

SIMATIC S7-1200



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Brochures

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

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

SIMATIC S7-1200

Introduction

S7-1200

Overview



- The new modular miniature controller from the SIMATIC S7 family
- Consisting of:
 - controller with integrated PROFINET interface for communication with programming device, HMI or other SIMATIC controllers
 - powerful, integrated technology functions such as counting, measuring, closed-loop control, and motion control
 - integrated digital and analog inputs/outputs
 - signal boards for direct use in a controller
 - signal modules for expansion of controllers by input/output channels
 - communication modules for expansion of controllers by communications interfaces
 - accessories, e.g. power supply, switch module or SIMATIC Memory Card
- The miniature controller that offers maximum automation at minimum cost
- Extremely simple installation, programming and operation
- Large-scale integration, space-saving, powerful
- Suitable for small to medium-size automation engineering applications
- Can be used both for simple controls and for complex automation tasks
- All CPUs can be used in stand-alone mode, in networks and within distributed structures
- Suitable for applications where programmable controllers would not have been economically viable in the past
- With exceptional real-time performance and powerful communication options

Application

The SIMATIC S7-1200 is the controller for open-loop and closed-loop control tasks in mechanical equipment manufacture and plant construction. It combines maximum automation and minimum cost.

Due to the compact modular design with a high performance at the same time, the SIMATIC S7-1200 is suitable for a wide variety of automation applications. Its range of use extends from the replacement of relays and contactors up to complex automation tasks in networks and within distributed structures.

The S7-1200 also increasingly opens up areas for which special electronics was previously developed for economical reasons.

Application examples include, for example:

- Placement systems
- Conveyor systems
- Elevators and escalators
- Material transportation equipment
- Metalworking machinery
- Packaging machines
- Printing machines
- Textile machines
- Mixing systems
- Freshwater treatment plants
- Wastewater treatment plants
- External displays
- Electricity distribution stations
- Room temperature control
- Heating/cooling system control
- Energy management
- Fire protection systems
- Air conditioning
- Lighting control
- Pump control
- Security/access control systems

Design

The SIMATIC S7-1200 family consists of the following modules:

- 3 compact controllers with graded performances in different versions as wide-range AC or DC controllers
- 2 signal boards (analog and digital) for low-cost modular controller expansion directly on the CPU, with retention of the mounting space
- 13 different digital and analog signal modules
- 2 communication modules (RS232/RS485) for communication via point-to-point connection
- Ethernet switch with 4 ports for implementation of many different network topologies
- PS 1207 stabilized power supply units, line voltage 115/230 V AC, rated voltage 24 V DC

Mechanical features

- Rugged, compact plastic enclosure
- Easily accessible connection and control elements, protected by front flaps
- Removable connection terminals, also for analog or digital expansion modules

Device features

- International standards: SIMATIC S7-1200 complies with the standards according to VDE, UL, CSA and FM (Class I, Category 2; Danger zone groups A, B, C and D, T4A). The quality management system used during production is certified according to ISO 9001

Design (continued)

Communication

The SIMATIC S7-1200 is equipped with different communication mechanisms:

- Integral PROFINET interface
- Point-to-point connection via communication modules

PROFINET interface

The integral PROFINET interface permits communication with:

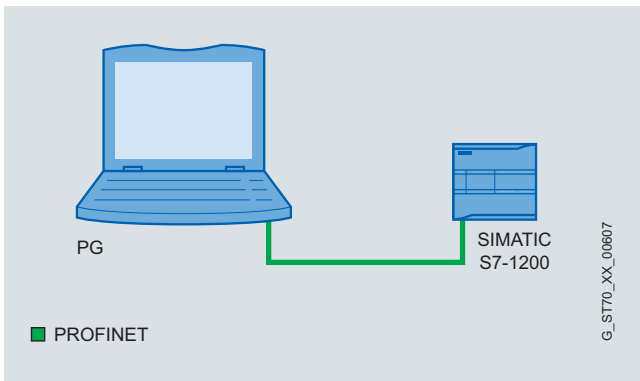
- Programming device
- HMI devices
- Other SIMATIC controllers

The following protocols are supported:

- TCP/IP
- ISO-on-TCP
- S7 communication

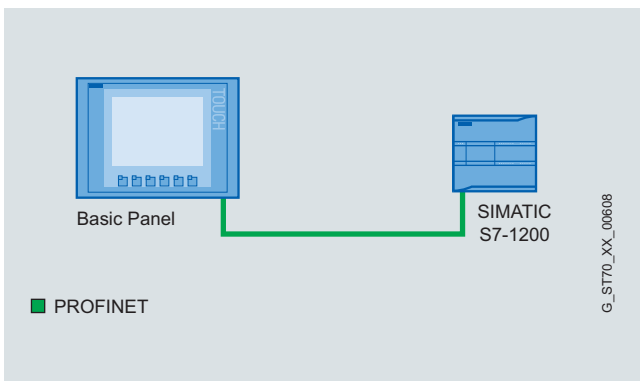
The following can be connected:

Field PG programming device and PCs via standard CAT5 cable.



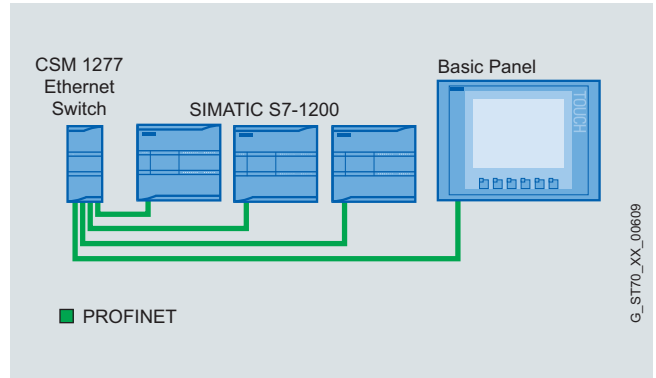
Connection between PG and CPU of SIMATIC S7-1200

- SIMATIC HMI Basic Panels



Connection between Basic Panel and CPU of SIMATIC S7-1200

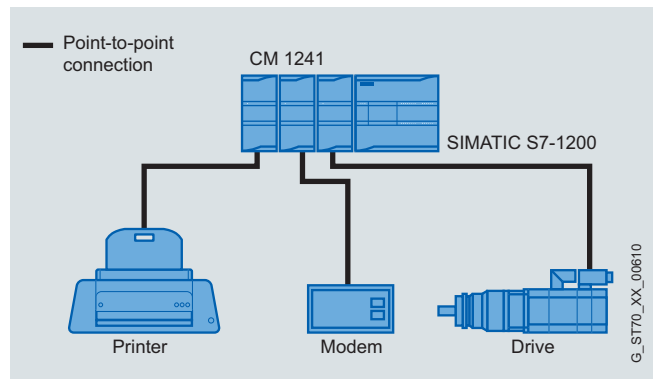
- Further SIMATIC S7-1200 controllers



Connection of several devices via CSM 1277 Ethernet switch

Point-to-point interface, freely-programmable interface mode
 Communication modules permit communication via point-to-point connections. The RS232 and RS485 physical transmission media are used. Data transmission is carried out in the "Freeport" mode of the CPU. A user-specific, bit-oriented communication protocol is used (e.g. ASCII protocol, USS, or MODBUS).

