-0AA00-0AA0**
Front connector 20-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AJ00-0AA0**
• 100 units	**6ES7 392-1AJ00-1AB0**
20-pin, with spring-loaded terminals	**6ES7 392-1BJ00-0AA0**
Bus connector 1 unit (spare part)	**6ES7 390-0AA00-0AA0**
Labelling strips 10 units (spare part)	**6ES7 392-2XX00-0AA0**
S7-SmartLabel Software for machine labelling of modules directly from the STEP 7 project	**2XV9 450-1SL00-0YX0**
Labelling sheets for machine labelling	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**
Suitable incremental encoders 6FX2 001-2...	Refer to A&D Mall under SIMODRIVE Sensor or Motion Connect 500 (see also) www.siemens.de/simatic-technologie)

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:
We offer incremental encoders and preassembled connecting cables for counting and positioning functions under SIMODRIVE Sensors or Motion Connect 500 (see also www.siemens.de/simatic-technologie).

Technical specifications

Number of counters	8
Counting range	32 bit or +/- 31 bit
Counting frequency if selected with	
• 24 V incremental position encoder, max.	10 kHz
• 24 V direction sensing element, max.	20 kHz
• 24 V initiator, max.	20 kHz
• NAMUR sensor, max.	20 kHz
Counting inputs	**8**
Input voltage	
• At "1" signal	11 to 30.2 V
• At "0" signal	-3 to +5 V
Input current	
• At "1" signal, typ.	9 mA
• At "0" signal, max.	2 mA
Input delay, max.	50 µs
Electrical isolation	Against backplane bus and shield
Connection of 2-wire initiators	Possible
Cable length, shielded	100 m
NAMUR inputs	**8**
Level	According to DIN 19 234
Input current	
• At "1" signal, min.	2.1 mA
• At "0" signal, max.	0.5 mA
Input delay, max.	50 µs
Electrical isolation	Against backplane bus and shield
Cable length, shielded	100 m
Digital inputs	**8**
Digital inputs	1 each for gate start / gate stop
Input voltage	
• At signal "1"	11 to 30.2 V
• At "0" signal	-3 to +5 V
Input current	
• At "1" signal, typ.	9 mA
• At "0" signal, max.	2 mA
Input delay, max.	50 µs
Electrical isolation	Against backplane bus and shield
Connection of two-wire BEROs	Possible
Cable length, shielded	100 m
Digital outputs	**8**
Output voltage	
• At signal "1"	L+ - 0.8 V
Output current for sensor	
• At signal "1"	0.5 A
• At "0" signal	0.5 mA
Aggregate current for outputs	
• Horizontal installation	
- up to 40°C	4 A
- up to 60 °C	2 A
• Vertical installation	
- up to 40°C	2 A
Switching frequency of outputs	
• For resistive load, max.	500 Hz
• For inductive loads, max.	0.5 Hz
Restriction of the voltage induced on circuit interruption to, typ.	L+ - 40 V
Short-circuit protection	Yes
Electrical isolation	Against backplane bus and shield
Output delay, typ.	300 µs
Line length	
• Unshielded	100 m
• Shielded	600 m
General	
Interrupts	
• Process interrupt	Configurable
• Diagnostics interrupt	Configurable
Diagnostics	Red LED for indicating group errors; diagnostic info can be read out

FM 350-2 counter module

Technical specifications (continued)

Auxiliary supply 1L+, load voltage 2L+	
• Rated value	24 V DC
• Permitted range	20.4 to 28.8 V
NAMUR sensor supply	
• Output voltage	8.2 V ±2%
• Output current, max.	200 mA, short-circuit-proof

Current consumption	
• From S7-300® bus, approx.	100 mA
• From L+ (without load), approx.	150 mA
Power loss, approx.	10 W
Required front connector	1 x 40-pin
Dimensions (W x H x D) in mm	80 x 125 x 120
Weight, approx.	460 g

Technical specifications (continued)

Standard function blocks	FC CNT2_CTR (FC 2)	FC CNT2_WR (FC 3)	FC CNT2_RD (FC 4)	FC DIAG_RD (FC 5)
Memory requirements				
• FB length in memory	320 byte	992 byte	496 byte	278 byte
• DB length in the memory	On request	On request	On request	On request
Runtimes in S7-300®/C7	0.5 to 0.6 ms	0.3 to 3.0 ms	0.2 to 3.0 ms	2.0 to 2.7 ms
Runtimes in S7-400®	On request	On request	On request	On request
Target system	SIMATIC® S7-300® (CPU 314 upwards), SIMATIC® S7-400®, SIMATIC® C7			

Ordering data

	Order No.
FM 350-2 counter module with 8 channels, max. 20 kHz; for 24-V incremental encoders and NAMUR encoders	**6ES7 350-2AH00-0AE0**
Front connector 40-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AM00-0AA0**
• 100 units	**6ES7 392-1AM00-1AB0**
40-pin, with spring-loaded terminals	**6ES7 392-1BM01-0AA0**
Bus connector 1 unit (spare part)	**6ES7 390-0AA00-0AA0**
Labelling strips 10 units (spare part)	**6ES7 392-2XX00-0AA0**
S7-SmartLabel Software for machine labelling of modules directly from the STEP 7 project	**2XV9 450-1SL00-0YX0**
Labelling sheets for machine labelling	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 350-2 manual	
German	**6ES7 350-2AH00-8AG0**
English	**6ES7 350-2AH00-8BG0**
French	**6ES7 350-2AH00-8CG0**
Italian	**6ES7 350-2AH00-8EG0**

Overview



- 8-channel intelligent counter module for universal metering and measurement tasks, as well as for simple positioning tasks (max. 4 axes).
- 8 counter inputs (optionally for 5 V or 24 V signal level)
- 8 integrated digital outputs for fast output of module reactions
  Provided that the outputs are not occupied by the set operating mode, they can be used freely as a process I/O by the user program.

Technical specifications

Voltages/Currents	
Power supply	5 V (through S7-bus)
Current consumption, typ.	150 mA
Connection	1 x 25-pin Sub-D connector 1 x 15-pin Sub-D connector
Pulse counter	
Number of inputs	8
Counting frequency, max.	10 kHz per channel
Counting modes	Up or down
Set/read counter	All channels can be set/read separately
Zero cont or counter value query	Interrupt generation for “0“ or count value
Period duration measurement	
Number of inputs	8
Internal reference frequency	Max. 100 kHz per channel, configurable for periods, e. g.:

Periods	**Meas. frequency**
100 kHz	1.6 Hz to 1 kHz
50 kHz	0.8 Hz to 500 Hz
25 kHz	0.4 Hz to 250 Hz

Time generator	
Number of inputs	8
Times	10 ms to 278 min
Simple positioning	
Number of inputs	4
Outputs per channel	2 (forward / backward)
Inputs per channel	2 (sensor track A / sensor track B)
Setpoint, max.	2^{31} inkrements
Scanning	1 x / 2 x / 4 x
Frequency, max.	2 kHz
Digital outputs	
Rated value	+ 24 V source output
Output current, max.	500 mA, short-circuit proof
Switching frequency	100 Hz resistive load 0,5 Hz inductive load 8 Hz lamp load
Cable length, shielded, max.	100 m
Digital inputs	

	24 V DC	**5 V DC**
Rated input voltage		
• At signal “1“	15 V to 30 V	2,4 V to 6 V
• At signal “0“	-3 V to 5 V	-0.6 V to 0.8 V
Rated input current, typ.	4.7 mA (at 24 V)	10 mA (at 5 V)
Cable length, shielded, max.	25 m	5 m

Miscellaneous	
UL/CSA/FM	No
Configuraton with active bus modules	Not supported
Dimensions (B x H x T)	40 mm x 125 mm x 120 mm
Weight, approx.	350 g

Ordering data

	Order No.
CM 35 counter module with 8 pulse inputs and 8 digital outputs, for universal counting and measuring tasks as well as simple positioning tasks	**6AT1 735-0AA01-0AA0**
Configuring package for CM 35, incl. manual and example program; on CD-ROM	**6AT1 735-0DA01-0YA0**

	Order No.
Sub-D connector	
15-pin, male	**6ES5 750-2AA21**
25-pin, male	**6ES5 750-2AA31**
Shield connecting element	See page 4/68
Terminal elements	See page 4/68

FM 351 positioning module

Overview



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

Note:
We offer position sensing systems and preassembled connecting cables for counting and positioning functions under SIMODRIVE Sensors or Motion Connect 500 (see also www.siemens.de/simatic-technologie).

Technical specifications

General specifications		
Supply voltage	24 V DC	
Current consumption	350 mA	
Supply current for position encoders	max. 350 mA	
Supply voltage for position encoder	5 V and 24 V	
Protection to DIN 40050	IP 20	
Permissible humidity to DIN 40040	Humidity class F	
Permissible ambient temperature		
• Storage and transport	-40 to + 70 °C	
• Operation	0 to + 60 °C	
Required front connector	1 x 20-pin	
Dimensions (W x H x D) in mm	80 x 125 x 120 mm	
Weight, approx.	550 g	
Position detection, incremental		
Accepts encoder types	**Encoders with TTL quadrature signal**	**Encoders with asymmetrical inputs**
Track signals	A; not A; B; not B	A, B
Zero mark signal	N; not N	N
Input signal	5 V differential signal (phys. RS 422)	-
• Differential input voltage	1 to 10 V	-
• Input frequency, max.	0.5 MHz	-
Input voltage	-	24 V
Input frequency, max.	-	50 kHz at 25 m cable length, 25 kHz at 100 m cable length
Cable length		
• 5-V encoder supply, max.	32 m	
• 24 V encoder supply, max.	100 m	

Synchronous-serial position detection	
Accepts encoder types	Single or multi-turn encoders with SSI (GRAY encoding)
Data signal	DATA; not DATA
Clock signal	CL; not CL
Frame length	13 or 25 bit serial
Input signal	5-V differential signal (phys. RS 422)
• Differential input voltage	1 to 10 V
Transmission rate max.	1 MHz
Encoder supply	24 V DC, max. 400 mA per channel
Cable length, max.	300 m (at max. 125 kHz)
Digital inputs	
Number of inputs	8
Functions	Reference cam, reversing cam,
	Set actual value on-the-fly,
	Start/stop positioning run
Electrical isolation	Yes
Input voltage	
• Rated value	24 V DC
• At "0" signal	-3 to +5 V
• At "1" signal	11 to 30 V
Input current for 2-wire BEROs	
At "0" signal, max.	2 mA
At "1" signal, max.	6 mA
Digital outputs	
Number of outputs	8
Functions	Rapid traverse, creep speed,clockwise, counter-clockwise
Electrical isolation	Yes
Output voltage	
• Rated value	24 V DC
• At signal "0"	Residual current max. 0.5 mA
• At signal "1"	UP - 0.8 V
Output current	5 mA to 0.6 A at UP_{max} (short-circuit proof)

Ordering data	Order No.
FM 351 positioning module	**6ES7 351-1AH01-0AE0**
for rapid traverse and creep-speed drives	
FM 351 manual	
German	**6ES7 351-1AH00-8AG0**
English	**6ES7 351-1AH00-8BG0**
French	**6ES7 351-1AH00-8CG0**
Italian	**6ES7 351-1AH00-8EG0**
703 connecting cable	
to connect FM 351, FM 352, FM 354 to:	
• Siemens incremental position encoder 6FX2 001-...	
5 m, outgoing feeder cable downwards	**6ES5 703-1BF00**
10 m, outgoing feeder cable, up	**6ES5 703-1CB01**
20 m, outgoing feeder cable, up	**6ES5 703-1CC01**
• Incremental position encoder for 5-V signals (RS 422), supply voltage 5 V, 1 end open	
5 m, outgoing feeder cable, up	**6ES5 703-2BF01**
10 m	**6ES5 703-2CB0** ■
• Incremental position encoder for 24-V signals (RS 422), supply voltage 24 V, 1 end open	
10 m	**6ES5 703-4CB0 0**
32 m	**6ES5 703-4CD20**
• Absolute SSI position encoder, supply volt. 24 V, 1 end open	
20 m	**6ES5 703-5CC0** ■
50 m	**6ES5 703-5CF0** ■
Outgoing feeder cable	
Downwards	**0**
Upwards	**1**

	Order No.
Sub-D connector	**6ES5 750-2AA21**
15-pin, male	
Front connector	
20-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AJ00-0AA0**
• 100 units	**6ES7 392-1AJ00-1AB0**
20-pin, with spring-loaded terminals	**6ES7 392-1BJ00-0AA0**
Bus connector	**6ES7 390-0AA00-0AA0**
1 unit (spare part)	
Labelling strips	**6ES7 392-2XX00-0AA0**
10 units (spare part)	
Slot number label	**6ES7 912-0AA00-0AA0**
S7-SmartLabel	**2XV9 450-1SL00-0YX0**
Software for machine labelling of modules directly from the STEP 7 project	
Labelling sheets for machine labelling	See "Accessories"
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**

FM 352 electronic cam controller

Overview



- Extremely fast electronic cam control
- Low-cost alternative to mechanical cam controllers
- 32 cam tracks, 13 on-board digital outputs for direct output of actions
- Incremental or synchro-serial position decoding

Note:
We offer position sensing systems and preassembled connecting cables for counting and positioning functions under SIMODRIVE Sensors or Motion Connect 500 (see also www.siemens.de/simatic-technologie).

Technical specifications

General specifications	
Supply voltage	24 V DC
Current consumption	
• L+ (without load)	200 mA
• From backplane bus	100 mA
Supply current for position encoders	Max. 300 mA
Supply voltage for position encoder	5 V or 24 V
Protection to DIN 40050	IP 20
Permissible humidity to DIN 40040	Humidity class F
Permissible ambient temperature	
• Storage and transport	-40 to +70 °C
• Operation	0 to +60 °C
Necessary front connectors	1 x 20-pin
Dimensions (W x H x D) in mm	80 x 125 x 120 mm
Weight, approx.	550 g

Position detection, incremental		
Accepts encoder types	**Encoders with TTL quadrature signal**	**Encoders with asymmetrical inputs**
Track signals	A; not A; B; not B	A, B
Zero mark signal	N; not N	N
Input signal	5-V differential signal (phys. RS 422)	-
• Differential input voltage	1 to 10 V	-
• Input frequency, max.	1 MHz	-
Input voltage	-	24 V
Input frequency, max.	-	50 kHz at 25 m cable length, 25 kHz at 100 m cable length
Cable length		
• 5-V encoder supply, max.	32 m	
• 24 V encoder supply, max.	100 m	

Synchronous-serial position detection	
Accepts encoder types	Single or multi-turn encoders with SSI (Gray encoding)
Data signal	DATA; not DATA
Clock signal	CL; not CL
Frame length	13 or 25 bit
Input signal	5-V differential signal (phys. RS 422)
• Differential input voltage	1 to 10 V
Transmission rate max.	1 MHz
Encoder supply	24 V, max. 300 mA
Cable length, max.	320 m (at max. 125 kHz)
Digital inputs	
Number of inputs	4
Functions	Reference point switch,
	Set actual value/measure lengths on-the-fly, brake enable, enable
	Track output no. 3
Electrical isolation	No
Input voltage	
• Rated value	24 V DC
• At "0" signal	-3 to +5 V
• At "1" signal	11 to 30 V
Input current for 2-wire BEROs	
At "0" signal, max.	2 mA
At "1" signal, max.	9 mA
Digital outputs	
Number of outputs	13
Functions	Cam track
Electrical isolation	No
Output voltage	
• Rated value	24 V DC
• For signal "0"	Residual current max. 0.5 mA
• For signal "1"	UP - 0.8 V
Output current	5 mA to 0.6 A at UP_{max} (short-circuit proof)

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

	Order No.
Labelling strips	**6ES7 392-2XX00-0AA0**
10 units (spare part)	
S7-SmartLabel	**2XV9 450-1SL00-0YX0**
Software for machine labelling of modules directly from the STEP 7 project	
Labelling sheets for machine labelling	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**

FM 352-5 High-Speed Boolean Processor

Overview



- The high-speed Boolean processor FM352-5 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 accompanying instruction set includes: bit instructions (parts instructions set for STEP 7), time generator, counter, frequency divider, frequency generator, shift register
- 12 integrated DI/8 integrated DO
- 1 channel for connecting a 24-V incremental encoder, a 5-V increment encoder (RS422) or a serial interface absolute value encoder

Micro Memory Card is required for operation of the FM 352-5

Note:
We offer position sensing systems and preassembled connecting cables for counting and positioning functions under SIMODRIVE Sensors or Motion Connect 500 (see also www.siemens.de/simatic-technologie).

Technical specifications

General specifications	
Supply voltage	24 V DC
Power consumption	
1L+ module supply	150 mA (max) 60 mA (type)
2L+ DI / DO supply	200 mA (max) 60 mA (type)
3L+ with encoders	600 mA (max) 80 mA plus encoder power supplt (type)
L3+ without encoder	200 mA (max) 60 mA (typical)
From backplane bus	100 mA (type)
Power pack for position encoder	
5 V output	250 mA max.
24 V output	400 mA max.
Output voltage protection	
5 V output	Electronic overload protection. No protection when applying normal or counter voltage.
24 V output	Overload and overheating protection during overload. Diagnostics when output reaches the temperature limit. No protection when applying normal or counter voltage
Rated load voltage L+	24 V DC
Range	20.4 to 28.8 V
Polarity reversal protection	Yes
Supply voltage for position encoder	5 V or 24 V
Protection according to DIN 40050	IP 20
Permissible ambient temperature	
Storage and transport	-40 to +70 °C
Operation	0 to +60 °C
Required front connector	1 x 40-pin
Dimensions (W x H x D)	80 x 125 x 120 mm
Shipping weight, approx.	500 g (with bus and 1L connection & without I/O connection or MMC)
Module weight, approx.	434 g (with 1L connection & without I/O connection or MMC)

Separation	
Between backplane bus and digital & sensor I/O & 1L & 2L & 3L	Yes (75 V DC, 60 V AC)
Between digital I/O & 2L and sensor I/O & 3L	Yes (75 V DC, 60 V AC)
Between 1L and 2L and 3L	Yes (75 V DC, 60 V AC)
Heat dissipation of electronics module, typ.	6.5 W
Digital inputs	
Number of inputs	8 standard and up to 12 for 24 V DC sensor inputs as digital inputs
Separation	Yes CPU, I/O and sensor units are separated
Digital input	
Rated value	24 V DC
• 0 signal	-30 to 5 V
• 1 signal	11 to 30 V
Input current	
• 0 signal	≤ 1.5 mA (current at 0 signal)
• 1 signal, typ.	3.8 mA
Input frequency	200 kHz max.
Hardware input delay	3 µs max. 1.5 µs typ.
Programmable digital filter delay	None, 5 µs, 10 µs, 15 µs, 20 µs, 50 µs, 1.5 ms
Minimum pulse width for program response	1 µs, 5 µs, 10 µs, 15 µs, 20 µs, 50 µs, 1.6 ms
Cable length, sensor	100 meters unshielded, 600 m shielded, shielded cable recommended when filtering is set in the 1.6 ms grid.
Cable length, HTL incremental encoder, Siemens, type 6FX2001-4	50 kHz, 25 m shielded, max. 25 kHz, 50 m shielded, max.
Minimum pulse width (max. SW counter frequency)	1 µs (200 kHz)
Connection of two-wire BEROs	Possible
Input characteristics	Type 1A for PLC BEROs with less than 1.5 mA cutoff current

Technicals specifications (continued)

Digital output	
Number of inputs	8
Output type	Current sinking
Output voltage	28.8 V max.
• Rated value	24 V DC
• 0 signal	28.8 V DC max.
• 1 signal	≤ 0.5 V DC max.
Output current	
• 0 signal (current at 0 signal)	≤ 1.0 mA
• 1 signal	
• Permissible range	5 mA to 0.6 A
• Rated value	0.5 A at 60°C
Leak current in switched off state	< 1 mA
Parallel outputs	Yes, 2
Loss of voltage/pt @ 500 mA	125 mW
Number of switching actuations	
• For resistive load	20 kHz at 0.5 A 100 kHz at 0.25 A
• For inductive load	2 Hz at 0.5 A with external commutator diodes 0.5 Hz at 0.5 A without external commutator diodes
• For a lamp load	≤ 10 Hz 5 Watt maximum
Output delay (resistive load)	
• ON to OFF	1.7 µs 50 mA / 1.5 µs 0.5 A
• OFF to ON	0.6 µs 50 mA / 1.0 µs 0.5 A
Output protection	
Short circuit	Yes
Threshold value for response	1.7 A to 3.5 A
Overvoltage	Yes
Thermal	Yes
Inductive limitation at kickback from inductive loads	Yes; 2M +45 V type, (40 to 55 V) Note: no protection against inductive kickback > 55 mJ
Digital input control	No
Cable length	
• Unshielded	100 m
• Shielded	600 m
Status, diagnostics	
Module malfunction	SF, red LED
MMC error	MCF, red LED
Module supply	5V DC, green LED
I/O status	IOF, red LED
Run mode	RUN, green LED
Stop mode	STOP, yellow LED
Overload on sensor power supply	5VF, red LED, 24VF, red LED
Status display, digital input module DI	I0 to I11, 12 green LEDs
Status display, digital output module DO	O0 to O7 8 green LEDs

Sensor support	
5 V differential	16-bit or 32-bit counter
24 V single-wire	16-bit or 32-bit counter
Serial interface	13-bit or 25-bit message length
Support for additional 24 V inputs	Yes, at 5 V differential or serial interface sensor inputs or if no sensor is available
Maximum counter input frequency for sensor	
• 5 V DC input	1 MHz
• 24 V DC input	200 kHz
Control at 5 V and 24 V signal	
Sensor gating	Pulse & direction, 1X, 2X, 4X
Reset source	No, HW, SW, HW and SW, HW or SW
Reset value source	Constant 0, min/max value, load value
Reset signal type	Edge, layer
Load value, source	Constant, module application
Hold source	No, HW, SW, HW and SW, HW or SW
Load value	User entry or module application
Counter range, minimum	User entry
Counter range, maximum	User entry
Main counting direction	Count forward/backward
Hardware hold source	Can be set to any input between 0 and 14
Hardware reset source	Can be set to any input between 0 and 14
Count modes	
Continuous	Yes, 16-bit or 32-bit counter
Counter range (16-bit counter):	-32768 to 32767 (user-specific within this range)
Counter range (32-bit counter):	-2,147,483,648 to 2,147,483,647 (user-specific within this range)
Periodic	Yes, 16-bit or 32-bit counter
Counter range (16-bit counter):	-32768 to 32767 (user-specific within this range)
Counter range (32-bit counter):	-2,147,483,648 to 2,147,483,647 (user-specific within this range)
Individual	Yes, 16-bit or 32-bit counter
Counter range (16-bit counter):	-32768 to 32767 (user-specific within this range)
Counter range (32-bit counter):	-2,147,483,648 to 2,147,483,647 (user-specific within this range)
Encoder signals	
Incremental 5 V encoder (RS422)	A, /A, B, /B, and N, /N
Incremental 24 V encoder	A, B and N

FM 352-5 High-Speed Boolean Processor

Technical specifications (continued)

SSI sensor	
Signal types	D, /D, CK and /CK
Master mode	Yes
Listening mode	Yes, up to two stations
Multi-turn	25-bit message frame
Maximum number of sequence steps	16.777.216 sequence step
Delay, configurable (Monoflop timer)	16, 32, 48, or 64 µs.
Shift register, length	13 bit or 25 bit
Clock rate	125 kHz, 250 kHz, 500 kHz, or 1 MHz
Cable length, RS-422 (5 V) incremental sensor, Siemens type 6FX201-2, 5 V supply	500 kHz, 32 meters, shielded, max.
Cable length, RS-422 (5 V) incremental sensor, Siemens type 6FX201-2, 24 V supply	500 kHz, 100 meters, shielded, max.
Cable length, RS-422 serial interface absolute sensor Siemens type 6FX201-5, 24 V supply	125 kHz, 320 meters shielded, max. 250 kHz, 160 meters shielded, max. 500 kHz, 60 meters shielded, max. 1 MHz, 20 meters shielded, max.
Data shifting direction (normalizing)	Left or right
Data shifting distance (normalizing)	0 to 12 bit
5 V level for input logic	Via RS-422
5 V input voltage	330Ω DC / 116Ω AC

Interrupts	
Diagnostics	1L, 2L, 3L missing; MMC error; output overload (8); sensor supply overload; differential wire break; parameter assignment error; serial interface message frame overflow.
Process	8 available; for generation by user program
Program technical specifications	
Program cycle time (scan)	1 µs
Update rate PLC interface	5 ms (2.6 ms typ.)
Input to output response time	
5 V input to 24 V output, 0 filter	1 to 4 µs (typ.)
24 V input to 24 V output, 0 filter	2 to 6 µs (typ.)
Control signal buffer size	**Partitioned, maximum**
FLIP FLOPS, etc.	
RSFF	1
SRFF	1
NEG	2
POS	2
BISCALE	2
CP_GEN	29
MOVE	17
MOVE_U	0

COUNTERS	
CTD16	36
CTU16	31
CTUD16	47
CTUD32	99
TIMERS	
TOF16	26
TOF32	55
TON16	25
TON32	53
TP16	26
TP32	54
SHIFT REGISTERS	
SHIFT	18
SHIFT2	18
SHIFT4	18
SHIFT8	19
COMPARATORS	
CMP16_EQ	6
CMP16_GE	17
CMP16_GT	8
CMP16_LE	17
CMP16_LT	8
CMP16_NE	6
CMP32_EQ	11
CMP32_GE	33
CMP32_GT	25
CMP32_LE	33
CMP32_LT	25
CMP32_NE	11
TYPE GENERATION	
I_DI	9
I_DI_U	0
LOGICAL OPS	
AND	1
OR	1
XOR	1
SENSOR TYPES	
Serial interface Master - 13-bit	64
Serial interface Master - 25-bit	117
Serial interface Listener - 16-bit	61
Serial interface Listener - 32-bit	100
None	77
Serial interface Master - 13-bit	122
Serial interface Master - 25-bit	0
Memory card	**Required for operation**
Size	128 KB, at least
Type	MMC (Micro Memory Card)
Order No.	6ES7 953-8Lx00-0AA0

Ordering data	Order No.
FM 352-5 high-speed Boolean processor	**6ES7 352-5AH00-0AE0**
Configuring software for FM 352-5 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**

	Order No.
Micro memory card	
128 KB	**6ES7 953-8LG00-0AA0**
512 KB	**6ES7 953-8LJ00-0AA0**
2 MB	**6ES7 953-8LL00-0AA0**
Front connector	
40-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AM00-0AA0**
• 100 units	**6ES7 392-1AM00-1AB0**
40-pin, with spring-loaded terminals	**6ES7 392-1BM01-0AA0**

FM 353 positioning module

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

Technical specifications

General specifications	
Supply voltage	24 V DC
Current consumption	300 mA
Protection to DIN 40050	IP 20
Permissible humidity to DIN 40040	Humidity class F
Permissible ambient temperature	
• Storage and transport	-40 to +70 °C
• Operation	0 to +55 °C
Required front connector	1 x 20-pin
Dimensions (W x H x D) in mm	80 x 125 x 118 mm
Weight, approx.	500 g
Drive interface	
Signal input	
Function	"Power section Ready"
Signal outputs	
Output signals	5 V difference signal (phys. RS 422) for: • Direction • Enable • Cycle • Power regulation
Differential output voltage, min.	2 V (R_L = 100 Ω)
• "0" signal, max.	1 V (I_0 = 20 mA)
• "1" signal, min.	3.7 V (I_0 = -20 mA)
Cable length	35 m

Digital inputs	
Number of inputs	4
Functions	• Reference cam • Set actual value on-the-fly • Measure on-the-fly • Start/stop positioning run • External block change
Electrical isolation	No
Input voltage	
• Rated value	24 V DC
• "0" signal, max.	-3 to +5 V
• "1" signal, min.	11 to 30 V
Input current, min.	
• "0" signal, max.	2 mA
• "1" signal, min.	6 to 15 mA
Digital outputs	
Number of inputs	4
Functions	• Position reached: stop • Axis traveling forward • Axis traveling in reverse • Change M function M97 • Change M function M98 • Enable start • Direct output using data record
Electrical isolation	No
Output voltage	
• Rated value	24 V DC
• "0" signal, max.	Residual current max. 2 mA
• "1" signal, min.	UP – 3 V
Output current	0.6 A at $UP_{max.}$ (short-circuit proof)

Ordering data	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) • Screen-based configuration software for FM 353 • Standard HMI forms for OP7/OP17	**6ES7 353-1AH01-0AE0**
FM 353 manual	
German	**6ES7 353-1AH01-8AG0**
English	**6ES7 353-1AH01-8BG0**
French	**6ES7 353-1AH01-8CG0**
Italian	**6ES7 353-1AH01-8EG0**
Edit FM Program editor for editing, loading and saving NC programs using standard programming device/PC; German/English, on CD-ROM	**6FC5 263-0AA03-0AB0**
Connecting cable to stepper motor power section	
1 m	**6FX8002-3AC02-1AB0**
2 m	**6FX8002-3AC02-1AC0**
3 m	**6FX8002-3AC02-1AF0**
Connecting cables and encoders	See Catalog NC 60, NC Z, CA 01 or in the A&D Mall
Sub-D connector 15-pin, female	**6ES5 750-2AB21**

	Order No.
Front connector 20-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AJ00-0AA0**
• 100 units	**6ES7 392-1AJ00-1AB0**
20-pin, with spring-loaded terminals	**6ES7 392-1BJ00-0AA0**
Bus connector 1 unit (spare part)	**6ES7 390-0AA00-0AA0**
Labelling strips 10 units (spare part)	**6ES7 392-2XX00-0AA0**
S7-SmartLabel Software for machine labelling of modules directly from the STEP 7 project	**2XV9 450-1SL00-0YX0**
Labelling sheets for machine labelling	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	**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 354 positioning module

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:
We offer position sensing systems and preassembled connecting cables for counting and positioning functions under SIMODRIVE Sensors or Motion Connect 500 (see also www.siemens.de/simatic-technologie).