Any terminal equipment with a serial interface can be connected, e.g. drives, printers, bar code readers, modems, etc.



Point-to-point connection via CM 1241 in programmable interface mode

SIMATIC S7-1200

Introduction

S7-1200

Function

The S7-1200 is characterized by:

- Extremely simple starter solution: Special starter packages and introductions facilitate familiarization.
- Uncomplicated operation: Powerful standard commands which are simple to use, together with the user-friendly programming software, reduce the programming overhead to a minimum.
- Exceptional real-time characteristics: Special interrupt functions, fast counters, and pulse outputs permit use even with time-critical processes.

The SIMATIC S7-1200 meets national and international standards:

- UL 508
- CSA C22.2 No. 142
- FM Class I, div. 2, group A, B, C, D; T4A Class I, Zone 2, IIC, T4
- VDE 0160
- EN 61131-2
- Requirements of the EMC directive in accordance with EN 50081-1, 50081-2 and 50082-2

Technical specifications

General technical specifications	
Degree of protection	IP20 acc. to IEC 529
Ambient temperature	
• Operation (95% humidity)	
- horizontal installation	0 ... 55 °C
- vertical installation	0 ... 45 °C
• Transportation and storage	-40 ... +70 °C
- with 95% humidity	25 ... 55 °C
Insulation	
• 5/24 V DC circuits	500 V AC test voltage
• 115/230 V AC circuits to ground	1500 V AC test voltage
• 115/230 V AC circuits to 115/230 V AC circuits	1500 V AC test voltage
• 230 V AC circuits to 5/24 V DC circuits	1500 V AC test voltage
• 115 V AC circuits to 5/24 V DC circuits	1500 V AC test voltage
Electromagnetic compatibility	Requirements of the EMC directive
• Noise immunity acc. to EN 50082-2	Test acc. to: IEC 801-2, IEC 801-3, IEC 801-4, EN 50141, EN 50204, IEC 801-5, VDE 0160
• Emitted interference acc. to EN 50081-1 and EN 50081-2	Test according to EN 55011, Class A, Group 1

General technical specifications

Mechanical strength

- Vibrations, test acc. to / tested with

IEC 68, Part 2-6:
10 ... 57 Hz;
constant amplitude
0.3 mm;
58 ... 150 Hz;
constant acceleration 1 g
(mounted on DIN rail) or
2 g (mounted in switchboard);
mode of vibration:
frequency sweeps with a sweep
rate of 1 octave/minute;
duration of vibration:
10 frequency sweeps per axis in
each direction of the three mutu-
ally perpendicular axes

- Shocks, test acc. to / tested with

IEC 68, Part 2-27/half-sine:
magnitude of shock 15 g (peak
value), duration 11 ms, 6 shocks
in each of the three mutually per-
pendicular axes

Environmental conditions	SIPLUS extreme	
Ambient temperature range	-25 to +60/+70 °C ¹⁾	
Relative humidity	100% Dewing, condensation and icing permissible	
Contaminant concentration	EN60721-3-3 3C4 and ISA S71.04 G1, G2, G3, GX ²⁾	
	Constant load	Limit value ³⁾
	SO ₂	4.8 ppm
	H ₂ S	9.9 ppm
	Cl	0.2 ppm
	HCl	0.66 ppm
	HF	0.12 ppm
	NH	49 ppm
	O ₃	0.1 ppm
	NO _x	5.2 ppm
	At RH < 75%, condensation permitted	
Saline fog	Saline fog test (EN 60068-2-52)	
Mechanically active substances	EN60721-3-3 3S4	
• Dust (suspended substance content)	4.0 mg/m ² h	
• Dust (precipitation)	40 mg/m ² h incl. conductive sand/dust ("Arizona dust")	
Biologically active substances	EN60721-3-3 3B2 Mildew growth, Fungus, excluding fauna	

¹⁾ Depends on the product family

²⁾ ISA -S71.04 severity level GX from October 2010

³⁾ 30 min/day

More information

Brochures

Information material for downloading can be found in the Internet:

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

Overview



- The clever compact solution
- With 10 integral input/outputs
- Expandable by:
 - 1 signal board (SB)
 - max. 3 communication modules (CM)

Design

The compact CPU 1211C has:

- 3 device versions with different power supply and control voltages.
- Integrated power supply either as wide-range AC or DC power supply (85 to 264 V AC or 24 V DC)
- Integrated 24 V encoder/load current supply: For direct connection of sensors and encoders. With 300 mA output current also for use as load power supply.
- 6 integrated digital inputs 24 V DC (current sinking/current sourcing (IEC type 1 current sinking)).
- 4 integrated digital outputs, either 24 V DC or relay.
- 2 integrated analog inputs 0 to 10 V.
- 2 pulse outputs (PTO) with a frequency of up to 100 kHz.
- Pulse-width modulated outputs (PWM) with a frequency of up to 100 kHz.
- Integrated Ethernet interface (TCP/IP native, ISO-on-TCP)
- 3 fast counters (100 kHz), with parameterizable enable and reset inputs, can be used simultaneously as up and down counters with separate inputs or for connecting incremental encoders.
- Expansion by additional communication interfaces, e.g. RS485 or RS232
- Expansion by analog or digital signals directly on the CPU via signal board (with retention of CPU mounting dimensions)
- Optional memory expansion (SIMATIC Memory Card)
- PID controller with auto-tuning functionality
- Integral real-time clock
- Interrupt inputs: For extremely fast response to rising or falling edges of process signals.
- Removable terminals on all modules
- Simulator (optional): For simulating the integrated inputs and for testing the user program.