Technical specifications

General specifications	
Supply voltage	24 V DC
Current consumption	350 mA
Supply current for position encoders	Max. 300 mA
Supply voltage for position encoder	5 V or 24 V
Protection to DIN 40050	IP 20
Permissible humidity to DIN 40040	Humidity class F
Permissible ambient temperature	
• Storage and transport	-40 to +70 °C
• Operation	0 to +55 °C
Required front connector	1 x 20-pin
Dimensions (W x H x D) in mm	80 x 125 x 118 mm
Weight, approx.	550 g
Position detection, incremental	
Accepts encoder types	Encoders with TTL quadrature signal
Track signals	A, not A; B, not B
Zero mark signal	N, not N
Input signal	5 V difference signal (phys. RS 422)
• Input frequency, max.	1 MHz
Cable length	
• 5-V encoder supply, max.	35 m at max. 220 mA
• 24-V encoder supply, max.	100 m at max. 300 mA
Synchronous-serial position detection	
Accepts encoder types	Single or multiturn encoders with SSI
Data signal	DATA, not DATA
Clock signal	CL, not CL
Frame length	13, 21 or 25 bit
Input signal	5 V difference signal (phys. RS 422)
Transmission rate max.	1.25 Mbit/s
Encoder supply	24 V DC, max. 300 mA
Cable length, max.	10 m (at 1.25 Mbit/s) 100 m (at up to 125 kbit/s)

Drive interface	
Input closed-loop controller signal	
Function	"Drive ready"
Electrical isolation	Yes (optocoupler)
Input voltage	
• Rated value	24 V DC
• "0" signal	-3 to +5 V
• "1" signal	15 to 30 V
Input current at "1" signal	2 mA to 6 mA
Output closed-loop controller enable (contact)	
Function	Safety disconnection of drives for operation using contact relays
Load, max.	1 A/50 V/30 VA DC
Analog output	
Function	Setpoint output for drive
Output voltage	• -10 to +10 V
Output current	• -3 to +3 mA
Cable length, max.	• 35 m
Digital inputs	
Number of inputs	4
Function (configurable)	• Reference cam
	• Set actual value on-the-fly
	• Measure on-the-fly
	• Start/stop positioning run
	• External block change
Electrical isolation	No
Input voltage	
• Rated value	24 V DC
• "0" signal	-3 to +5 V
• "1" signal	11 to 30 V
Input current, min.	
• "0" signal, max.	2 mA
• "1" signal	6 to 15 mA

Technical specifications (continued)

Digital outputs	
Number of inputs	4
Function	• Position reached: stop • Axis traveling forward • Axis traveling in reverse • Change M function M97 • Change M function M98 • Enable start • Direct output via data record
Electrical isolation	No
Output voltage	
• Rated value	24 V DC
• "0" signal	Residual current max. 2 mA
• "1" signal	UP – 3 V
Output current	0.6 A at $UP_{max.}$ (short-circuit proof)

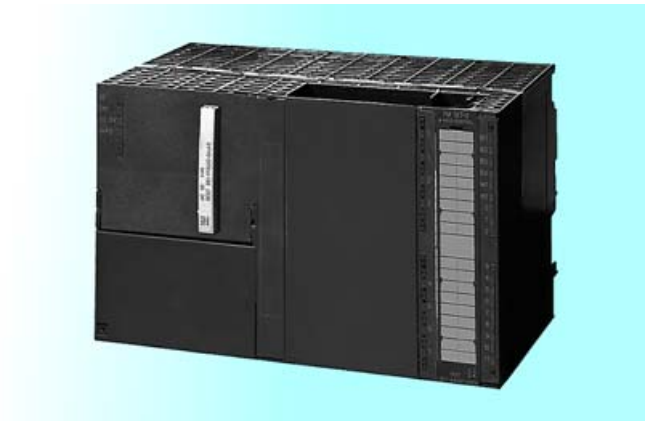
Ordering data

	Order No.
FM 354 positioning module 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) • Screen-based configuration software for FM 354 • Standard HMI forms for OP7/OP17	**6ES7 354-1AH01-0AE0**
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 Program editor for editing, loading and saving NC programs using standard programming device/PC; German/English, on CD-ROM	**6FC5 263-0AA03-0AB0**
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 unit	**6ES7 392-1AJ00-0AA0**
• 100 units	**6ES7 392-1AJ00-1AB0**
20-pin, with spring-loaded terminals	**6ES7 392-1BJ00-0AA0**
Bus connector 1 unit (spare part)	**6ES7 390-0AA00-0AA0**
Labelling strips 10 units (spare part)	**6ES7 392-2XX00-0AA0**
S7-SmartLabel Software for machine labelling of modules directly from the STEP 7 project	**2XV9 450-1SL00-0YX0**
Labelling sheets for machine labelling	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	**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 357-2 positioning module

Overview



- Continuous path and positioning control for the 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 using the isochronous PROFIBUS (not for FM 357-2H in combination with HT6)

Note:
We offer position sensing systems and preassembled connecting cables for counting and positioning functions under SIMODRIVE Sensors or Motion Connect 500 (see also www.siemens.de/simatic-technologie).

Technical specifications

General specifications	
NC program memory, approx.	750 KB
Programmable traversing speed max.	1000 m/min
Supply voltage	24 V DC
Power consumption max.	24 W
Power consumption from backplane bus	100 mA
Protection to DIN 40050	IP 20
Required front connector	1 x 40-pin
Dimensions (W x H x D) in mm	200 x 125 x 118
Weight approx.	1.2 kg
Position detection, incremental	
Accepts encoder types	Encoders with TTL quadrature signal
Track signals	A, not A; B, not B
Zero mark signal	N, not N
Input signal	5 V difference signal (phys. RS 422)
Input frequency, max.	1 MHz
Cable length	
• 5-V encoder supply, max.	35 m at max. 210 mA
• 24 V encoder supply, max.	100 m at max. 300 mA
Synchronous-serial position detection	
Accepts encoder types	Single or multiturn encoders with SSI
Data signal	DATA, not DATA
Clock signal	CL, not CL
Frame length	13, 21 or 25 bit
Input signal	5 V difference signal (phys. RS 422)
Transmission rate max.	1.5 Mbit/s
Encoder supply	24 V DC, max. 300 mA
Cable length, max.	250 m (at max.187.5 kbit/s)

Drive interface for analog drives	
Output closed-loop controller enable (contact)	
Function	Safety disconnection of drives for operation via contact relays
Load, max.	1 A/50 V/30 VA DC
Analog output	
Function	Setpoint output for drive
Output voltage	• -10 to +10 V
Output current	• -3 to +3 mA
Cable length, max.	• 35 m
Drive control interface for stepper motors	
Output signals	5 V difference signal (phys. RS 422) for: • Direction, enable, clock
Differential output voltage, min.	2 V (RL = 100 Ω)
• "0" signal, max.	1 V (I0 = 20 mA)
• "1" signal, min.	3.7 V (I0 = -20 mA)
Sensor frequency for T, max.	750 kHz
Permissible cable length max.	50 m
• In mixed mode with servo axes max.	35 m
Digital drive interface using PROFIBUS DP with MC expansions	See SIMODRIVE 611 Universal, MASTERDRIVES MC
Digital inputs	
Number of inputs	18
Function	• 4 Bero • 2 probe • 12 freely usable
Electrical isolation	Yes

Technical specifications (continued)

Input voltage	
• Rated value	24 V DC
• "0" signal	-3 to +5 V
• Type "1"	11 to 30 V
Input current	
• "0" signal, max.	2 mA
• Type "1"	6 mA to 30 mA
Digital outputs	
Number of inputs	8
Function	• 8 freely usable
Electrical isolation	Yes
Output voltage	
• Rated value	24 V DC
• "0" signal	Residual current max. 2 mA
• "1" signal	UP – 3 V
Output current	0.6 A at UP_{max}
FM-READY output (contact)	
Function	Ready for linking to Emergency Stop
Load, max.	1 A/50 V/30 VA DC

Ordering data

	Order No.
FM 357-2 positioning module Basic device	**6ES7 357-4AH01-0AE0**
System firmware incl. configuring package on CD-ROM, Ge., En., Fr., It., comprising manual (electronic), configuring software (parameterization forms, standard blocks, HMI forms for OP17/OP27)	
FM 357-2L system firmware on memory card	**6ES7 357-4AH03-3AE0**
FM 357-2LX system firmware with additional functions; on memory card	**6ES7 357-4BH03-3AE0**
FM 357-H system firmware with additional functions for handling range; on memory card	**6ES7 357-4CH03-3AE0**

	Order No.
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 Program editor for editing, loading and saving NC programs using standard programming device/PC; German/English, on CD-ROM	**6FC5 263-0AA03-0AB0**
Connecting cables and encoders	See Catalog NC 60, NC Z, CA 01 or have a look in the A&D Mall
Front connector	
40-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AM00-0AA0**
• 100 units	**6ES7 392-1AM00-1AB0**
40-pin, with spring-loaded terminals	**6ES7 392-1BM01-0AA0**
Battery	**6ES7 971-1AA00-0AA0**

FM STEPDRIVE power section

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 control and the FM 353 and FM 357-2 function modules, it performs highly accurate positioning tasks in the lower output range of 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. The FM STEPDRIVE has the same design as the SIMATIC S7-300 family.

Technical specifications

Supply voltage	115 V /230 V AC ± 20% selectable
Max. input current	11 A / 5.5 A
Frequency	47 Hz to 63 Hz
Connection system	Via terminals max. 2.5 mm^2
Supply voltage (signals)	24 V DC (20.4 V to 28.8 V)
Max. input current	1.5 A
DC link voltage	325 V
Pulse interface	5 V signals [1)] 15-pin sub D sokket connector, standard cable
Signal interface	24 V, I/O signals [1)]
Motor connection	3 x 325 V (connected to supply)
Phase current	1.7 A to 6.8 A (adjustable on unit)

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

Max. cable length	Up to 50 m (164 ft) with 1.5 mm^2 Up to 30 m (98 ft 5 in) with 0.75 mm^2
Terminals	For max. 2.5 mm^2
Number of steps/revolution	Can be set to 500, 1000, 5000, 10000
Degree of protection to DIN EN 60529 (IEC 60529)	IP 20, must be installed in cabinet
Moisture condensation	Not permissible
Permissible ambient temperature	
• Storage and transport	-40 °C to +70 °C (-40 °F to +158 °F)
• Operation	0 °C to +50 °C (+32 °F to +122 °F) with reduction in power, and dependent on mounting position
Weight, approx.	0.85 kg (1 lb 14 oz)
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)

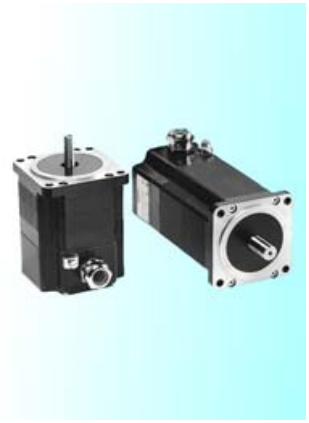
Ordering data

	Order No.
Power section for FM STEPDRIVE stepper motors	**6SN1 227-2ED10-0HA0**
Sub-D connector 15-pin, female (matching connector, pack of 3)	**6FC9 348-7HX**

	Order No.
Motor cable	
EMC tested	
10 m	**6FX5 008-5AA00-1BA0**
20 m	**6FX5 008-5AA00-1CA0**
50 m	**6FX5 008-5AA00-1FA0**
Connecting cables	See Catalog NC Z

4

Overview



Stepper motors for the positioning of axes.

- Simple and favorably priced drive concept for high-precision positioning tasks in the output range up to 600 W
- Applications:
  - Positioning drives in general automation systems
  - Positioning drives in processing plants
  - Positioning in the basic handling area
- Optionally with holding brake for fixing the position after switching off the motor.
- Can be used with the positioning modules FM 353 and FM 357-2 via FM STEPDRIVE

Technical specifications

Motor type	3-phase stepper motor
Motor voltage	325 V
Insulation according to EN 60034-1 (IEC 60034-1)	Temperature class F for a winding temperature of ΔT = 100 K at an ambient temperature of +40 °C (+104°F)
Type according to DIN 42950	IM B5 (IM V1, IM V3)
Degree of protection according to IEC 60529	IP 56; IP 41 on shaft protrusion
Cooling	Natural air cooling
Permissible ambient temperature • Storage and transport • Operation	 -40 °C to +70 °C 0 °C to +40 °C
Max. pulse frequency	5.3 kHz (at 1FL304.)
	4.3 kHz (at 1FL306.)
Number of steps/revolution	500/1000/5000/10000 adjustable via FM STEPDRIVE
Max. speed	6000 rpm
Step angle in degrees	0.72°/0.36°/0.072°/0.036°
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. • Radial, approx.	 60 N (on half shaft protrusion, engaged from the motor flange) 100 N (with 1FL3041, 1FL3042) 110 N (with 1FL3043) 300 N (with 1FL3061,1FL3062)
Rotational accuracy, concentricity and axial runout according to DIN 42955 (IEC 60072-1)	Tolerance N (Normal)
Vibration severity according to EN 60034-14 (IEC 60034-14)	Grade N (Normal)
Sound pressure level max. EN 21680 Impact load DIN 40046, T7	• 1FL3041: 65 dB(A) • 1FL3042: 72 dB(A) • 1FL3043: 75 dB(A) • 1FL3061: 69 dB(A) • 1FL3062: 72 dB(A) • 1FL304.: 50 g • 1FL306.: 50 g
Paint finish	Black
Connection	Terminal block

Technical specifications 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
• Engage brake	15 ms	15 ms
Connection	Connector (mating connector in scope of supply)	

Ordering data

	Order No.
SIMOSTEP stepper motors 1FL3	
• 2 Nm, shaft diameter 12 mm	**1FL3 041-0AC31-0BK0**
• 4 Nm, shaft diameter 12 mm	**1FL3 042-0AC31-0BK0**
• 6 Nm	**1FL3 043-0AC31-0BG0**
• 10 Nm	**1FL3 061-0AC31-0BG0**
• 15 Nm	**1FL3 062-0AC31-0BG0**
with holding brake	
• 2 Nm, shaft diameter 12 mm	**1FL3 041-0AC31-0BJ0**
• 4 Nm, shaft diameter 12 mm	**1FL3 042-0AC31-0BJ0**
• 6 Nm	**1FL3 043-0AC31-0BH0**

	Order No.
SIMOSTEP stepper motors 1FL3	
with holding brake (continued)	
• 10 Nm	**1FL3 061-0AC31-0BH0**
• 15 Nm	**1FL3 062-0AC31-0BH0**
Motor cable	
EMC tested, for connecting to FM STEPDRIVE	
• 10 m	**6FX5 008-5AA00-1BA0**
• 20 m	**6FX5 008-5AA00-1CA0**
• 50 m	**6FX5 008-5AA00-1FA0**

FM 355 closed-loop control module

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

Number of controllers	**4**
General specifications	
Rated load voltage L+	24 V DC
• Permitted range	20.4 to 28.8 V
Electrical isolation	
• To backplane bus	Yes (optocoupler)
• Between channels	No
Permissible potential difference	
• between input (frame terminal and the central grounding point)	75 V DC, 60 V AC
• Between analog inputs and N_{ANA} (U_{CM})	2.5 V DC
• Isolation tested at	500 V DC
Current consumption	
• From backplane bus, typ./max.	50 mA/75 mA
• From L+ (without load)	
- FM 355 C, typ.	260 mA
- FM 355 C, max.	310 mA
- FM 355 S, typ.	220 mA
- FM 355 S, max.	270 mA
Total current of the digital outputs, max.	400 mA
Power loss	
• FM 355 C, typ.	6.5 W
• FM 355 C, max.	7.8 W
• FM 355 S, typ.	5.5 W
• FM 355 S, max.	6.9 W
Required front connector	2 x 20-pin
Dimensions (W x H x D) in mm	80 x 125 x 120
Weight, approx.	470 g
Digital inputs	
• Number of inputs	8
Input voltage	
• Rated value	24 V DC
• At "0" signal	-3 to +5 V
• At "1" signal	13 to 30 V
Input current at "1" signal, typ.	7 mA
Input characteristic	In accordance with ICE 1131, type 2
Connection of two-wire BEROs	Possible
• Permissible quiescent current, max.	1.5 mA
Line length	
• Unshielded	600 m
• Shielded	1000 m
Digital outputs	
• Number	8 (only FM 355S)
Output voltage	
• At "1" signal	L+ (-2.5 V)
Output current	
• At "1" signal	
- rated value	0.1 A
- permitted range	5 to 150 mA
• At "0" signal, residual current, max.	0.5 mA
Load resistance	240 Ω to 4 kΩ
Output power	
• Lamp load, max.	5 W
Switch 2 outputs in parallel	For logic operations
Setting a digital input	Possible
Switching frequency	
• With resistive load/lamp load, max.	100 Hz
• Inductive loads, max.	0.5 Hz
Voltage induced on circuit interruption limited to (internally), typ.	L+(-1.5 V)
Short-circuit protection of output	Yes, electronic
Line length	
• Unshielded	600 m
• Shielded	1000 m
Analog inputs	
Number of inputs	4

Technical specifications (continued)