Device versions

Version	Supply voltage	Input voltage DI	Output voltage DO	Output current
• DC/DC/DC	24 V DC	24 V DC	24 V DC	0.5 A, transistor
• DC/DC/relay	24 V DC	24 V DC	5 ... 30 V DC / 5 ... 250 V AC	2 A; 30 W DC / 200 W AC
• AC/DC/relay	85 ... 264 V AC	24 V DC	5 ... 30 V DC / 5 ... 250 V AC	2 A; 30 W DC / 200 W AC

SIMATIC S7-1200

Central processing units

CPU 1211C

Function

- Comprehensive instruction set:
A wide range of operations facilitate programming:
 - basic operations such as binary logic operations, result allocation, save, count, create times, load, transfer, compare, shift, rotate, create complement, call subprogram (with local variables)
 - integral communication commands (e.g. USS protocol, Modbus RTU, S7 communication "T-Send/T-Receive" or Freepport)
 - user-friendly functions such as pulse-width modulation, pulse sequence function, arithmetic functions, floating point arithmetic, PID closed-loop control, jump functions, loop functions and code conversions
 - mathematical functions, e.g. SIN, COS, TAN, LN, EXP
- Counting:
User-friendly counting functions in conjunction with the integrated counters and special commands for high-speed counters open up new application areas for the user
- Interrupt processing:
 - edge-triggered interrupts (activated by rising or falling edges of process signals on interrupt inputs) support a rapid response to process events
 - time-triggered interrupts
 - counter interrupts can be triggered when a setpoint is reached or when the direction of counting changes
 - communication interrupts allow the rapid and easy exchange of information with peripheral devices such as printers or bar code readers
- Password protection
- Test and diagnostics functions:
Easy-to-use functions support testing and diagnostics, e.g. online/offline diagnostics
- "Forcing" of inputs and outputs during testing and diagnostics:
Inputs and outputs can be set independently of cycle and thus permanently, for example, to test the user program
- Motion Control in accordance with PLCopen for simple movements
- Library functionality

Programming

The STEP 7 Basic programming package permits complete programming of all S7-1200 controllers and the associated I/O.

Technical specifications

	6ES7 211-1BD30-0XB0	6ES7 211-1AD30-0XB0	6ES7 211-1HD30-0XB0
Product-type designation	CPU 1211C AC/DC/Relay	CPU 1211C DC/DC/DC	CPU 1211C DC/DC/Relay
Product version			
associated programming package	STEP 7 Basic V10.5	STEP 7 Basic V10.5	STEP 7 Basic V10.5
Supply voltages			
Rated value			
• 24 V DC		Yes	Yes
• permissible range, lower limit (DC)		20.4 V	20.4 V
• permissible range, upper limit (DC)		28.8 V	28.8 V
• 120 V AC	Yes		
• 230 V AC	Yes		
• permissible range, lower limit (AC)	85 V		
• permissible range, upper limit (AC)	264 V		
• permissible frequency range, lower limit	47 Hz		
• permissible frequency range, upper limit	63 Hz		
Load voltage L+			
• Rated value (DC)		24 V	24 V
• permissible range, lower limit (DC)		20.4 V	20.4 V
• permissible range, upper limit (DC)		28.8 V	28.8 V
Current consumption			
Current consumption (rated value)	60 mA at 120 V AC 30 mA at 240 V AC	300 mA; Typical	300 mA; Typical
Current consumption, max.	180 mA at 120 V AC 90 mA at 240 V AC	0.9 A; 24 V DC	0.9 A; 24 V DC
Inrush current, max.	20 A; at 264 V	12 A; 28.8 V DC	12 A; 28.8 V DC
Current output to backplane bus (DC 5 V), max.	750 mA; 5 V DC max. for SM and CM	750 mA; 5 V DC max. for SM and CM	750 mA; 5 V DC max. for SM and CM
Power loss			
Power loss, typ.	10 W	8 W	8 W
Memory			
Available project memory/user memory	25 kbyte	25 kbyte	25 kbyte

Technical specifications (continued)

	6ES7 211-1BD30-0XB0	6ES7 211-1AD30-0XB0	6ES7 211-1HD30-0XB0
Product-type designation	CPU 1211C AC/DC/Relay	CPU 1211C DC/DC/DC	CPU 1211C DC/DC/Relay
Work memory			
• integrated	25 kbyte	25 kbyte	25 kbyte
• expandable	No	No	No
Load memory			
• integrated	1 Mbyte	1 Mbyte	1 Mbyte
• expandable	24 Mbyte; with SIEMENS Memory Card	24 Mbyte; with SIEMENS Memory Card	24 Mbyte; with SIEMENS Memory Card
Backup			
• present	Yes; entire project maintenance-free in the integral EEPROM	Yes; entire project maintenance-free in the integral EEPROM	Yes; entire project maintenance-free in the integral EEPROM
• without battery	Yes	Yes	Yes
CPU/ blocks			
Number of blocks (total)	DBs, FCs, FBs, counters, timers). Up to 65,535 blocks can be addressed. There is no limit, use of the entire work memory	DBs, FCs, FBs, counters, timers). Up to 65,535 blocks can be addressed. There is no limit, use of the entire work memory	DBs, FCs, FBs, counters, timers). Up to 65,535 blocks can be addressed. There is no limit, use of the entire work memory
OB			
• Number, max.	Limited only by RAM for code	Limited only by RAM for code	Limited only by RAM for code
CPU/ processing times			
for bit operations, min.	0.1 µs; / instruction	0.1 µs; / instruction	0.1 µs; / instruction
for word operations, min.	12 µs; / instruction	12 µs; / instruction	12 µs; / instruction
for floating point arithmetic, min.	18 µs; / instruction	18 µs; / instruction	18 µs; / instruction
Data areas and their retentivity			
retentive data area in total (incl. times, counters, flags), max.	2 048 byte	2 048 byte	2 048 byte
Flag			
• Number, max.	4 kbyte; Size of bit memory address area	4 kbyte; Size of bit memory address area	4 kbyte; Size of bit memory address area
Address area			
I/O address area			
• I/O address area, overall	1024 bytes for inputs / 1024 bytes for outputs	1024 bytes for inputs / 1024 bytes for outputs	1024 bytes for inputs / 1024 bytes for outputs
• overall	1 024 byte	1 024 byte	1 024 byte
• Outputs	1 024 byte	1 024 byte	1 024 byte
Process image			
• Inputs, adjustable	1 kbyte	1 kbyte	1 kbyte
• Outputs, adjustable	1 kbyte	1 kbyte	1 kbyte
Digital channels			
• integrated channels (DI)	6	6	6
• integrated channels (DO)	4	4	4
Analog channels			
• Integrated channels (AI)	2	2	2
• Integrated channels (AO)	0	0	0
Hardware configuration			
Number of modules per system, max.	3 communication modules, 1 signal board	3 communication modules, 1 signal board	3 communication modules, 1 signal board

SIMATIC S7-1200

Central processing units

CPU 1211C

Technical specifications (continued)