Number of controllers	
Input range (rated values/ display range/ input resistance)	
• Voltage	+/- 80 mV; -80 to +80 mV/10 MΩ; 0 to 10V/ -1.75 to 11.75V/ 100 kΩ
• Current	0 to 20 mA/-3.5 to 23.5 mA/ 50 Ω 4 to 20 mA/ 0 to 23.5 mA; 50 Ω
• Thermocouple type	B/0 to 13.81 mV/10 MΩ J/-8.1 to 69.54 mV/ 10 MΩ K/-6.54 mV to 54.88/ 10 MΩ R/-0.23 to 21.11 mV/10 MΩ S/-0.24 to 18.7 mV/10 MΩ
• Resistance thermometer	Pt 100/30.82 to 650.46 mV/ 10 MΩ
Principle of measurement	Integrating
Resolution (including overrange)	12 or 14 bit, parameterizable
Conversion time per analog input	
• At 12 bit	16 2/3 ms at 60 Hz 20 ms at 50 Hz
• At 14 bit	100 ms at 50 and 60 Hz
Transient recovery time	
• For resistive load	0.1 ms
• Capacitive loads	3.3 ms
• Inductive loads	0.5 ms
Substitute values injectable	Yes, parameterizable
Permissible input voltage for voltage input (destruction limit)	20 V
Permissible input current for current input (destruction limit)	40 mA
Connection for transducer	For voltage measurement and for current measurement (as 4-wire transducers)
Linearization of characteristic	Yes, parameterizable
• For thermocouples	Type B, J, K, R, S
• For resistance thermometers	Pt 100 (standard range)
Temperature compensation	Yes, parameterizable (internal and external with Pt 100)
Noise voltage suppression for f = n x (fl +/- 1 %), fl = noise frequency	
• Common-mode noise, min. (Vpp < 2.5 V)	70 dB
• Series-mode noise, min. (peak value of fault < rated value of input range)	40 dB
Operational limit (in the entire temperature range, referred to input range)	+/-0.6 to +/-1%
Basic error limit (operating error limit at 25 °C, referred to the input range)	+/-0.4 to +/-0.6%
Temperature error (referred to input range)	+/-0.005%/K
Linearity error (referred to input range)	+/-0.05%
Cable length (shielded)	200 m, 50 m at 80 mV with thermocouples
Analog outputs	
• Number	4 (only FM 355C)
• Output ranges	+/-10 V / 0 to 10 V 0 to 20 mA, 4 to 20 mA
Load resistor	
• Voltage outputs, min.	1 kΩ
- capacitive load, max.	1 µF
• Current outputs, max.	500 Ω
- inductive load, max.	1 mH
Voltage output	
• Short-circuit protection	Yes
• Short-circuit current, max.	25 mA
Current output	
• Idle voltage, max.	18 V
Connection of actuators	
• For voltage output	2-lead connection
• For current output	2-lead connection
Operating error limit (in the entire temperature range of the modules, relative to input range)	
• Voltage	+/- 0.5%
• Current	+/- 0.6%
Basic error threshold (operating error threshold at 25 °C, with reference to output range)	
• Voltage	+/- 0.2%
• Current	+/- 0.3%
Temperature	+/- 0.02%/K
Linearity error	+/- 0.05%
Cable length (shielded)	200 m, 50m at 80 mV with thermocouples

FM 355 closed-loop control module

Technical specifications function blocks

FB	Memory requirements		Runtimes	
	FB length in load memory	DB length in load memory	in S7-300/C7 (for CPU 314, C7-623/624)	in S7-400 (for CPU 414)
PID_FM	1.976 byte	490 byte	0.65 ms	0.077 ms
FUZ_355	464 byte	172 byte	2.1 ms	1.9 ms
FORCE355	790 byte	214 byte	2.2 ms	2.0 ms
READ_355	644 byte	184 byte	2.5 ms	2.2 ms
CH_DIAG	420 byte	178 byte	2.3 ms	2.1 ms
PID_PAR	1.074 byte	410 byte	4.3 ms	3.8 ms
CJ_T_PAR	354 byte	130 byte	1.8 ms	1.6 ms
Target system	SIMATIC S7-300 (from CPU 314), S7-400, C7			

Ordering data

	Order No.
FM 355 C closed-loop control module	**6ES7 355-0VH10-0AE0**
with 8 digital outputs for 4 step or pulse controllers	
FM 355 S closed-loop control module	**6ES7 355-1VH10-0AE0**
with 4 analog outputs for 4 continuous-action controllers	
FM 355 manual	
Manual and Getting Started	
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 unit	**6ES7 392-1AJ00-0AA0**
• 100 units	**6ES7 392-1AJ00-1AB0**
20-pin, with spring-loaded terminals	**6ES7 392-1BJ00-0AA0**
Bus connector	**6ES7 390-0AA00-0AA0**
1 unit (spare part)	

	Order No.
Labelling strips	**6ES7 392-2XX00-0AA0**
10 units (spare part)	
S7-SmartLabel	**2XV9 450-1SL00-0YX0**
Software for machine labelling of modules directly from the STEP 7 project	
Labelling sheets for machine labelling	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



- 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
- Ready-to-use controllers
- 2 versions:
  - 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

Number of controllers	**4**
General specifications	
Rated load voltage L+	24 V DC
• Permitted range	20.4 to 28.8 V
Electrical isolation	
• To backplane bus	Yes (optocoupler)
• Between channels	No
Permissible potential difference	
• Between input (frame terminal and the central grounding point)	75 V DC, 60 V AC
• Between analog inputs and N_{ANA} (U_{CM})	2.5 V DC
• Isolation tested at	500 V DC
Current consumption	
• From backplane bus, typ./max.	50 mA/75 mA
• From L+ (without load)	
- FM 355-2 C, typ.	260 mA
- FM 355-2 C, max.	310 mA
- FM 355-2 S, typ.	220 mA
- FM 355-2 S, max.	270 mA
Total current of the digital outputs, max.	400 mA
Power loss	
• FM 355-2 C, typ.	6.5 W
• FM 355-2 C, max.	7.8 W
• FM 355-2 S, typ.	5.5 W
• FM 355-2 S, max.	6.9 W
Required front connector	2 x 20-pin
Dimensions (W x H x D) in mm	80 x 125 x 120
Weight, approx.	470 g
Digital inputs	
• Number	8
Input voltage	
• Rated value	24 V DC
• At "0" signal	-3 to +5 V
• At "1" signal	13 to 30 V
Input current at "1" signal, typ.	7 mA
Input characteristic	In accordance with ICE 1131, Typ 2
Connection of two-wire BEROs	Possible
• Permissible quiescent current, max.	1.5 mA
Line length	
• Unshielded	600 m
• Shielded	1000 m
Digital outputs	
• Number of inputs	8 (only FM 355-2S)
Output voltage	
• At signal "1"	L+ (-2.5 V)
Output current	
• At "1" signal	
- rated value	0.1 A
- permitted range	5 to 150 mA
• At "0" signal, residual current, max.	0.5 mA
Load resistance	240 Ω to 4 kΩ
Output power	
• Lamp load, max.	5 W
Switch 2 outputs in parallel	For logic operations
Setting a digital input	Possible
Switching frequency	
• With resistive load/lamp load, max.	100 Hz
• Inductive loads, max.	0.5 Hz
Voltage induced on circuit interruption limited to (internally), typ.	L+(-1.5 V)
Short-circuit protection of output	Yes, electronic
Line length	
• Unshielded	600 m
• Shielded	1000 m
Analog inputs	
Number of inputs	4
Input range (rated values/ display range/ input resistance)	
• Voltage	0 to 10V/ -1.75 to 11.75V/ 100 kΩ
• Current	0 to 20 mA/ -3.5 to 23.5 mA/50 Ω 4 to 20 mA/ 0 to 23.5 mA; 50 Ω

FM 355-2 closed-loop control module

Technical specifications (continued)

• Thermocouple type	B/0 to 13.81 mV/10 MΩ E/ -9.84 to 76.36mV/ 10 MΩ J/-8.1 to 69.54 mV/10 MΩ K/-6.54 mV to 54.88/10 MΩ R/-0.23 to 21.11 mV/10 MΩ S/-0.24 to 18.7 mV/10 MΩ
• Resistance thermometer	Pt 100/30.82 to 650.46 mV/ 10 MΩ
Principle of measurement	Integrating
Resolution (including overrange)	14-bit
Conversion time per analog input	100 ms at 50 and 60 Hz
Transient recovery time	
• For resistive load	0.1 ms
• Capacitive loads	3.3 ms
• Inductive loads	0.5 ms
Substitute values injectable	Yes, parameterizable
Permissible input voltage for voltage input (destruction limit)	20 V
Permissible input current for current input (destruction limit)	40 mA
Connection for transducer	For voltage measurement and for current measurement (as 4-wire transducers)
Linearization of characteristic	Yes, parameterizable
• For thermocouples	Type B,E, J, K, R, S
• For resistance thermometers	Pt 100 (standard range)
Temperature compensation	Yes, parameterizable, via internal sensor or externally with Pt 100
Noise voltage suppression for f = n x (fl +/- 1 %), fl = noise frequency	
• Common-mode noise, min. (Vpp < 2.5 V)	70 dB
• Series-mode noise, min. (peak value of fault < rated value of input range)	40 dB
Operational limit (in the entire temperature range, referred to input range)	+/-0.06 to +/-0.7%
Basic error limit (operating error limit at 25 °C, referred to the input range)	+/-0.04 to +/-0.5%
Temperature error (referred to input range)	+/-0.005%/K
Linearity error (referred to input range)	+/-0.05%
Cable length (shielded)	200 m, 50m at 80 mV and thermocouples
Analog outputs	
• Number of inputs	4 (only FM 355-2C)
• Output ranges	+/-10 V / 0 to 10 V 0 to 20 mA, 4 to 20 mA
Load resistor	
• Voltage outputs, min.	1 kΩ
- capacitive load, max.	1 µF
• Current outputs, max.	500 Ω
- inductive load, max.	1 mH
Voltage output	
• Short-circuit protection	Yes
• Short-circuit current, max.	25 mA
Current output	
• Idle voltage, max.	18 V
Connection of actuators	
• For voltage output	2-lead connection
• For current output	2-lead connection
Operating error limit (in the entire temperature range of the modules, relative to input range)	
• Voltage	+/- 0.5%
• Current	+/- 0.6%
Basic error threshold (operating error threshold at 25 °C, with reference to output range)	
• Voltage	+/- 0.2%
• Current	+/- 0.3%
Temperature	+/- 0.02%/K
Linearity error	+/- 0.05%
Cable length (shielded)	200 m, 50m at 80 mV and thermocouples

Technical specifications, function blocks

FB	Memory requirements		Runtimes	
	FB length in load memory	DB length in load memory	in S7-300/C7 (for CPU 315-2DP)	in S7-400 (for CPU 416-2DP)
FMT_PID	1.804 byte	490 byte	0.65 … 7.41 ms[1)]	0.04 … 0.82 ms[1)]
FMT_PAR	324 byte	172 byte	1.7 ms	0.19 ms
FMT_CJ_T	410 byte	214 byte	1.8 ms	0.19 ms
FMT_DS1	216 byte	184 byte	1.9 ms	0.19 ms
FMT_TUN	332 byte	178 byte	4.5 ms	0.19 ms
FMT_PV	1108 byte	410 byte	4.3 ms	3.8 ms
READ_PV =TRUE			3.2 ms	0.28 ms
LOAD_PV=TRUE			2.9 ms	0.35 ms
Target system	SIMATIC S7-300 (from CPU 314), S7-400, C7			

1) Dependent on the parameterization of READ_OUT, LOAD_OP and LOAD_PAR (READ_PAR)

Ordering data

	Order No.
FM 355-2 C temperature closed-loop control module with 8 digital outputs for 4 step or pulse controllers	**6ES7 355-2CH00-0AE0**
FM 355-2 S temperature closed-loop control module with 4 analog outputs for 4 continuous-action controllers	**6ES7 355-2SH00-0AE0**
Front connector 20-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AJ00-0AA0**
• 100 units	**6ES7 392-1AJ00-1AB0**
20-pin, with spring-loaded terminals	**6ES7 392-1BJ00-0AA0**
Bus connector 1 unit (spare part)	**6ES7 390-0AA00-0AA0**
Labelling strips 10 units (spare part)	**6ES7 392-2XX00-0AA0**

	Order No.
S7-SmartLabel Software for machine labelling of modules directly from the STEP 7 project	**2XV9 450-1SL00-0YX0**
Labelling sheets for machine labelling	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	**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**

SM 338 ultrasonic position encoder module

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 to 16 ms
Supply voltage for sensors	
• With Electrical isolation	
- voltage	± 15 V
- current	200 mA
• Without electrical isolation	
- voltage	24 V
- current, total	300 mA, without electrical 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 to 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 to 60 °C
• for vertical installation	0 °C to 40 °C
Relative air humidity	5 % to 95 % (without condensation)
Atmospheric pressure	860 hPa to 1080 hPa
Pollutant concentration	
• SO_2 max.	10 ppm
• H_2S max.	1 ppm
Vibration	
• 10 Hz to 57 Hz	0.075 mm amplitude
• 57 Hz to 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 to +70 °C
• Atmospheric pressure	< 700 hPa (3000 m above sea level)
• Relative air humidity	5 % to 95 % (without condensation)
Casing	
Dimensions (W x H x D in mm)	80 x 125 x 120
Weight	500 g
Degree of protection	IP 20

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**

	Order No.
SM 388 ultrasonic position encoder module manual	
German	**6ES7 338-7UH00-8AC0**
English	**6ES7 338-7UH00-8BC0**
Configuration package for SM 338 comprising manual, parameterization forms and example programs (German, English)	**6AT1 733-8DA00-0YA0**

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:
We offer position sensing systems and preassembled connecting cables for counting and positioning functions under SIMODRIVE Sensors or Motion Connect 500 (see also www.siemens.de/simatic-technologie).

Technical specifications

General	
Rated load voltage L+	24 V DC
• Permitted range	20.4 to 28.2 V
Electrical isolation	No
Encoder supply	
• Output voltage	L+ - 0.8 V
• Output current, max.	900 mA
Interrupts	
• Diagnostics interrupt	Configurable
Current consumption	
• From S7-300 ® backplane bus, max.	160 mA
• From L+, max.	10 mA
Power loss	3 W
Dimensions (W x H x D) in mm	40 x 125 x 120
Required front connector	20-pin
Weight	235 g

SSI encoder inputs	
Position encoders	Absolute
Cable length (shielded), max.	320 m at 125 kHz
	160 m at 250 kHz
	60 m at 500 kHz
	20 m at 1 MHz
Digital inputs	
Input voltage	
• At "1" signal	11 to 30,2 V
• At "0" signal	-3 to 5 V
Input current	
• At "1" signal, typ.	9 mA
• At "0" signal, max.	2 mA
Input delay	300 µs
Connection of 2-wire BERO	Yes
Cable length (shielded), max.	600 m

Ordering data

	Order No.
SM 338 POS input module for position detection with ultrasonic sensors with start/stop interface	**6ES7 338-4BC00-0AB0**
Front connector 20-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AJ00-0AA0**
• 100 units	**6ES7 392-1AJ00-1AB0**
20-pin, with spring-loaded terminals	**6ES7 392-1BJ00-0AA0**
Front door, improved version e.g. for 32-channel modules; permits connection of 1.3 mm^2/16 AWG conductors	**6ES7 328-0AA00-7AA0**

	Order No.
SIMATIC Manual Collection Electronic manuals on CD-ROM, multi-language	**6ES7 998-8XC01-8YE0**
SIMATIC Manual Collection updating service for 1 year Current S7 Manual Collection CD as well as the three following updates	**6ES7 998-8XC01-8YE2**
S7-300 manual Design, CPU data, module data, instruction 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**

SIWAREX U

Overview



SIWAREX U is an optimal solution in all areas where sensors (e.g. load cells, force sensors or torque measuring shafts) are used for measurement. The main applications of SIWAREX U include:

- Fill level monitoring of bins and hoppers
- Monitoring of crane loads
- Load measurement of conveyor belts
- Overload protection in industrial elevators and rolling mills
- Scales for potentially explosive areas (can be implemented by using an Ex(i) interface)
- Weight encoders for other types of scales (e.g. conveyor type scales, etc.).

Technical specifications

Main applications	
• Load measurement on cranes	•
• Overload protection	•
• Belt tensioning devices	•
• Platform scales	•
• Fill level measurements (containers/bins)	•
• Proportioning and mixing scales	–
• Scales with verification capacity	–
Intrinsically-safe load cell powering	Optional (Ex-I)
Stand-alone (without SIMATIC)	With IM 153-1
Integration in:	
• S5-90/S5-95U/S5-100U	–
• 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 bzw. ET 200M
• TELEPERM M (AS 388/488/TM)	–
Communication interfaces	SIMATIC S7 (P-Bus) RS 232
Process interfaces	
• Digital inputs	–
• Digital outputs	–
• Pulse input	–
• Analog output/analog input	–/–
Remote display connection (via serial interface)	• Gross, channel 1, 2 specified value 1, 2
Printer connection	–

Measuring properties	
Class III EU type approval for commercial scales (with verification capability)	–
Accuracy (definition acc. to measuring technology)	0.05%
n_{IND} acc. to EN 45 501 min. measuring signal ΔU_{min} pro d (*) no verification capability	3000 (*) 1.5 µV
Internal resolution	65 535
Data format for weight values	2 byte (fixed point)
No. of measurements/second	50
Filters	Exponent filter: 0.05 to 5 Hz Mean value filter
Scale functions	
• Weight values	Gross weight
• Limit	2 (min/max)
• Scale standstill	–
• Zero setting function	Via command
Proportioning functions	
• Control of coarse/fine flow valves	–
• Tolerance monitoring	–
• Material flow monitoring	–
• Automatic proportioning optimization	–
• Automatic reproportioning	–
• Inching mode	–
Integral display and operator panel	–
Module parameterization	Using SIMATIC S5/S7/M7/C7 or PC parametizaton software SIWATOOL U
UL/CSA/FM approval	•
IP degree of protection to DIN EN 60 529; IEC 60 529	IP 20

• Function included
– Function not included

Technical specifications (continued)

Load cell supply	
• 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)	
- R_{Lmin}	> 41 Ω single-channel > 82 Ω two-channel
- R_{Lmax}	< 4010 Ω with Ex(i) interface
- R_{Lmin}	> 87 Ω
- R_{Lmax}	< 4010 Ω
Permissible load cell characteristic	Up to 4 mV/V
Perm. range of measurement signal (with largest characteristic value set)	-1.5 to +42.5 mV
Max. distance of load cells	1000 m (300 m in Ex area[1])
Voltage supply DC 24 V	
• Rated voltage	24 V DC
• Max. current consumption	220 mA
Voltage supply from backplane bus	Typ. 100 mA
Serial interface 1	RS 232:
• Transmission rate	9600 bps
• Parity	Even/odd/without
• No. of data bit / stop bit	8/1
• Signal level	In acc. with EIA-RS 232C
• Protocols	SIWAREX protocol

Serial interface 2	TTY:
• Transmission rate	9600 bps
• Parity	Even/odd/without
• No. of data bit / stop bit	8/1
• Signal level	Passive, floating
• Protocols	Remote display protocol for digital remote displays
Binary inputs	–
Binary outputs	–
Analog output	
• Output range	–
• Total error at 25 °C	–
• Update rate	–
• Resolution	–
• Burden including line resistance	–
Climatic requirements $T_{min(IND)}$ to $T_{max(IND)}$ (operating temperature)	vertical installation: 0 to +60 °C horizontal installation: 0 to +40 °C
EMC requirements in accordants with	NAMUR NE21, Part 1 89/386/EEC
MTBF (SN 29500)	>350,000 h

∞ Function included
– Function not included
1) Up to 1000 m, depending on the gas group.

Ordering data

	Order No.
SIWAREX U weighing module	
Single-channel version for connection of one balance	**7MH4 601-1AA01**
Two-channel version for connection of two balance	**7MH4 601-1BA01**
Configuring package incl. SIWATOOL parameterization software, manual on CD-ROM and example programs	**7MH4 683-3AA63**
SIWAREX U manual	
German	**7MH4 693-3AA11**
English	**7MH4 693-3AA21**
Junction box JB for connecting together max. 4 load cells	**7MH4 710-1BA**
9-conductor cable to connect SIWAREX U to 9-pin PC interface (RS 232C)	**7MH4 607-8CA**

	Order No.
Cable LI2Y (ST) to connect SIWAREX U to junction boxes	**7MH4 702-8AB**
Front connector	
20-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AJ00-0AA0**
• 100 units	**6ES7 392-1AJ00-1AB0**
20-pin, with spring-loaded terminals	**6ES7 392-1BJ00-0AA0**
Labelling strips 10 units (spare part)	**6ES7 392-2XX00-0AA0**
Shield connecting element 80 mm wide, with 2 rows for 4 terminal elements each	**6ES7 390-5AA00-0AA0**
Terminal elements	
2 units	
For 1 cable with 4 to 13 mm diameter	**6ES7 390-5CA00-0AA0**

SIWAREX M

Overview



SIWAREX M is a weighing and proportioning system with verification capability for maximum accuracy requirements. The main applications of SIWAREX M include:

- Fill level scales with verification capability
- Platform scales and vehicle scales with verification capability
- Single component scales
- Multi-component scales
- Proportioning scales with verification capability
- Scales for potentially explosive areas (can be implemented by using an Ex(i) interface)
- Weight encoders for other types of scales (e.g. differential proportioning scales, etc.)

Technical specifications

Main applications	
• Load measurement on cranes	–
• Overload protection	–
• Belt tensioning devices	–
• Platform scales	•
• Fill level measurement (container/bins)	•
• Proportioning and mixing scales	•
• Scales with verification capacity	•
Intrinsically safe load cell powering	Optional (Ex-I)
Stand-alone (without SIMATIC)	•
Integration in:	
• S5-90/S5-95U/S5-100U	Via RS 232/TTY + CP
• S5-95U/DP (PROFIBUS master)	Via RS 232/TTY + CP
• S5-115U/S5-135U/S5-155U	Via ET 200M
• S7-300	Direct integration
• S7-400	via ET 200M
• PCS 7	via ET 200M
• M7-300	–
• M7-400	–
• C7	Via IM or ET 200M
• TELEPERM M (AS 388/488/TM)	Via ET 200M
Communication interfaces	SIMATIC S7 (P bus) RS 232, TTY
Process interfaces	
• Digital inputs	3 (assignable)
• Digital outputs	4 (assignable)
• Pulse input	–
• Analog output/analog input	•/–
Remote display connection (via serial interface)	• (with verification capability) gross/net/setpoint remote display with operator control
Printer connection	• (verification capability)

Measuring properties	
Class III EU type approval for commercial scales (with verification capability)	6000 d
Accuracy (definition acc. to measuring technology)	0.01%
n_{IND} acc. to EN 45 501 min. measuring signal Δu_{min} pro d (*) no verification capability	6000 0.5 µV
Internal resolution	± 524,288
Data format for weight values	4 byte (fixed point)
No. of measurements/second	50
Filters	Exponent filter: 0.05 to 5 Hz Mean value filter
Scale functions	
• Weight values	Gross/net/tare
• Limit	4 (min/max/empty/overfill)
• Scale standstill	•
• Zero setting function	Via command and automatically
Proportioning functions	
• Control of coarse/fine flow valves	•
• Tolerance monitoring	•
• Material flow monitoring	•
• Automatic proportioning optimization	•
• Automatic reproportioning	•
• Inching mode	•
Integral display and operator panel	–
Module parameterization	Via SIMATIC S5/S7/C7 or SIWATOOL M PC parameterization software
UL/CSA/FM approval	Yes
IP degree of protection to DIN EN 60 529; IEC 60 529	In S7 frame: IP 20 Stand-alone: IP 10

• Function included
– Function not included

Technical specifications (continued)

• Load cell supply	
• Supply voltage U_s (rated value)	10.2 V DC
• Max. supply current	≤ 180 mA
• Permissible load resistance:	
- R_{Lmin}	> 60 Ω single-channel
- R_{Lmax}	< 4010 Ω
	with Ex(i) interface:
- R_{Lmin}	> 87 Ω
- R_{Lmax}	< 4010 Ω
Permissible load cell characteristics	Up to 4 m V/V
Perm. range of measurement signal (with largest characteristic value set)	-41.5 to 41.5 mV
Max. distance of load cells	1000 m 300 m in Ex area [1]
Voltage supply DC 24 V	
• Rated voltage	24 V DC
• Max. current consumption	300 mA
Voltage supply from backplane bus	Typ. 50 mA
Serial interface 1	RS 232:
• Transmission rate	2400/9600 bps
• Parity	Even/odd
• No. of data bit / stop bit	8/1
• Signal level	In acc. with EIA-RS 232
• Protocols	SIWAREX-Protokoll 3964R, XON/XOFF (printer) [2]
Serial interface 2	TTY:
• Transmission rate	9600 bps
• Parity	Even
• No. of data bit / stop bit	8/1

Serial interface 2	TTY:
• 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 isolation: 500 V
Analog output	
• Output range	0/4 to 20 mA
• Total error at 25 °C	0.15%
• Update rate	Approx. 350 ms
• Resolution	16 bit (0-20 mA)
• Burden including line resistance	≤ 600 Ω
Climatic requirements $T_{min(IND)}$ to $T_{max(IND)}$ (opperating temperature)	Vertical installation: -10 to +60 °C horizontal installation/with verification-capability: -10 to +40 °C
EMC requirements in accordance with	NAMUR NE21, Part 1 90/384/EWG 89/386/EWG
MTBF (SN 29500)	172 000 h at +40°C

1) Up to 1000 m, depending on the gas group.
2) Serial printer, ANSI-, EPSON-, IBM-compatible

Ordering data

	Order No.
SIWAREX M weighing module with verification capability	**7MH4 553-1AA41**
Configuring package incl. SIWATOOL parameterization software, manual on CD-ROM and example programs	**7MH4 583-3FA63**
SIWAREX M manual	
German	**7MH4 593-3AA11**
English	**7MH4 593-3AA21**
Junction box JB for connecting max. 4 load cells	**7MH4 710-1BA**
9-conductor cable to connect SIWAREX M to 9-pin PC interface (RS 232C)	
2 m	**7MH4 702-8CA**
5 m	**7MH4 702-8CB**

	Order No.
Cable LI2Y (ST) to connect SIWAREX M to junction boxes	**7MH4 702-8AB**
Front connector 20-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AJ00-0AA0**
• 100 units	**6ES7 392-1AJ00-1AB0**
20-pin, with spring-loaded terminals	**6ES7 392-1BJ00-0AA0**
Labelling strips 10 units (spare part)	**6ES7 392-2XX00-0AA0**
Shield connecting element 80 mm wide, with 2 rows for 4 terminal elements each	**6ES7 390-5AA00-0AA0**
Terminal elements 2 units	
For 1 cable with 4 to 13 mm diameter	**6ES7 390-5CA00-0AA0**

SIWAREX A

Overview



SIWAREX A is a weighing and proportioning system with verification capability for maximum accuracy requirements and fast processes. The main applications of SIWAREX A include:

- Filling plants
- Bagging scales
- Single component scales
- Multi-component scales
- Filling scales with verification capability
- Scales for potentially explosive areas (can be implemented by using an Ex(i) interface).

Technical specifications

Main applications	
• Load measurement on cranes	–
• Overload protection	–
• Belt tensioning devices	–
• Platform scales	–
• Fill level measurement (containers/bins)	•
• Propoortioning and mixing 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	Direct integration
• S7-400	Via ET 200M
• PCS 7	–
• M7-300	–
• M7-400	–
• C7	Via IM or ET 200M
• TELEPERM M (AS 388/488/TM)	–
Communication interfaces	SIMATIC S7 (P-Bus) RS 232, TTY
Process interfaces	
• Digital input	3
• Digital output	4
• Pulse input	–
• Analog output/analog input	•/–
Remote display connection (via serial interface)	• (verification capability) Gross/net
Printer connection	• (verification capability)
Measuring properties	
Class III EU type approval for commercial scales (with verification capability)	6000 d (2 x 6000 d)

Accuracy (definition in acc. with measuring technology)	0.01%
n_{IND} in acc. with EN 45 501	6000
Min. measuring signal u_{min} pro d (*) no verification capability	0.5 µV
Internal resolution	1,048,576
Data format for weight values	4 byte (fixed point)
No. of measurements/second	50
Filters	Mean value filter, 4 stages
Scale functions	
• Weight values	Gross/net
• Limits	–
• Scales standstill	•
• Zero setting function	Via command or automatically
Proportioning functions	
• Control of coarse/fine flow valves	•
• Tolerance monitoring	•
• Material flow monitoring	•
• Autom. proportioning optimization	•
• Automatic reproportioning	•
• Inching mode	•
Integral display and operator panel	–
Module parameterization	Via SIMATIC S7 or SIWATOOL A PC-parameterization software
UL/CSA/FM approval	–
IP degree of protection to DIN EN 60 529; IEC 60 529	In S7 frame: IP 20 Stand-alone: IP 10
Load cell supply	
• Supply voltage U_s (rated value)	10.2 V DC
• Max. supply current	≤ 180 mA
Permiss. load resistance:	
- R_{Lmin}	> 60 Ω
- R_{Lmax}	< 4010 Ω
	With Ex(i) interface:
- R_{Lmin}	> 87 Ω
- R_{Lmax}	< 4010 Ω

• Function included
– Function not included

Technical specifications (continued)

Main application	
Perm. load cell characteristic	Up to 4 mV/V
Perm. range of measurement signal (with largest characteristic value set)	-1.5 to +41.5 mV
Max. distance of load cells	1000 m 300 m in Ex area[1)]
Voltage supply 24 V DC	
• Rated voltage	24 V DC
• Max. current consumption	300 mA
Voltage supply from backplane bus	Typ. 50 mA
Serial interface 1	RS 232:
• Transmission rate	2400/9600 Baud
• Parity	Even/odd
• No. of data bit / stop bit	8/1
• Signal level	In acc. with EIA-RS 232
• Protocol	SIWAREX protocol XON/XOFF (printer)[2)]
Serial interface 2	TTY:
• Transmission rate	9600 bps
• Parity	Even
• No. of data bit / stop bit	8/1
• Signal level	Active/passive (floating)
• Protocol	Remote display protocol SIWAREX protocol

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 Isolation: 500 V
Analog output	
• Output range	0/4-20 mA
• Total error at 25 °C	0.15%
• Update rate	Approx. 350 ms
• Resolution	16 bit (0-20 mA)
• Burden including line resistance	≤ 600 Ω
Climatic requirements $T_{min(IND)}$ to $T_{max(IND)}$ **(operating temperature)**	vertical installation: -10 to +60 °C horizontal installation/ with verification capability: -10 to +40 °C
EMC requirements in accordance with	NAMUR NE21, Part 1 90/384/EWG 89/386/EWG
MTBF (SN 29500)	> 172 000 h at +40°C

1) Up to 1000 m, depending on the gas group.
2) Serial printer, ANSI-, EPSON-, IBM-compatible

Ordering data

	Order No.
SIWAREX A weighing module with verification capability, for maximum accuracy and fast processes	**7MH4 421-1AA01**
Configuring package incl. SIWATOOL parameterization software, manual on CD-ROM and example programs	**7MH4 483-3DA63**
SIWAREX M manual	
German	**7MH4 593-3AA11**
English	**7MH4 593-3AA21**
Junction box JB for connecting together max. 4 load cells	**7MH4 710-1BA**
9-conductor cable to connect SIWAREX A to 9-pin PC interface (RS 232C)	
2 m	**7MH4 702-8CA**
5 m	**7MH4 702-8CB**

	Order No.
Cable LI2Y (ST) to connect SIWAREX M to junction boxes	**7MH4 702-8AB**
Front connector 20-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AJ00-0AA0**
• 100 units	**6ES7 392-1AJ00-1AB0**
20-pin, with spring-loaded terminals	**6ES7 392-1BJ00-0AA0**
Labelling strips 10 units (spare part)	**6ES7 392-2XX00-0AA0**
Shield connecting element 80 mm wide, with 2 rows for 4 terminal elements each	**6ES7 390-5AA00-0AA0**
Terminal elements 2 units	
For 1 cable with 4 to 13 mm diameter	**6ES7 390-5CA00-0AA0**