	6ES7 211-1BD30-0XB0	6ES7 211-1AD30-0XB0	6ES7 211-1HD30-0XB0
Product-type designation	CPU 1211C AC/DC/Relay	CPU 1211C DC/DC/DC	CPU 1211C DC/DC/Relay
Time of day			
Clock			
• Hardware clock (real-time clock)	Yes	Yes	Yes
• Backup time	240 h; Typical	240 h; Typical	240 h; Typical
• Deviation per day, max.	60 s/month at 25°C	60 s/month at 25°C	60 s/month at 25°C
Test commissioning functions			
Status/control			
• Status/control variable	Yes	Yes	Yes
• Variables	Inputs/outputs, memory bits, DB, distributed I/Os, timers, counters	Inputs/outputs, memory bits, DB, distributed I/Os, timers, counters	Inputs/outputs, memory bits, DB, distributed I/Os, timers, counters
Forcing			
• Forcing	Yes	Yes	Yes
Communication functions			
S7 communication			
• supported	Yes	Yes	Yes
• as server	Yes	Yes	Yes
Open IE communication			
• TCP/IP	Yes	Yes	Yes
• ISO-on-TCP (RFC1006)	Yes	Yes	Yes
Number of connections			
• overall	15; dynamically	15; dynamically	15; dynamically
1st interface			
Type of interface	PROFINET	PROFINET	PROFINET
Physics	Ethernet	Ethernet	Ethernet
Isolated	Yes	Yes	Yes
automatic detection of transmission speed	Yes	Yes	Yes
Autonegotiation	Yes	Yes	Yes
Autocrossover	Yes	Yes	Yes
CPU/ programming			
Configuration software			
• STEP 7	STEP 7 Basic V10.5	STEP 7 Basic V10.5	STEP 7 Basic V10.5
Programming language			
• LAD	Yes	Yes	Yes
• FBD	Yes	Yes	Yes
Cycle time monitoring			
• can be set	Yes	Yes	Yes
Digital inputs			
Number of digital inputs	6; Integrated	6; Integrated	6; Integrated
• of which, inputs usable for technological functions	3; HSC (High Speed Counting)	3; HSC (High Speed Counting)	3; HSC (High Speed Counting)
m/p-reading	Yes	Yes	Yes
Number of simultaneously controllable inputs			
• All mounting positions - Concurrently controllable inputs, up to 40 °C	6	6	6

Technical specifications (continued)

	6ES7 211-1BD30-0XB0	6ES7 211-1AD30-0XB0	6ES7 211-1HD30-0XB0
Product-type designation	CPU 1211C AC/DC/Relay	CPU 1211C DC/DC/DC	CPU 1211C DC/DC/Relay
Input voltage			
• Rated value, DC	24 V	24 V	24 V
• for signal "0"	5 V DC at 1 mA	5 V DC at 1 mA	5 V DC at 1 mA
• for signal "1"	15 V DC at 2.5 mA	15 V DC at 2.5 mA	15 V DC at 2.5 mA
Input current			
• for signal "1", typ.	1 mA	1 mA	1 mA
Input delay (for rated value of input voltage)			
• for standard inputs - parameterizable	0.2, 0.4, 0.8, 1.6, 3.2, 6.4, and 12.8 ms, selectable in 4 groups	0.2, 0.4, 0.8, 1.6, 3.2, 6.4, and 12.8 ms, selectable in groups of four	0.2, 0.4, 0.8, 1.6, 3.2, 6.4, and 12.8 ms, selectable in 4 groups
- at "0" to "1", min.	0.2 ms	0.2 ms	0.2 ms
- at "0" to "1", max.	12.8 ms	12.8 ms	12.8 ms
• for interrupt inputs - parameterizable	Yes	Yes	Yes
• for counter/technological functions - parameterizable	Single phase : 3 at 100 kHz, differential: 3 at 80 kHz	Single phase : 3 at 100 kHz, differential: 3 at 80 kHz	Single phase : 3 at 100 kHz, differential: 3 at 80 kHz
Cable length			
• Cable length, shielded, max.	500 m; 50 m for technological functions	500 m; 50 m for technological functions	500 m; 50 m for technological functions
• Cable length unshielded, max.	300 m; For technological functions: No	300 m; For technological functions: No	300 m; For technological functions: No
Digital outputs			
Number of digital outputs	4; Relay	4	4; Relay
• of which high-speed outputs		2; 100 kHz Pulse Train Output	
Short-circuit protection	No; to be provided externally	No; to be provided externally	No; to be provided externally
Limitation of inductive shutdown voltage to		L+ (-48 V)	
Switching capacity of the outputs			
• with resistive load, max.	2 A	0.5 A	2 A
• on lamp load, max.	30 W DC; 200 W AC	5 W	30 W DC; 200 W AC
Output voltage			
• for signal "0" (DC), max.		0.1 V; with 10k ohms load	
• for signal "1", min.		20 V	
Output current			
• for signal "1" rated value		0.5 A	
• for signal "0" residual current, max.		0.1 mA	
Output delay with resistive load			
• 0 to "1", max.	10 ms; max.	1 µs; max.	10 ms; max.
• 1 to "0", max.	10 ms; max.	5 µs; max.	10 ms; max.
Parallel switching of 2 outputs			
• for increased power	No		No
Switching frequency			
• of the pulse outputs, with resistive load, max.	1 Hz	100 kHz	1 Hz
Cable length			
• Cable length, shielded, max.	500 m	500 m	500 m
• Cable length unshielded, max.	150 m	150 m	150 m

SIMATIC S7-1200

Central processing units

CPU 1211C

Technical specifications (continued)

	6ES7 211-1BD30-0XB0	6ES7 211-1AD30-0XB0	6ES7 211-1HD30-0XB0
Product-type designation	CPU 1211C AC/DC/Relay	CPU 1211C DC/DC/DC	CPU 1211C DC/DC/Relay
Relay outputs			
Number of relay outputs	4		4
Number of operating cycles	mechanically 10 million, at rated load voltage 100,000		mechanically 10 million, at rated load voltage 100,000
Analog inputs			
Number of analog inputs	2	2	2
Number of analog inputs for voltage/current measurement	2		2
Cable length, shielded, max.	100 m; twisted and shielded	100 m; twisted and shielded	100 m; twisted and shielded
Input ranges			
• Voltage	Yes	Yes	Yes
Input ranges (rated values), voltages			
• 0 to +10 V	Yes	Yes	Yes
• Input resistance (0 to 10 V)	≥100k ohms	≥100k ohms	≥100k ohms
Analog value creation			
Integrations and conversion time/ resolution per channel			
• Resolution with overrange (bit including sign), max.	10 bit	10 bit	10 bit
• Integration time, parameterizable	Yes	Yes	Yes
• Conversion time (per channel)	625 μs	625 μs	625 μs
Formation of analog values (in isochronous mode)			
Cable length			
• Max. cable length, shielded	10 m; twisted	10 m; twisted	10 m; twisted
Encoder supply			
24 V encoder supply			
• 24 V	permissible range: 20.4 to 28.8 V	permissible range: 20.4 to 28.8 V	permissible range: 20.4 to 28.8 V
Encoder			
Connectable encoders			
• 2-wire BEROs	Yes	Yes	Yes
Integrated Functions			
Number of counters	3	3	3
Counter frequency (counter) max.	100 kHz	100 kHz	100 kHz
Frequency meter	Yes	Yes	Yes
controlled positioning	Yes	Yes	Yes
PID controller	Yes	Yes	Yes
Number of alarm inputs	4	4	4
Number of pulse outputs		2	
Limit frequency (pulse)		100 kHz	
Operator control and monitoring			
Display			
• integrated	No	No	No
Galvanic isolation			
Galvanic isolation digital inputs			
• Galvanic isolation digital inputs	500 V AC for 1 minute	500 V AC for 1 minute	500 V AC for 1 minute
• between the channels, in groups of	1	1	1