4

SM 374 simulator

Overview



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

Technical specifications

Inputs	16 switches
Outputs	16 LEDs
Electrical isolation	No
Power consumption max.	80 mA
Power losses, typ.	0.35 W
Dimensions (W x H x D) in mm	40 x 125 x 120
Weight, approx.	190 g

Ordering data

	Order-No.
SM 374 simulator module incl. bus connector and labelling strips	**6ES7 374-2XH01-0AA0**
Bus connector 1 unit (spare part)	**6ES7 390-0AA00-0AA0**

	Order No.
Labelling strips 10 units (spare part)	**6ES7 392-2XX00-0AA0**
S7-SmartLabel	See page 4/91
Labelling cover 10 units (spare part)	**6ES7 392-2XY00-0AA0**

DM 370 dummy module

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

Current consumption	
• From backplane bus, max.	5 mA
Power losses, typ.	0.03 W
Dimensions (W x H x D) in mm	40 x 125 x 120
Weight	180 g

Ordering data

	Order No.
DM 370 dummy module incl. bus connector and labelling strips	**6ES7 370-0AA01-0AA0**
Bus connector	See above

	Order No.
Labelling strips	See above
S7-SmartLabel	See page 4/91
Labelling cover	See above

Overview



- The economical complete solution for serial communications 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) and
  - Printer driver
- Simple parameterization by means of a parameterization tool integrated inSTEP®7

Technical specifications

CP 340 Version	RS 232 (V.24)	20 mA (TTY)	RS 422/485 (X.27)
Interfaces			
• Number of inputs	1, electrical isolation		
• 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
• Cable length, max.	15 m	100 m /1000 m (act./passive)	1200 m
ASCII:			
• Max. frame length	1024 byte		
• Transmission rate, max.	9.6 kbit/s		
3964 (R):			
• Max. frame length	1024 byte		
• Transmission rate, max..	19.2 kbit/s		
Printer driver:			
• Transmission rate, max.	9.6 kbit/s		
• Supported printers	HP-Deskjet, HP-Laserjet, IBM-Proprinter, user-defined		
• Memory requirements of the handling blocks, approx.	2700 byte (data communications, sending and receiving)		
Current consumption typ.	165 mA	220 mA	165 mA
Power loss	0.85 W		
Dimensions (W x H x D) in mm	40 x 125 x 120		
Weight, approx.	300 g		

Ordering data

	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**

	Order No.
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**

CP 341

Overview



- For powerful, high-speed serial communications 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 in STEP® 7

Technical specifications

Version	RS 232C (V.24)	20 mA (TTY)	RS 422/485 (X.27)
Interfaces			
• Number of inputs	1, electrical isolation		
• Transmission rate			
- Max.	76.8 kbit/s	19.2 kbit/s	76.8 kbit/s
- Min.	0.3 kbit/s	0.3 kbit/s	0.3 kbit/s
• Cable length, max.	15 m	1000 m	1200 m
• Connection technique	9-pin Sub-D male	9-pin Sub-D female	15-pin Sub-D socket connector
Implemented protocol driver	ASCII; 3964 (R) (not with RS 485); RK 512 (not with RS 485); customized driver can be loaded		
ASCII			
• Max. frame length	1024 byte		
• Transmission rate, max.	76.8 kbit/s (half-duplex) / 38.4 kbit/s (full-duplex)		
3964 (R)			
• Max. frame length	1024 byte		
• Transmission rate, max.	76.8 kbit/s		
RK 512			
• Max. frame length	1024 byte		
• Transmission rate, max.	76.8 kbit/s		
Memory requirements of the function blocks, approx.	5500 byte (data communication, sending and receiving)		
External voltage supply	24 V DC (3 screw-type terminals: L+, M, GND)		
Current consumption typ.	200 mA	200 mA	240 mA
• From backplane bus, max.	70 mA	70 mA	70 mA
Power loss	4.8 W	4.8 W	5.8 W
Dimensions (W x H x D) in mm	40 x 125 x 120		
Weight, approx.	300 g		

Technical specifications available drivers

MODBUS Master	
	• MODBUS protocol with RTU format • Master/slave coupling: SIMATIC S7 is the master • Implemented function codes: 01, 02, 03, 04, 05, 06, 07, 08, 11,12,15,16 • No RS 232 C (V.24) control and signaling lines • CRC polynomial: X16 + x15 + x2 +1 • Interfaces: TTY (20 mA); V.24 (RS 232 C); X.27 (RS 422, 2-wire or 4-wire/RS 485, 2-wire) • Receive location specified at BRCV • Character delay time 3.5 characters or multiples thereof • Broadcast message possible
Parameters to be set	• Transmission rate 300 bit/s up to 76800 bit/s; (TTY up to 19200 bit/s) • Character frame • With/without RS 485 mode for 2-wire connections • With/without modem operation (ignore scratch characters) • Response monitoring time 100 ms to 25.5 s in 100 ms steps • Factor for character delay time 1-10 • Reservation of the receive line when using the X.27 interface module
MODBUS Slave	
	• MODBUS protocol with RTU format • Master/slave coupling: SIMATIC S7 is the slave • Implemented function codes: 01, 02, 03, 04, 05, 06, 08, 15, 16 • No V.24 control and signaling line • CRC polynomial X16 + x15 + x2 + 1 • Interfaces: TTY (20 mA), V.24 (RS 232C X.27 (RS 422, 2-wire or 4-wire/RS 485, 2-wire) • Communication FB 180, instance DB 180 (using a multi-instance)

MODBUS Slave	
	• Conversion of the MODBUS data address to S7 data areas. Data areas that can be edited: DB, flags, outputs, inputs, timers, counters • Character delay time 3.5 characters or multiples thereof
Parameters to be set	• Transmission rate 300 bit/s to 76800 bit/s; (TTY up to 19200 bit/s) • Character frame • Slave address of the CP (1 to 255) • With/without RS 485 mode for 2-wire connection • With/without modem operation (ignore scratch characters) • Factor for character delay time 1-10 • Number of the work DB (for FB processing) • Enabling of memory areas that can be written by the master • Reservation of the receive line when using the RS 422 (X.27) interface module • Conversion of the MODBUS addresses to S7 data areas
Data Highway	
	• Data Highway Full Duplex (DF1) protocol • Interfaces: TTY (20 mA), V.24 (RS 232C), RS 422 (4-wire) • No "embedded responses"
Parameters to be set	• Transmission rate 300 bit/s to 76800 bit/s; (TTY up to 19200 bit/s) • Character frame: 7/8 bit; 1/2 Stop bit; even/odd/no parity • Receiving location DB and data word • Timeout for acknowledge character: 30 ms to 10 s • Number of repeats for NAK: 0 to 5 • Number of ENQ requests: 0 to 5 • Duplicate Message Transmission-Detection: On or Off • Acknowledgement for CP immediately on receipt or only after transfer to the CPU

CP 341

Ordering data	Order No.
CP 341 communications processor	**6ES7 341-1AH01-0AE0**
with one RS 232 C (V.24) interface	
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 341 communications processor	**6ES7 341-1BH01-0AE0**
with one 20 mA (TTY) interface	
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 341 communications processor	**6ES7 341-1CH01-0AE0**
with one RS 422/485 (X.27) interface	
RS 422/485 connecting cable	
for linking to SIMATIC S7	
5 m	**6ES7 902-3AB00-0AA0**
10 m	**6ES7 902-3AC00-0AA0**
50 m	**6ES7 902-3AG00-0AA0**

	Order No.
CP 341 manual	
German	**6ES7 341-1AH00-8AA0**
English	**6ES7 341-1AH00-8BA0**
French	**6ES7 341-1AH00-8CA0**
Italian	**6ES7 341-1AH00-8EA0**
Loadable drivers for CP 341	
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, witout 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



The CP 343-2 is the AS-Interface master for PLC SIMATIC S7-300 and the distributed I/O device ET 200M. The new communications processor offers the following functions:

- Connection of up to 62 AS-Interface slaves and integrated analog value transmission (according to expanded AS-Interface Specification V2.1)
- Supports all AS-Interface master functions according to expanded AS-Interface Specification V2.1
- Display of operating status and operational readiness of the connected slaves through LEDs in the front-plate
- Display errors (incl. AS-Interface voltage errors, configuration errors) through LEDs in the frontplate
- Compact housing in the design of 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 PLC	16 byte I/O and P-bus S7-300
• 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
Permissible ambient 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 for connection of SIMATIC S7-300 and ET 200M to AS-Interface according to extended AS-Interface; without front connector	**6GK7 343-2AH00-0XA0**
Front connector 20-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AJ00-0AA0**
• 100 units	**6ES7 392-1AJ00-1AB0**

	Order No.
CP 343-2 manual including software (FC) and examples	
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 Communications systems, protocols, products; on CD-ROM, German/English	**6GK1 975-1AA00-3AA0**

CP 342-5

Overview



- PROFIBUS DP master or slave with electrical interface to connect the SIMATIC S7-300 and the SIMATIC C7 to PROFIBUS up to 12 Mbit/s (including 45.45 kbit/s)
- Direct connection to the optical PROFIBUS-Network through FOC interface for plastic and PCF FO cables.
- Communication services:
  - PROFIBUS DP
  - PG/OP communication
  - S7 communication (Client, Server, Multiplexing)
  - S5-compatible communication (SEND/RECEIVE)
- Simple configuration and programming using PROFIBUS
- PG/OP communication between networks through S7 routing.
- Module changeover without PG

Technical specifications

Data transmission rate	9.6 to 12 Mbit/s (exception: 3 and 6 Mbit/s)
Interfaces	
• Connection to PROFIBUS	9-pin Sub-D socket
• Supply voltage	4-pole 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
Permissible ambient 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 interface (SEND/RECEIVE)	
• Number of usable connections	Max. 16
• Useful data/connections	Max. 240 byte (SEND and RECEIVE)

Multi-protocol operation	
• Number of usable connections	Max. 32 (without DP); max. 28 (with DP)
• Size of DP diagnostics data per connected slave	Max. 240 byte
DP master function	
• DP Master	DP-VO
• Number of DP slaves	124
• Total size of DP data ranges	
- DP input range	2160 byte
- DP output range	2160 byte
• Size of DP data ranges per connected slave	
- DP input range	244 byte
- DP output range	244 byte
DP slave function	
• DP slave	DP-VO
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.
CP 342-5 communications processor for connection of SIMATIC S7-300 to PROFIBUS up to 12 Mbit/s; with electronic manual on CD-ROM	**6GK7 342-5DA02-0XE0**
NCM S7 configuration software for PROFIBUS	Delivered with STEP 7 V5 onwards
NCM S7 manual for PROFIBUS Paper version, for V5.x (STEP 7 V5.x)	
German	**6GK7 080-5AA04-8AA0**
English	**6GK7 080-5AA04-8BA0**
French	**6GK7 080-5AA04-8CA0**
Spanish	**6GK7 080-5AA04-8DA0**
Italian	**6GK7 080-5AA04-8EA0**
Manual "Communication for SIMATIC S7-300/-400"	
German	**6ES7 398-8EA00-8AA0**
English	**6ES7 398-8EA00-8BA0**
French	**6ES7 398-8EA00-8CA0**
Spanish	**6ES7 398-8EA00-8DA0**
Italian	**6ES7 398-8EA00-8EA0**

	Order No.
PROFIBUS bus connector IP 20 for connection to PPI, MPI, PROFIBUS	
Without PG interface	**6ES7 972-0BA12-0XA0**
With PG interface	**6ES7 972-0BB12-0XA0**
PROFIBUS FastConnect bus connector RS 485 with 90° outgoing feeder cable; with insulation displacement system, max. transmission rate 12 Mbit/s	
Without PG interface	**6ES7 972-0BA50-0XA0**
With PG interface	**6ES7 972-0BB50-0XA0**
PROFIBUS 12M bus terminal Bus terminal for connection of PROFIBUS stations up to 12 Mbit/s; with connecting cable	**6GK1 500-0AA10**
DM 370 dummy module	**6ES7 370-0AA01-0AA0**

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 up to 12 Mbit/s (including 45.45 kbit/s)
- Direct connection to the optical PROFIBUS network through integrated fiber-optic cable interface for plastic and PCF fiber optics
- Communication services:
  - PROFIBUS-DP
  - PG/OP communication
  - S7 communication (client, server, multiplexing)
  - S5-compatible communication (SEND/RECEIVE))
- Simple configuration and programming using PROFIBUS
- PG/OP communication between networks through S7 routing.
- Module changeover without 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 socket
• 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. ambient conditions	
• Operating temperature	0 °C to +60 °C
• Transport/storage temperature	-40 °C to +70 °C
• Relative humidity	Max. 95% at +25°C
• Operating altitude	
Design	Compact assembly
• Module format	40 x 125 x 120
• Dimensions (W x H x D) in mm	Approx. 300 g
• Weight	4
Performance data	
S7 communication	
• No. of usable connections	Max. 16

DP master function	
• DP master	DP-V0
• Number of operational DP slaves	124
• Size of the DP data ranges in total	
- 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	
• Size of DP data storage areas	
- DP input range	240 byte
- DP output range	240 byte
PG/OP communication	
• Number of operable OP connections (acyclic services)	16
S5-compatible interface (SEND/RECEIVE)	
• No. of usable connections	Max. 16
• Useful data/connections	Max. 240 byte (send and receive)
Multi-protocol operation	
• No. of usable connections	32 (without DP); max. 28 (with DP)

Ordering data	Order No.
CP 342-5 FO 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**
NCM S7 configuration software for PROFIBUS	Delivered with STEP 7 V5 onwards
NCM S7 manual for PROFIBUS Paper version, for V5.x (STEP 7 V5.x)	
German	**6GK7 080-5AA04-8AA0**
English	**6GK7 080-5AA04-8BA0**
French	**6GK7 080-5AA04-8CA0**
Spanish	**6GK7 080-5AA04-8DA0**
Italian	**6GK7 080-5AA04-8EA0**

	Order No.
Manual for PROFIBUS networks Paper version Network architecture, components (OLM (V3), OBT, ILM), configuration and assembly	
German	**6GK1 970-5CA20-0AA0**
English	**6GK1 970-5CA20-0AA1**
PROFIBUS Plastic Fiber Optic, simplex plug/polishing kit 100 simplex plugs and 5 polishing sets for assembling PROFIBUS plastic fiber-optic cables for the optical PROFIBUS DP	**6GK1 901-0FB00-0AA0**
PROFIBUS Plastic Fiber Optic, stripping tool set Tools for removing the outer casing and core casing	**6GK1 905-6PA10**
Plug adapter for installing plastic simplex plugs; 50 units	**6ES7 195-1BE00-0XA0**

CP 343-5

Overview



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

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

Technical specifications

Data transmission rate	9.6 to 12 Mbit/s
Interfaces	
• Connection to PROFIBUS	9-pin Sub-D socket
• 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. ambient 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

1) Depending on the CPU used

S7 communication performance data	
• Number of usable connections	Max. 16 [1]
S5-compatible interface performance data (SEND/RECEIVE)	
• Number of usable connections	Max. 16
• Useful data/connection	Max. 240 byte (SEND and RECEIVE)
Performance data FMS function	
• Number of usable connections	max. 16
• Variable length for READ	237 byte
• Variable length for WRITE and REPORT	233 byte
• No. of configurable server variables	256
• No. of variables which can be loaded from partner	256
Multi-protocol operation	
• Number of operable connections	Max. 48

Ordering data

	Order-No.
CP 343-5 communications processor for connecting SIMATIC S7-300 to PROFIBUS	**6GK7 343-5FA01-0XE0**
NCM S7 configuration software for PROFIBUS	Delivered with STEP 7 V5 onwards
NCM S7 manual for PROFIBUS	See CP 342-5
Manual "Communication for SIMATIC S7-300/-400"	See CP 342-5
PROFIBUS bus connector IP 20	See CP 342-5
PROFIBUS FastConnect bus connector RS 485	See CP 342-5
PROFIBUS 12M bus terminal	See CP 342-5
DM 370 dummy module	See CP 342-5

Overview



- 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
  - Multiprotocol mode with ISO and TCP transport protocol
  - Adjustable Keep Alive function
- Communication services:
  - ISO and TCP/IP transport protocols
  - PG/OP communication
  - S7 communication (client, server, multiplexing)
  - S5-compatible communication
- Multicast at UDP
- Remote programming and commissioning through the network
- Configuration of the CP 343-1 with the option package NCM S7 for Industrial Ethernet (integrated in STEP 7)
- With S7 routing, PG/OP communication can be used across the whole network.

Technical specifications

Data transmission rate	10 Mbit/s und 100 Mbit/s
Interfaces	
• Connection to Industrial Ethernet (10/100 Mbit/s)	15-pin Sub-D socket (automatic switching between AUI and industrial twisted pair)
• 10BaseT, 100BaseTX	RJ45
• Supply voltage	4-pin terminal block
Supply voltage	+5 V DC (±5%) and +24 V DC (±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	8.3 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
Design	
• Module format	Compact S7-300 module double width

Design	
• 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.x)
Performance data	
S5-compatible communication (SEND/RECEIVE)	
Sum of all simultaneously operable ISO/TCP/UDP connections	Max. 16
• No. of useful data	Max. 8 KB
- ISO or TCP	Max. 8 KB
- UDP	Max. 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. 32

Ordering data

	Order No.
CP 343-1 communications processor for connecting SIMATIC S7-300 to Industrial Ethernet using ISO, TCP/IP and UDP	**6GK7 343-1EX11-0XE0**
NCM S7 configuration software for Industrial Ethernet	Delivered with STEP 7 V5 onwards
NCM S7 manual for Industrial Ethernet Paper version, for V5.x (STEP 7 V5.0)	
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**

	Order No.
Manual "Communication for SIMATIC S7-300/-400"	See CP 342-5
SIMATIC NET electronic manuals German, English; on CD-ROM	**6GK1 975-1AA00-3AA0**

CP 343-1 IT

Overview



- 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
  - Multi-protocol operation for ISO, TCP/IP and UDP
  - Adjustable Keep Alive function
- Communication services:
  - ISO, TCP/IP and UDP transport protocol
  - PG/OP communication
  - S7 communication
  - S5-compatible communication
  - IT communication
- Web function for accessing process data through Web browser
- E-mail function for sending electronic mail from the S7-300
- FTP server and client function for communication with data
- Multicast at UDP
- PG/OP communication between networks through S7 routing.
- Remote programming and commissioning through the network

Technical specifications

Data transmission rate	**10 Mbit/s or 100 Mbit/s**
Interfaces	
• Connection to Industrial Ethernet (10/100 Mbit/s)	15-pin Sub-D socket (automatic switching betw. AUI and industrial and twisted pair)
• 10BaseT, 100BaseTX	RJ45
• Supply voltage	4-pin terminal block
Supply voltage	+5 V DC (±5%) and +24 V DC (±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	8.3 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
Design	
• Module format	Compact module S7-300 double width
• Dimensions (B x H x T) in mm	80 x 125 x 120
• Weight	Approx. 600 g

Design	
Configuration software	NCM S7 for Industrial Ethernet (supplied with STEP 7 V5.x)
Performance data	
IT communications	
Number of connections to an e-mail server	Max. 1
Memory capacity of the file system	10 MB
S5-compatible communication	
(SEND/RECEIVE)	
• Sum of all simultaneously operable ISO/TCP/UDP connections	Max. 16
• Number of useful data	
- ISO or TCP	Max. 8 KB
- UDP	Max. 2 KB
S7 communication	
• Number of connections [1]	Max. 16
PG/OP communication	
• Number of usable OP connections (acyclic utilities)	Max. 16
Multi protocol operation	
• Sum of all simultaneously operable connections	Max. 32

1) Depends on the S7 CPU being used

Ordering data

	Order No.
CP 343-1 IT communications processor® for connecting SIMATIC S7-300 to Industrial Ethernet for S5-compatible communication, S7 communication, e-mail and www server, 10/100 Mbit/s, with electronic manual on CD-ROM	**6GK7 343-1GX11-0XE0**

	Order No.
NCM S7 configuration software for Industrial Ethernet	Delivered with STEP 7 V5 upwards
NCM S7 manual for Industrial Ethernet	See CP 343-1

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 defines an engineering model or distributed automation solutions and a model for system-wide communication through PROFIBUS and Industrial Ethernet with IT standards
- Additional communications services:
  - PG/OP communication
  - S7 communication
  - S5 compatible communication
- Multicast at UDP
- Remote programming and commissioning through the network
- Or S5-compatible communication

4

Technical specifications

Data transmission rate	10 Mbit/s and 100 Mbit/s autosensing
Interfaces	
• Connection to Industrial Ethernet AUI/industrial twisted pair	15-pin Sub-D socket with slide catch (automatic switchover between AUI and twisted pair)
• Twisted pair (10Base/100BaseT)	RJ45 socket
• Connection for power supply	4-pin terminal block
Supply voltage	+5 V DC (±5%) and +24 V DC (±5%)
Current consumption	
• From backplane bus	70 mA
• From external 24 V DC	Typ. 400 mA max. 580 mA (depends on the interface being used)
Power loss, approx.	10 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
Design	
• Module format	Compact module S7-300, double width

Design	
• Dimensions (W x H x D) in mm	80 x 125 x 120
• Weight	Approx. 600 g
Degree of protection	IP 20
Configuration	
• Configuration software for PROFInet	Option package SIMATIC iMap
• Configuration software for additional services	NCM S7 for Industrial Ethernet (supplied with STEP 7 v.5.x)
Performance data	
PROFInet Communication	
• Number of communication partners	Max. 64
S5 compatible communication (SEND/RECEIVE)	
• Sum of all simultaneously operable TCP/UDP connections	Max. 16
• Number of useful data,	
- TCP	Max. 8 KB
- UDP	Max. 2 KB
S7 and PG/OP communication	
• Number of connections[1)]	Max. 16
• Multi-protocol operation	
• Sum of all simultaneously operable connections	Max. 32

1) Depends on the S7 CPU being used

Ordering data

	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**

	Order No.
NCM S7 configuration software for Industrial Ethernet	Delivered with STEP 7 V5 onwards
NCM S7 manual for Industrial Ethernet	See CP 343-1
SIMATIC iMap V1.1 Linking editor for configuring of communication with Component based Automation	
Single license	**6ES7 820-0CC01-0YX0**
Software update service	**6ES7 820-0CC01-0YX0**

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 unit	**6ES7 392-1AJ00-0AA0**
• 100 units	**6ES7 392-1AJ00-1AB0**
20-pin, with spring-loaded terminals; 1 unit	**6ES7 392-1BJ00-0AA0**

	Order No.
Front connector	
40-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AM00-0AA0**
• 100 units	**6ES7 392-1AM00-1AB0**
40-pin, with spring-loaded terminals; 1 unit	**6ES7 392-1BM01-0AA0**

SIMATIC TOP connect; fully modular connection

Overview



- The standard connection for SIMATIC S7-300
- For fast and error-free connection of sensors and actuators for distances of up to 3 m
- For clear and understandable wiring in the switching cabinet
- Comprising front connector module, connecting cable and terminal block
- All components are easy to plug in and can be replaced individually

For further information:

- Internet: http://www.siemens.de/simatic_tc
- Catalog KT 10.2

Technical specifications

Front connector module	
Rated operating voltage	**24 V DC**
Max. permissible operating voltage	**60 V DC**
Max. permissible continuous current • Per connector pin	1 A
Max. permissible continuous current	4 A/byte
Permissible ambient temperature	0 to + 60 °C
Test voltage	0.5 kV, 50 Hz, 60 s
Clearances and creepage distances	IEC 664 (1980), IEC 664 A (1981), to DIN VDE 0110 (01.89), overvoltage class II, pollution severity 2

Front connector module 16-core and 2 x 16-core twisted ribbon cable from SIMATIC S7 to terminal block	
Operating voltage	**60 V DC**
Continuous current per signal conductor	1 A
Max. total current	4 A/byte
Operating temperature	0 to + 60 °C
Outer diameter in mm 16-core/ 2 x 16-core	Approx. 9.5/11.5

Technical specifications (continued)

Terminal blocks for single-wire connection and 3-wire sensors	
Operating voltage, max.	60 V DC
Continuous current per signal	1 A
Total current, max. (supply)	4 A/byte
Operating temperature	0 to + 60 °C
Installation orientation	Any
Clearances 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 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 sensors 6ES7924-0CA00-_A_0	Approx. 60 x 41 x 70
Terminal blocks with 8S relays	
Excitation side	
Inductor operating voltage	**24 V DC**
Connected to input	No
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 make-break operations
• Electrical	600 x 10^3 make-break operations at 230 V AC/2 A/ cos φ = 1
Operating temperature	0 to +60 °C
Installation position	Horizontal, vents running vertically. A space of at least 30 mm must be maintained above and below the relay terminal block for heat dissipation

Terminal blocks with 8S relays (continued)	
Clearances and creepage distances	IEC 1131-2 (1992), EN 50 178 (4/98) overvoltage class III pollution severity 2 Between control 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 pending
Connection blocks can be released for permanent wiring	
• For 24 V infeed for supplying the digital modules	4-pin connection block
• For relay outputs	Two 8-pin connection blocks
Dimensions (W x H x D) in mm	Approx. 60 x 68 x 78
Terminal blocks for 2 A module for SIMATIC S7	
Operating voltage, max.	**60 V DC**
Continuous current per signal line	2 A
Operating temperature	0 to + 60 °C
Installation orientation	Any
Clearances 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 severity 3
Dimensions (W x H x D in mm)	Approx. 60 x 41 x 70
Terminal blocks for SIMATIC S7 analog modules	
Operating voltage, max.	60 V DC
Continuous current per signal line	1 A
Operating temperature	0 to + 60 °C
Installation orientation	Any
Clearances 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 severity 3
Dimensions (W x H x D in mm)	Approx. 60 x 41 x 70

Ordering data

	Order No.
Front connector module (2 x 8 I/O)	
Power supplied by means of	
• spring-loaded terminals	**6ES7 921-3AA00-0AA0**
• screw-type terminals	**6ES7 921-3AB00-0AA0**
Front connector module (4 x 8 I/O)	
Power supplied by means of	
• spring-loaded terminals	**6ES7 921-3AA20-0AA0**
• screw-type terminals	**6ES7 921-3AB20-0AA0**

	Order-No.
Front connector module (1 x 8 I/O) for 2 A modules	
Power supplied by means of	
• spring-loaded terminals	**6ES7 921-3AC00-0AA0**
• screw-type terminals	**6ES7 921-3AD00-0AA0**
Front connector module for analog signal modules	
Power supplied by means of	
• spring-loaded terminals	**6ES7 921-3AF00-0AA0**
• screw-type terminals	**6ES7 921-3AG00-0AA0**

► Available ex works

SIMATIC TOP connect; fully modular connection

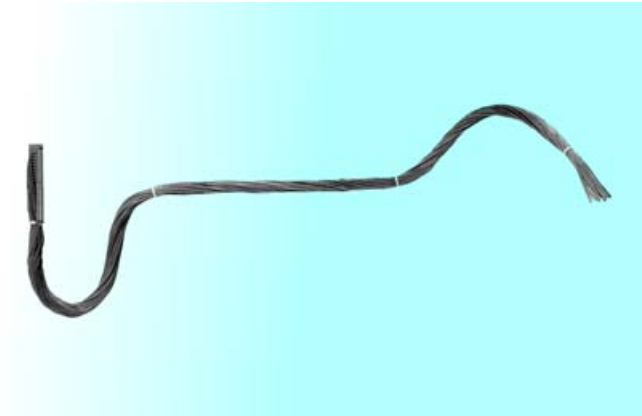
Ordering data (continued)

	Order No.
Connecting cable	
Round-sheath ribbon cable, 16-wire, sold by the meter, unshielded	
• 30 m	**6ES7 923-0CD00-0AA0**
• 60 m	**6ES7 923-0CG00-0AA0**
Shielded	
• 30 m	**6ES7 923-0CD00-0BA0**
• 60 m	**6ES7 923-0CG00-0BA0**
Round-sheath ribbon cable, 2 x 16-wire, sold by the meter, unshielded	
• 30 m	**6ES7 923-2CD00-0AA0**
• 60 m	**6ES7 923-2CG00-0AA0**
Connectors (female ribbon cable connectors)	**6ES7 921-3BE10-0AA0**
8 connectors, 8 cable grips	
Crimping tool	**6ES7 928-0AA00-0AA0**
to attach connectors	
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 2 A 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**

	Order No.
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	**6ES7 928-1BA00-0AA0**
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**

► Available ex works

Overview



- For fast, direct connections to individual elements in the control cabinet
- Comprises front connector with individual cores attached
- Core type H05V-K or UL/CSA
- 0.5 mm² wire cross section also allows higher currents

For further information:

- Internet: http://www.ad.siemens.de/simatic_tc
- Catalog KT 10.2

Technical specifications

Front connector with single cores, 16 channels	
Rated operating voltage	24 V DC
Max. permissible continuous current with simultaneous loading of all cores	1.5 A
Permissible ambient temperature	0 to +60 °C
Cores types	H05V-K single cores or UL-Style 1007/1569 CSA-AWM TR64
Cross-section	0.5 mm², copper
Bunch diameter in mm	Approx. 15
Core color	Blue, numbered 1 to 20 (adapter contact = core number)
Contact type	Screw contacts

Front connector with single cores, 32 channels	
Rated operating voltage	24 V DC
Max. permissible continuous current with simultaneous loading of all cores	1.5 A
Permissible ambient temperature	0 to +60 °C
Number of cores	40 H05V-K- or UL/CSA-Adern
Cross-section	0.5 mm², copper
Bunch diameter in mm	Approx. 17
Core color	Blue, numbered 1 to 40 (adapter contact = core number)
Contact type	Screw contacts

Ordering data

	Order No.
Front connector with single wires 20 x 0.5 mm², screw connection	
for SIMATIC S7-300 (16 I/O); 1 unit	
• H05V-K wires	
2.5 m	**6ES7 922-3BC50-0AB0**
3.2 m	**6ES7 922-3BD20-0AB0**
5.0 m	**6ES7 922-3BF00-0AB0**
Special lengths	On request
• UL/CSA wires	
3.2 m	**6ES7 922-3BD20-0UB0**
5.0 m	**6ES7 922-3BF00-0UB0**
Front connector with single wires 40 x 0.5 mm², screw connection	
for SIMATIC S7-300 (32 I/O); 1 unit	
• H05V-K wires	
2.5 m	**6ES7 922-3BC50-0AC0**
3.2 m	**6ES7 922-3BD20-0AC0**
5.0 m	**6ES7 922-3BF00-0AC0**
Special lengths	On request
• UL/CSA wires	
3.2 m	**6ES7 922-3BD20-0UC0**
5.0 m	**6ES7 922-3BF00-0UC0**

	Order No.
Front connector with single wires 20 x 0.5 mm², screw connection	
for SIMATIC S7-300 (16 I/O); pack of 5	
• H05V-K wires	
2.5 m	**6ES7 922-3BC50-5AB0**
3.2 m	**6ES7 922-3BD20-5AB0**
5.0 m	**6ES7 922-3BF00-5AB0**
Front connector with single wires 40 x 0.5 mm², screw connection	
for SIMATIC S7-300 (32 I/O); pack of 5	
• H05V-K wires	
2.5 m	**6ES7 922-3BC50-5AC0**
3.2 m	**6ES7 922-3BD20-5AC0**
5.0 m	**6ES7 922-3BF00-5AC0**