Technical specifications (continued)

	6ES7 211-1BD30-0XB0	6ES7 211-1AD30-0XB0	6ES7 211-1HD30-0XB0
Product-type designation	CPU 1211C AC/DC/Relay	CPU 1211C DC/DC/DC	CPU 1211C DC/DC/Relay
Galvanic isolation digital outputs			
• Galvanic isolation digital outputs	Yes; Relays	Yes	Relays
• between the channels	No	No	No
• between the channels, in groups of	1	1	1
Permissible potential difference			
between different circuits	500 V DC between 24 V DC and 5 V DC	500 V DC between 24 V DC and 5 V DC	500 V DC between 24 V DC and 5 V DC
EMC			
Interference immunity against discharge of static electricity			
• Interference immunity against discharge of static electricity acc. to IEC 61000-4-2	Yes	Yes	Yes
- Test voltage with air discharge	8 kV	8 kV	8 kV
- Test voltage with contact discharge	6 kV	6 kV	6 kV
Interference immunity to cable-borne interference			
• on the supply lines acc. to IEC 61000-4-4	Yes	Yes	Yes
• Interference immunity on signal lines acc. to IEC 61000-4-4	Yes	Yes	Yes
Immunity to surge voltages			
• on the supply lines acc. to IEC 61000-4-5	Yes	Yes	Yes
Immunity to conducted interference, induced by high-frequency fields			
• Interference immunity against high-frequency radiation acc. to IEC 61000-4-6	Yes	Yes	Yes
Emission of radio interference in accordance with EN 55 011			
• Emission of radio interferences acc. to EN 55 011 (limit class A)	Yes; Group 1	Yes; Group 1	Yes; Group 1
• Emission of radio interference acc. to EN 55 011 (limit class B)	Yes	Yes	Yes
Climatic and mechanical conditions for storage and transport			
Climatic conditions for storage and transport			
• Free fall			
- Max. height of fall (in packaging)	0.3 m; five times, in shipping package	0.3 m; five times, in shipping package	0.3 m; five times, in shipping package
• Temperature			
- permissible temperature range	-40 °C ... +70 °C	-40 °C ... +70 °C	-40 °C ... +70 °C
• Relative humidity			
- permissible range (without condensation) at 25 °C	95%	95%	95%

SIMATIC S7-1200

Central processing units

CPU 1211C

Technical specifications (continued)

	6ES7 211-1BD30-0XB0	6ES7 211-1AD30-0XB0	6ES7 211-1HD30-0XB0
Product-type designation	CPU 1211C AC/DC/Relay	CPU 1211C DC/DC/DC	CPU 1211C DC/DC/Relay
Mechanical and climatic conditions during operation			
Climatic conditions during operation			
• Temperature			
- permissible temperature range	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted 95% rel. humidity, no condensation	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted 95% rel. humidity, no condensation
- permissible temperature change	5 °C ... 55 °C, 3 °C/min	5 °C ... 55 °C, 3 °C/min	5 °C ... 55 °C, 3 °C/min
• Atmospheric pressure acc. to IEC 60068-2-13			
- permissible atmospheric pressure	1080 ... 795 hPa	1080 ... 795 hPa	1080 ... 795 hPa
- permissible operating altitude	-1000m ... 2000m	-1000m ... 2000m	-1000m ... 2000m
• Concentration of pollutants			
- SO ₂ at RH < 60% without condensation	< 0.5 ppm	< 0.5 ppm	< 0.5 ppm
- H ₂ S at RH < 60% without condensation	< 0.1 ppm	< 0.1 ppm	< 0.1 ppm
Environmental requirements			
Operating temperature			
• min.	0 °C	0 °C	0 °C
• max.	55 °C	55 °C	55 °C
• vertical installation, min.	0 °C	0 °C	0 °C
• vertical installation, max.	45 °C	45 °C	45 °C
• horizontal installation, min.	0 °C	0 °C	0 °C
• horizontal installation, max.	55 °C	55 °C	55 °C
Storage/transport temperature			
• min.	-40 °C	-40 °C	-40 °C
• max.	70 °C	70 °C	70 °C
Air pressure			
• Operation, min.	795 hPa	795 hPa	795 hPa
• Operation, max.	1 080 hPa	1 080 hPa	1 080 hPa
• Storage/transport, min.	660 hPa	660 hPa	660 hPa
• Storage/transport, max.	1 080 hPa	1 080 hPa	1 080 hPa
Relative humidity			
• Operation, max.	95 %; no condensation	95 %; no condensation	95 %; no condensation
Vibrations			
• Vibrations	2g wall mounting, 1g DIN rail	2g wall mounting, 1g DIN rail	2g wall mounting, 1g DIN rail
• Operation, checked according to IEC 60068-2-6	Yes	Yes	Yes
Shock test			
• checked according to IEC 60068-2-27	Yes; IEC 68, Part 2-27 half-sine: Strength of the shock 15 g (peak value), duration 11 ms	Yes; IEC 68, Part 2-27 half-sine: Strength of the shock 15 g (peak value), duration 11 ms	Yes; IEC 68, Part 2-27 half-sine: Strength of the shock 15 g (peak value), duration 11 ms
Degree of protection			
IP20	Yes	Yes	Yes
Standards, approvals, certificates			
CE mark	Yes	Yes	Yes
C-TICK	Yes	Yes	Yes
cULus	Yes	Yes	Yes
FM approval	Yes	Yes	Yes

Technical specifications (continued)

	6ES7 211-1BD30-0XB0	6ES7 211-1AD30-0XB0	6ES7 211-1HD30-0XB0
Product-type designation	CPU 1211C AC/DC/Relay	CPU 1211C DC/DC/DC	CPU 1211C DC/DC/Relay
Dimensions and weight			
Dimensions			
• Width	90 mm	90 mm	90 mm
• Height	100 mm	100 mm	100 mm
• Depth	75 mm	75 mm	75 mm
Weight			
• Weight, approx.	420 g	370 g	380 g