► Available ex works

SIMATIC TOP connect; flexible connection

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Ordering data (continued)

	Order No.
Front connector with single wires 20 x 0.5 mm², crimp connection	
for SIMATIC S7-300 (16 I/O); 1 unit	
• H05V-K wires	
2.5 m	**6ES7 922-3BC50-0AF0**
3.2 m	**6ES7 922-3BD20-0AF0**
5.0 m	**6ES7 922-3BF00-0AF0**

	Order No.
Front connector with single wires 40 x 0.5 mm², crimp connection	
for SIMATIC S7-300 (32 I/O); 1 unit	
• H05V-K wires	
2.5 m	**6ES7 922-3BC50-0AG0**
3.2 m	**6ES7 922-3BD20-0AG0**
5.0 m	**6ES7 922-3BF00-0AG0**

Overview



- For connecting the racks in multi-tier configurations of the SIMATIC S7-300
- IM 365:
  For configuring a central controller and no more than one expansion rack
- IM 360/IM 361:
  For configuring a central controller and up to four expansion racks

Technical specifications

Interface modules	IM 365	IM 360	IM 361
Max. interface modules per CPU	1 pair	1	3
Supply voltage (external)	-	-	24V DC
Current consumption			
• From 24 V DC line	-	-	0.5 A
• From internal bus (5 V)	100 mA	350 mA	-
Power loss typ.	0.5 W	2 W	5 W
Dimensions (W x H x D) in mm	40 x 125 x 120 per module	40 x 125 x 120	80 x 125 x 120
Weight, approx.	580g (total)	225 g	505 g

Ordering data

	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**

	Order-No.
IM 365 interface module to expand the S7-300 by max. 1 EU; 2 modules with fixed connecting cable (1 m)	
Standard temperature range	**6ES7 365-0BA01-0AA0**
Extended temperature range	**6ES7 365-0BA81-0AA0**
SIMATIC Manual Collection	**6ES7 998-8XC01-8YE0**
SIMATIC Manual Collection updating service for 1 year	**6ES7 998-8XC01-8YE2**
S7-300 manual Design, CPU data, module data, instruction 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**

► Available ex works

PS 307 power supply modules

Overview



- Load power supplies for S7-300/ET 200M
- For conversion of the line voltage to the required operating voltage of 24 V DC
- Output current of 2 A, 5 A or 10 A

Technical specifications

Power supply, type	2 A	2 A	5 A	5 A	10 A
Order No. [1]	**6ES7 307-1BA00-0AA0**	**6ES7 305-1BA80-0AA0**	**6ES7 307-1EA00-0AA0**	**6ES7 307-1EA80-0AA0**	**6ES7 307-1KA01-0AA0**
Input	Single-phase AC	Direct voltage	Single-phase AC	Single-phase AC	Single-phase AC
Rated voltage $V_{in\ rated}$	**120/230 V AC** set with selector switch on the unit	**24 to 110 V DC** Wide-range input	**120/230 V AC** set with selector switch on the unit	**120/230 V AC** set with selector switch on the unit	**120/230 V AC** set with selector switch on the unit
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	85 to 132 V/170 to 264 V AC
Surge strength	2.3 x Vin $_{rated}$, 1.3 ms	154 V; 0.1 s	2.3 x $V_{in\ rated}$,1.3 ms	2.3 x $V_{in\ rated}$, 1.3 ms	2.3 x Vin $_{rated}$, 1.3 ms
Mains buffering at $I_{out\ rated}$	> 20 ms at V_{in} = 93/187 V	> 10 ms at $V_{in\ rated}$	> 20 ms at V_{in} = 93/187 V	> 20 ms at V_{in} = 93/187 V	> 20 ms at V_{in} = 93/187 V
Rated line frequency, 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 $I_{in\ rated}$	0.9/0.6 A	2.7-0.6 A (4-0.9 A)	2,1/1, 3 A	2.1/1.2 A	4.1/1.8 A
Inrush current limiting (+25 °C)	< 20 A, < 3 ms	< 20 A, < 10 ms	< 45 A, < 3 ms	< 45 A, < 3 ms	< 55 A, < 3 ms
I^2t	< 1.0 A^2s	< 5 A^2s	< 1.2 A^2s	< 1.8 A^2s (typ. 1.2 A^2s)	< 3.3 A^2s
Integral 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 6.3 A/250 V (not accessible)
Recommended circuit-breaker (IEC 898) in the supply cable	From 3 A, characteristic C	From 10 A, characteristic C, suitable for DC	From 6 A, characteristic C	From 10 A, characteristic C or from 6 A, characteristic D	From 10 A, characteristic
Output	Regulated, floating direct voltage	Regulated, floating direct voltage	Regulated, floating direct voltage	Regulated, floating direct voltage	Regulated, floating direct voltage
Rated voltage $V_{out\ rated}$	**24 V DC**	**24 V DC**	**24 V DC**	**24 V DC**	**24 V DC**
Total tolerance	± 3 %	± 3 %	± 3 %	± 3 %	± 3 %
• Steady-state line compensation	• Approx. 0.1 %	Approx. 0.2 %	Approx. 0.1 %	± 0.2 %	Approx. 0.1 %
• Steady-state load compensation	• Approx. 0.2 %	Approx. 0.4 %	Approx. 0.2 %	± 0.4 %	Approx. 0.5 %
Residual ripple (switching 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. 100 mV_{pp})
Setting range	-	-	-	-	-
Status indicator	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.
Turn-on/off response	No overshoot of V_{out} (soft starting)	No overshoot of V_{out} (soft starting)	No overshoot of V_{out} (soft starting)	No overshoot of V_{out} (soft starting)	No overshoot of V_{out} (soft starting)
Starting 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	< 1.5 s/typ. 80 ms

1) For mounting on a standard rail (35 mm x 15 mm), versions are available with an integrated mounting adapter: Order No. 6EP1331-1SL11

Technical specifications (continued)

Power supply, type	**2 A**	**2 A**	**5 A**	**5 A**	**10 A**
Rated current $I_{out\ rated}$	**2 A**	**2 A (3 A for U_e > 24 V)**	**5 A**	**5 A**	**10 A**
Current range					
• Up to +45 °C	• 0 to 2 A	0 to 2 A (3A)	0 to 5 A	0 to 5 A	0 to 10 A
• Up to +60 °C	• 0 to 2 A	0 to 2 A (3A)	0 to 5 A	0 to 5 A	0 to 10 A
Dynamic V/I for					
• Starting into short-circuit	• Typ. 10 A for 90 ms	Typ. 9 A for 270 ms	Typ. 20 A for 75 ms	20 A for 180 ms	Typ. 35 A for 80 ms
• Short-circuit in operation	• Typ. 10 A for 90 ms	Typ. 9 A for 270 ms	Typ. 20 A for 75 ms	20 A for 80 ms	Typ. 35 A for 150 ms
Parallel connection to increase power	Not permissible	Yes, 2 units	Not permissible	Not permissible	Not permissible
Efficiency					
Efficiency at $V_{out\ rated}$, $I_{out\ rated}$	Approx. 83%	Approx. 75%	Approx. 87%	Approx. 84%	Approx. 87%
Power loss at $V_{out\ rated}$, $I_{out\ rated}$	Approx. 10 W	Approx. 16 W (24 W)	Approx. 18 W	Approx. 23 W	Approx. 34 W
Regulation					
Dynamic line compensation ($V_{in\ rated}$ ±15 %)	± 0.3% V_{out}	± 0.3 % V_{out}	± 0.3% V_{out}	± 0.3% V_{out}	± 0.3% V_{out}
Dynamic load compensation (I_{out}: 50/100/50 %)	± 0.8% V_{out}	± 2.5 % V_{out}	± 2.5% V_{out}	± 3% V_{out}	± 2.5% V_{out}
Correction time					
• Load step 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
• Load step 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
Protection and monitoring					
Output overvoltage protection	Additional control circuit, shutdown at approx. 30 V, auto. restart	Additional control circuit, shutdown at approx. 30 V, auto. restart	Additional control circuit, shutdown at approx. 30 V, auto. restart	Additional control circuit, shutdown at approx. 30 V, auto. restart	Additional control circuit, shutdown at approx. 30 V, auto. restart
Current limiting	2.2 to 2.6 A	3.3 to 3.9 A	5.5 to 6.5 A	5.5 to 6.5 A	11 to 12 A
Short-circuit protection	Electronic shutdown, auto restart	Electronic shutdown, auto. restart	Electronic shutdown, auto. restart	Electronic shutdown, auto. restart	Electronic shutdown, auto. restart
Continuous short-circuit RMS current	< 4 A	< 2 A	< 9 A	< 5 A	< 10 A
Overload/short-circuit indicator	-	-	-	-	-
Safety					
Isolation primary/secondary	Yes, SELV output voltage V_{out} acc. to EN 60 950 and EN 50 178	Yes, SELV output voltage V_{out} to EN 60 950 and EN 50 178, clearances and creepage distances > 5 mm	Yes, SELV output voltage V_{out} acc. to EN 60 950 and EN 50 178	Yes, SELV output voltage V_{out} to EN 60 950 and EN 50 178, clearances and creepage distances > 8 mm	Yes, SELV output voltage V_{out} acc. to EN 60 950 and EN 50 178
Protective class	Class I	Class I	Class I	Class I	Class I
Discharge 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. 0.5 mA)
Technical Inspectorate type testing	Yes	Yes	Yes	Yes	Yes
CE marking	Yes	Yes	Yes	Yes	Yes
UL/cUL (CSA) approval	Yes, UL/CSA-listed (UL 508, CSA 22.2), File E143289	Yes, UL/CSA-listed (UL 508, CSA 22.2), File E143289	Yes, UL/CSA-listed (UL 508, CSA 22.2), File E143289	Yes, UL/CSA-listed (UL 508, CSA 22.2), File E143289	Yes, UL/CSA-listed (UL 508, CSA 22.2), File E143289
FM approval	Yes, Class I Div. 2 Group A, B, C, D T4	-	Yes, Class I Div. 2 Group A, B, C, D, T 4	-	Yes, Class I Div. 2, A, B, C, D, T4
Shipbuilding approval	In S7-300 range	Yes, GL, ABS, DNV, LRS	In S7-300 range	Yes, GL, ABS, DNV, LRS	In S7-300 range
Degree of protection (EN 60 529; VDE 0470 T1)	IP 20	IP 20	IP 20	IP 20	IP 20

PS 307 power supply modules

Technical specifications (continued)

Power supply, type	2 A	2 A	5 A	5 A	10 A
EMC					
Emitted interference	EN 50 081-1, EN 55 022 Class B	EN 50 081-1, EN 55 011 Class A	EN 50 081-1, EN 55 022 Class B	EN 55 011 Class A EN 50 081-2,	EN 50 081-1, EN 55 022 Class B
Line harmonic limiting	Not applicable	Not applicable	EN 61 000-3-2	-	-
Interference immunity	EN 61 000-6-2, EN 61 000-4-2, -3, -4, -5,-6,-11	EN 50 082-2, IEC 801-2, -3, -4, -5, prEN 50 121-3, -2	EN 61 000-4-2, -3, -4, -5, -6, -11	EN 50 082-2, IEC 801-2, -3, -4, -5	EN 61 000-6-2, EN 61 000-4-2, -3, -4,-5, -6, -11
Operating specifications					
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	0 to +60 °C with natural convection
Non-operating temperature range	-40 to +85 °C	- 25 to + 85 °C	-40 to +85 °C	- 25 to + 85 °C	-40 to +85 °C
Humidity class	Climate class 3K3 to EN 60 721	Climate class 3K5 acc. to EN 60 721, brief condensation permissible	Climate class 3K3 to EN 60 721	Relative humidity up to 75 % average value, 95 % on 30 days/year, brief condensation permissible	Climate class 3K3 to EN 60 721
Mechanical specifications					
Terminals					
• Supply input L, N, PE (DC input: L+1, M1, PE)	• One screw terminal each for 0.5 to 2.5 mm^2 solid/stranded	One screw terminal each for 0.5 to 2.5 mm^2 solid/stranded	One screw terminal each for 0.5 to 2.5 mm^2 solid / stranded	One screw terminal each for 0.5 to 2.5 mm^2 solid / stranded	One screw terminal each for 0.5 to 2.5 mm^2 solid / stranded
• Output L+	• 2 screw terminals for 0.5 to 2.5 mm^2	3 screw terminals for 0.5 to 2.5 mm^2	3 screw terminals for 0.5 to 2.5 mm^2	3 screw terminals for 0.5 to 2.5 mm^2	4 screw terminals for 0.5 to 2.5 mm^2
• Output M	• 2 screw terminals for 0.5 to 2.5 mm^2	3 screw terminals for 0.5 to 2.5 mm^2	3 screw terminals for 0.5 to 2.5 mm^2	3 screw terminals for 0.5 to 2.5 mm^2	4 screw terminals for 0.5 to 2.5 mm^2
Dimensions in (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	120 x 125 x 120
Approx. weight	0.42 kg	0.75 kg	0.74 kg	0.57 kg	1.1 kg
Mounting [1]	Snap-mounting on S7 rails[1]	Snap-mounting on S7 rail	Snap-mounting on S7 rail[1]	Snap-mounting on S7 rail	Snap-mounting on S7 rail[3]
Accessories [1]	Mounting adapter for standard rail and PS-CPU connector[1]	Mounting adapter for standard rail and PS-CPU connector	Mounting adapter for standard rail and PS-CPU connector[1]	Mounting adapter for standard rail and PS-CPU connector	Mounting adapter for standard rail and PS-CPU connector[3]

1) For mounting on a standard rail (35 mm x 15 mm), versions are available with an integrated mounting adapter: Order No. 6EP1331-1SL11
2) Delivery planned for December 2002; Successor type for 6ES7 307-1KA00-0AA0.
3) For mounting on a standard rail (35 mm x 15 mm), versions are available with an integrated mounting adapter: Order No. 6EP1334-1SL12

Ordering data

	Order No.
PS 307 load power supply module	
including power connector; 120/230 V AC; 24 V DC	
2 A	**6ES7 307-1BA00-0AA0**
2 A, extended temperature range	**6ES7 305-1BA80-0AA0**
5 A	**6ES7 307-1EA00-0AA0**
5 A, extended temperature range	**6ES7 307-1EA80-0AA0**
10 A (PS 307-1K)	**6ES7 307-1KA01-0AA0**

	Order No.
Mounting adapter	**6ES7 390-6BA00-0AA0**
for snapping PS 307 to the 35 mm DIN rail (EN 50 022)	
PS-CPU power connector	**6ES7 390-7BA00-0AA0**
Spare part	
S7 Manual Collection, S7-300 manual	See SM 321

► Available ex works

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	**6ES7 390-1AB60-0AA0**
482 mm	**6ES7 390-1AE80-0AA0**
530 mm	**6ES7 390-1AF30-0AA0**
830 mm	**6ES7 390-1AJ30-0AA0**
2000 mm	**6ES7 390-1BC00-0AA0**

Labeling sheets

Overview

Labeling sheets

- Film sheets for application-specific labeling of I/O modules of the SIMATIC S7-300 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 fail-safe systems

Additional information is available in the internet under:
http://www.s7-smartlabel.de.

Technical specifications

Dimensions	DIN A4
Labeling strips per sheet, pre-perforated	10
Weight, approx.	0.1 kg

Ordering data

	Order No.
Labelling 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**
Labelling sheets	
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**

► Available ex works

Labeling strips

Overview

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

Ordering data

	Order No.		Order No.
Labelling strips for signal modules (except 32-channel), function modules and CPU 312 IFM	**6ES7 392-2XX00-0AA0**	**Labelling strips** for 32-channel signal modules	**6ES7 392-2XX10-0AA0**

Labelling cover

Overview

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

Ordering data

	Order No.		Order No.
Labelling cover for signal modules (except 32-channel), function modules and CPU 312 IFM	**6ES7 392-2XY00-0AA0**	**Labelling cover** for 32-channel signal modules	**6ES7 392-2XY10-0AA0**