Ordering data

Ordering data	Order No.	Ordering data	Order No.
CPU 1211C Compact CPU, AC/DC/relay; integrated program/data memory 25 kbyte, load memory 1 Mbyte; wide-range power supply 85 ... 264 V AC; Boolean execution times 0.1 µs per operation; 6 digital inputs, 4 digital outputs (relays), 2 analog inputs; expandable by up to 3 communication modules and 1 signal board; digital inputs can be used as HSC at 100 kHz	C 6ES7 211-1BD30-0XB0	Accessories SB 1221 signal board 4 inputs, 5 V DC, 200 kHz 4 inputs, 24 V DC, 200 kHz SB 1222 signal board 4 outputs, 5 V DC, 0.1 A, 200 kHz 4 outputs, 24 V DC, 0.1 A, 200 kHz SB 1223 signal board 2 inputs, 24 V DC, IEC type 1 active high; 2 24 V DC transistor outputs, 0.5 A, 5 W; can be used as HSC at up to 30 kHz 2 inputs, 5 V DC, 200 kHz 2 outputs 5 V DC, 0.1 A, 200 kHz 2 inputs, 24 V DC, 200 kHz 2 outputs 24 V DC, 0.1 A, 200 kHz SB 1232 signal board 1 analog output, ±10 V with 12 bits or 0 to 20 mA with 11 bits Simulator (optional) 8 input switches, for CPU 1211C / CPU 1212C SIMATIC Memory Card (optional) 2 MB 24 MB Terminal block (spare part) For CPU 1211/1212 For DI, with 14 screws, tin-plated; 4 units For DO, with 8 screws, tin-plated; 4 units For AI, with 3 screws, tin-plated; 4 units	C 6ES7 221-3AD30-0XB0 C 6ES7 221-3BD30-0XB0 C 6ES7 222-1AD30-0XB0 C 6ES7 222-1BD30-0XB0 C 6ES7 223-0BD30-0XB0 C 6ES7 223-3AD30-0XB0 C 6ES7 223-3BD30-0XB0 C 6ES7 232-4HA30-0XB0 C 6ES7 274-1XF30-0XA0 C 6ES7 954-8LB00-0AA0 6ES7 954-8LF00-0AA0 C 6ES7 292-1AH30-0XA0 C 6ES7 292-1AP30-0XA0 C 6ES7 292-1BC30-0XA0
CPU 1211C Compact CPU, DC/DC/DC; integrated program/data memory 25 kbyte, load memory 1 Mbyte; power supply 24 V DC; Boolean execution times 0.1 µs per operation; 6 digital inputs, 4 digital outputs, 2 analog inputs; expandable by up to 3 communication modules and 1 signal board; digital inputs can be used as HSC at 100 kHz, 24 V DC digital outputs can be used as pulse outputs (PTO) or pulse-width modulated outputs (PWM) at 100 kHz	C 6ES7 211-1AD30-0XB0		
CPU 1211C Compact CPU, DC/DC/relay; integrated program/data memory 25 kbyte, load memory 1 Mbyte; power supply 24 V DC; Boolean execution times 0.1 µs per operation; 6 digital inputs, 4 digital outputs (relays), 2 analog inputs; expandable by up to 3 communication modules and 1 signal board; digital inputs can be used as HSC at 100 kHz	C 6ES7 211-1HD30-0XB0		

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

SIMATIC S7-1200

Central processing units

CPU 1211C

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Ordering data

S7-1200 automation system, System Manual

For SIMATIC S7-1200 and STEP 7 Basic

	B	Order No.
German	B	6ES7 298-8FA30-8AH0
English	B	6ES7 298-8FA30-8BH0
French	B	6ES7 298-8FA30-8CH0
Spanish	B	6ES7 298-8FA30-8DH0
Italian	B	6ES7 298-8FA30-8EH0
Chinese	B	6ES7 298-8FA30-8KH0

S7-1200 automation system, Easy Book

Brief instructions

	B	Order No.
German	B	6ES7 298-8FA30-8AQ0
English	B	6ES7 298-8FA30-8BQ0
French	B	6ES7 298-8FA30-8CQ0
Spanish	B	6ES7 298-8FA30-8DQ0
Italian	B	6ES7 298-8FA30-8EQ0
Chinese	B	6ES7 298-8FA30-8KQ0

B: Subject to export regulations: AL: N and ECCN: EAR99T

STEP 7 Basic engineering software

Target system:

SIMATIC S7-1200 controllers and the associated I/O.

The WinCC Basic which is included permits configuration of the SIMATIC Basic Panels

Requirement:

MS Windows XP SP3 / MS Windows Vista SP1

Type of delivery:

German, English, with online documentation

	D	Order No.
Single license	D	6ES7 822-0AA00-0YA0
STEP 7 Basic Software Update Service, 1 year	D	6ES7 822-0AA00-0YL0
Trial License STEP 7 Basic; on DVD, 14-day trial	D	6ES7 822-0AA00-0YA7

D: Subject to export regulations: AL: N and ECCN: 5D992

More information

Brochures

Information material for downloading can be found in the Internet:

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

Overview



- The superior compact solution
- With 14 integral input/outputs
- Expandable by:
 - 1 signal board (SB)
 - 2 signal modules (SM)
 - Max. 3 communication modules (CM)

Design

The compact CPU 1212C has:

- 3 device versions with different power supply and control voltages
- Integrated power supply either as wide-range AC or DC power supply (85 to 264 V AC or 24 V DC)
- Integrated 24 V encoder/load current supply: For direct connection of sensors and encoders. With 300 mA output current also for use as load power supply
- 8 integrated digital inputs 24 V DC (current sinking/current sourcing (IEC type 1 current sinking))
- 6 integrated digital outputs, either 24 V DC or relay
- 2 integrated analog inputs 0 to 10 V
- 2 pulse outputs (PTO) with a frequency of up to 100 kHz
- Pulse-width modulated outputs (PWM) with a frequency of up to 100 kHz
- Integrated Ethernet interface (TCP/IP native, ISO-on-TCP)
- 4 fast counters (3 with max. 100 kHz; 1 with max. 30 kHz), with parameterizable enable and reset inputs, can be used simultaneously as up and down counters with 2 separate inputs or for connecting incremental encoders
- Expansion by additional communication interfaces, e.g. RS485 or RS232
- Expansion by analog or digital signals directly on the CPU via signal board (with retention of CPU mounting dimensions)
- Expansion by a wide range of analog and digital input and output signals via signal modules
- Optional memory expansion (SIMATIC Memory Card)
- PID controller with auto-tuning functionality
- Integral real-time clock
- Interrupt inputs: For extremely fast response to rising or falling edges of process signals
- Removable terminals on all modules
- Simulator (optional): For simulating the integrated inputs and for testing the user program

Device versions

Version	Supply voltage	Input voltage DI	Output voltage DO	Output current
• DC/DC/DC	24 V DC	24 V DC	24 V DC	0.5 A, transistor
• DC/DC/relay	24 V DC	24 V DC	5 ... 30 V DC / 5 ... 250 V AC	2 A; 30 W DC / 200 W AC
• AC/DC/relay	85 ... 264 V AC	24 V DC	5 ... 30 V DC / 5 ... 250 V AC	2 A; 30 W DC / 200 W AC

SIMATIC S7-1200

Central processing units

CPU 1212C

Function

- Comprehensive instruction set:
A wide range of operations facilitate programming:
 - basic operations such as binary logic operations, result allocation, save, count, create times, load, transfer, compare, shift, rotate, create complement, call subprogram (with local variables)
 - integral communication commands (e.g. USS protocol, Modbus RTU, S7 communication "T-Send/T-Receive" or Freepport)
 - user-friendly functions such as pulse-width modulation, pulse sequence function, arithmetic functions, floating point arithmetic, PID closed-loop control, jump functions, loop functions and code conversions
 - mathematical functions, e.g. SIN, COS, TAN, LN, EXP
- Counting:
User-friendly counting functions in conjunction with the integrated counters and special commands for high-speed counters open up new application areas for the user
- Interrupt processing:
 - edge-triggered interrupts (activated by rising or falling edges of process signals on interrupt inputs) support a rapid response to process events.

- time-triggered interrupts.
- counter interrupts can be triggered when a setpoint is reached or when the direction of counting changes.
- communication interrupts allow the rapid and easy exchange of information with peripheral devices such as printers or bar code readers
- Password protection
- Test and diagnostics functions:
Easy-to-use functions support testing and diagnostics, e.g. online/offline diagnostics
- "Forcing" of inputs and outputs during testing and diagnostics:
Inputs and outputs can be set independently of cycle and thus permanently, for example, to test the user program
- Motion Control in accordance with PLCopen for simple movements
- Library functionality

Programming

The STEP 7 Basic programming package permits complete programming of all S7-1200 controllers and the associated I/O.

Technical specifications

	6ES7 212-1BD30-0XB0	6ES7 212-1AD30-0XB0	6ES7 212-1HD30-0XB0
Product-type designation	CPU 1212C AC/DC/Relay	CPU 1212C DC/DC/DC	CPU 1212C AC/DC/Relay
Product version			
associated programming package	STEP 7 Basic V10.5	STEP 7 Basic V10.5	STEP 7 Basic V10.5
Supply voltages			
Rated value			
• 24 V DC		Yes	Yes
• permissible range, lower limit (DC)		20.4 V	20.4 V
• permissible range, upper limit (DC)		28.8 V	28.8 V
• 120 V AC	Yes		
• 230 V AC	Yes		
• permissible range, lower limit (AC)	85 V		
• permissible range, upper limit (AC)	264 V		
• permissible frequency range, lower limit	47 Hz		
• permissible frequency range, upper limit	63 Hz		
Load voltage L+			
• Rated value (DC)	24 V	24 V	24 V
• permissible range, lower limit (DC)	5 V	20.4 V	5 V
• permissible range, upper limit (DC)	250 V	28.8 V	250 V
Current consumption			
Current consumption (rated value)	80 mA at 120 V AC 40 mA at 240 V AC		175 mA; Typical
Current consumption, max.	240 mA at 120 V AC 120 mA at 240 V AC	1.2 A; 24 V DC	1.2 A; 24 V DC
Inrush current, max.	20 A; at 264 V	12 A; 28.8 VDC	12 A; At 28.8 V
Current output to backplane bus (DC 5 V), max.	1 000 mA; 5 V DC max. for SM and CM	1 000 mA; 5 V DC max. for SM and CM	1 000 mA; 5 V DC max. for SM and CM
Power loss			
Power loss, typ.	11 W	9 W	9 W
Memory			
Available project memory/user memory	25 kbyte	25 kbyte	25 kbyte

Technical specifications (continued)

	6ES7 212-1BD30-0XB0	6ES7 212-1AD30-0XB0	6ES7 212-1HD30-0XB0
Product-type designation	CPU 1212C AC/DC/Relay	CPU 1212C DC/DC/DC	CPU 1212C AC/DC/Relay
Work memory			
• integrated	25 kbyte	25 kbyte	25 kbyte
• expandable	No	No	No
Load memory			
• integrated	1 Mbyte	1 Mbyte	1 Mbyte
• expandable	24 Mbyte; with SIEMENS Memory Card	24 Mbyte; with SIEMENS Memory Card	24 Mbyte; with SIEMENS Memory Card
Backup			
• present	Yes; entire project maintenance-free in the integral EEPROM	Yes; entire project maintenance-free in the integral EEPROM	Yes; entire project maintenance-free in the integral EEPROM
• without battery	Yes	Yes	Yes
CPU/ blocks			
Number of blocks (total)	DBs, FCs, FBs, counters, timers). Up to 65,535 blocks can be addressed. There is no limit, use of the entire work memory	DBs, FCs, FBs, counters, timers). Up to 65,535 blocks can be addressed. There is no limit, use of the entire work memory	DBs, FCs, FBs, counters, timers). Up to 65,535 blocks can be addressed. There is no limit, use of the entire work memory
OB			
• Number, max.	Limited only by RAM for code	Limited only by RAM for code	Limited only by RAM for code
CPU/ processing times			
for bit operations, min.	0.1 µs; / instruction	0.1 µs; / instruction	0.1 µs; / instruction
for word operations, min.	12 µs; / instruction	12 µs; / instruction	12 µs; / instruction
for floating point arithmetic, min.	18 µs; / instruction	18 µs; / instruction	18 µs; / instruction
Data areas and their retentivity			
retentive data area in total (incl. times, counters, flags), max.	2 048 byte	2 048 byte	2 048 byte
Flag			
• Number, max.	4 kbyte; Size of bit memory address area	4 kbyte; Size of bit memory address area	4 kbyte; Size of bit memory address area
Address area			
I/O address area			
• I/O address area, overall	1024 bytes for inputs / 1024 bytes for outputs	1024 bytes for inputs / 1024 bytes for outputs	1024 bytes for inputs / 1024 bytes for outputs
• overall	1 024 byte	1 024 byte	1 024 byte
• Outputs	1 024 byte	1 024 byte	1 024 byte
Process image			
• Inputs, adjustable	1 kbyte	1 kbyte	1 kbyte
• Outputs, adjustable	1 kbyte	1 kbyte	1 kbyte
Digital channels			
• integrated channels (DI)	8	8	8
• integrated channels (DO)	6	6	6
Analog channels			
• Integrated channels (AI)	2	2	2
• Integrated channels (AO)	0	0	0
Hardware configuration			
Number of modules per system, max.	3 communication modules, 1 signal board, 2 signal modules	3 communication modules, 1 signal board, 2 signal modules	3 communication modules, 1 signal board, 2 signal modules

SIMATIC S7-1200

Central processing units

CPU 1212C

Technical specifications (continued)

	6ES7 212-1BD30-0XB0	6ES7 212-1AD30-0XB0	6ES7 212-1HD30-0XB0
Product-type designation	CPU 1212C AC/DC/Relay	CPU 1212C DC/DC/DC	CPU 1212C AC/DC/Relay
Time of day			
Clock			
• Hardware clock (real-time clock)	Yes	Yes	Yes
• Backup time	240 h; Typical	240 h; Typical	240 h; Typical
• Deviation per day, max.	60 s/month at 25°C	60 s/month at 25°C	60 s/month at 25°C
Test commissioning functions			
Status/control			
• Status/control variable	Yes	Yes	Yes
• Variables	Inputs/outputs, memory bits, DB, distributed I/Os, timers, counters	Inputs/outputs, memory bits, DB, distributed I/Os, timers, counters	Inputs/outputs, memory bits, DB, distributed I/Os, timers, counters
Forcing			
• Forcing	Yes	Yes	Yes
Communication functions			
S7 communication			
• supported	Yes	Yes	Yes
• as server	Yes	Yes	Yes
Open IE communication			
• TCP/IP	Yes	Yes	Yes
• ISO-on-TCP (RFC1006)	Yes	Yes	Yes
Number of connections			
• overall	15; dynamically	15; dynamically	15; dynamically
1st interface			
Type of interface	PROFINET	PROFINET	PROFINET
Physics	Ethernet	Ethernet	Ethernet
Isolated	Yes	Yes	Yes
automatic detection of transmission speed	Yes	Yes	Yes
Autonegotiation	Yes	Yes	Yes
Autocrossover	Yes	Yes	Yes
CPU/ programming			
Configuration software			
• STEP 7	STEP 7 Basic V10.5	STEP 7 Basic V10.5	STEP 7 Basic V10.5
Programming language			
• LAD	Yes	Yes	Yes
• FBD	Yes	Yes	Yes
Cycle time monitoring			
• can be set	Yes	Yes	Yes
Digital inputs			
Number of digital inputs	8; Integrated	8; Integrated	8; Integrated
• of which, inputs usable for technological functions	4; HSC (High Speed Counting)	4; HSC (High Speed Counting)	4; HSC (High Speed Counting)
m/p-reading	Yes	Yes	Yes
Number of simultaneously controllable inputs			
• All mounting positions - Concurrently controllable inputs, up to 40 °C	8	8	8

Technical specifications (continued)

	6ES7 212-1BD30-0XB0	6ES7 212-1AD30-0XB0	6ES7 212-1HD30-0XB0
Product-type designation	CPU 1212C AC/DC/Relay	CPU 1212C DC/DC/DC	CPU 1212C AC/DC/Relay
Input voltage			
• Rated value, DC	24 V	24 V	24 V
• for signal "0"	5 V DC at 1 mA	5 V DC at 1 mA	5 V DC at 1 mA
• for signal "1"	15 V DC at 2.5 mA	15 V DC at 2.5 mA	15 V DC at 2.5 mA
Input current			
• for signal "1", typ.	1 mA	1 mA	1 mA
Input delay (for rated value of input voltage)			
• for standard inputs - parameterizable	0.2, 0.4, 0.8, 1.6, 3.2, 6.4, and 12.8 ms, selectable in groups of four	0.2, 0.4, 0.8, 1.6, 3.2, 6.4, and 12.8 ms, selectable in groups of four	0.2, 0.4, 0.8, 1.6, 3.2, 6.4, and 12.8 ms, selectable in groups of four
- at "0" to "1", min.	0.2 ms	0.2 ms	0.2 ms
- at "0" to "1", max.	12.8 ms	12.8 ms	12.8 ms
• for interrupt inputs - parameterizable	Yes	Yes	Yes
• for counter/technological functions - parameterizable	Single phase : 3 at 100 kHz, 1 at 30 kHz differential: 3 at 80 kHz, 1 at 30 kHz	Single phase : 3 at 100 kHz, 1 at 30 kHz differential: 3 at 80 kHz, 1 at 30 kHz	Single phase : 3 at 100 kHz, 1 at 30 kHz differential: 3 at 80 kHz, 1 at 30 kHz
Cable length			
• Cable length, shielded, max.	500 m; 50 m for technological functions	500 m; 50 m for technological functions	500 m; 50 m for technological functions
• Cable length unshielded, max.	300 m; For technological functions: No	300 m; For technological functions: No	300 m; For technological functions: No
Digital outputs			
Number of digital outputs	6; Relay	6	6; Relay
• of which high-speed outputs		2; 100 kHz Pulse Train Output	
Short-circuit protection	No; to be provided externally	No; to be provided externally	No; to be provided externally
Limitation of inductive shutdown voltage to		L+ (-48 V)	
Switching capacity of the outputs			
• with resistive load, max.	2 A	0.5 A	2 A
• on lamp load, max.	30 W DC; 200 W AC	5 W	30 W DC; 200 W AC
Output voltage			
• for signal "0" (DC), max.		0.1 V; with 10k ohms load	
• for signal "1", min.		20 V	
Output current			
• for signal "1" rated value		0.5 A	
• for signal "0" residual current, max.		0.1 mA	
Output delay with resistive load			
• 0 to "1", max.	10 ms; max.	1 µs	10 ms; max.
• 1 to "0", max.	10 ms; max.	5 µs	10 ms; max.
Switching frequency			
• of the pulse outputs, with resistive load, max.	1 Hz	100 kHz	1 Hz
Cable length			
• Cable length, shielded, max.	500 m	500 m	500 m
• Cable length unshielded, max.	150 m	150 m	150 m

SIMATIC S7-1200

Central processing units

CPU 1212C

Technical specifications (continued)

	6ES7 212-1BD30-0XB0	6ES7 212-1AD30-0XB0	6ES7 212-1HD30-0XB0
Product-type designation	CPU 1212C AC/DC/Relay	CPU 1212C DC/DC/DC	CPU 1212C AC/DC/Relay
Relay outputs			
Number of relay outputs	6		6
Number of operating cycles	mechanically 10 million, at rated load voltage 100,000		mechanically 10 million, at rated load voltage 100,000
Analog inputs			
Number of analog inputs	2	2	2
Cable length, shielded, max.	100 m; twisted and shielded	100 m; twisted and shielded	100 m; twisted and shielded
Input ranges			
• Voltage	Yes	Yes	Yes
Input ranges (rated values), voltages			
• 0 to +10 V	Yes	Yes	Yes
• Input resistance (0 to 10 V)	≥100k ohms	≥100k ohms	≥100k ohms
Analog value creation			
Integrations and conversion time/ resolution per channel			
• Resolution with overrange (bit including sign), max.	10 bit	10 bit	10 bit
• Integration time, parameterizable	Yes	Yes	Yes
• Conversion time (per channel)	625 μs	625 μs	625 μs
Formation of analog values (in isochronous mode)			
Cable length			
• Max. cable length, shielded	10 m; twisted	10 m; twisted	10 m; twisted
Encoder supply			
24 V encoder supply			
• 24 V	permissible range: 20.4 to 28.8 V	permissible range: 20.4 to 28.8 V	permissible range: 20.4 to 28.8 V
Encoder			
Connectable encoders			
• 2-wire BEROs	Yes	Yes	Yes
Integrated Functions			
Number of counters	4	4	4
Counter frequency (counter) max.	100 kHz	100 kHz	100 kHz
Frequency meter	Yes	Yes	Yes
controlled positioning	Yes	Yes	Yes
PID controller	Yes	Yes	Yes
Number of alarm inputs	4	4	4
Number of pulse outputs		2	
Limit frequency (pulse)		100 kHz	
Operator control and monitoring			
Display			
• integrated	No	No	No
Galvanic isolation			
Galvanic isolation digital inputs			
• Galvanic isolation digital inputs	500 V AC for 1 minute	500 V AC for 1 minute	500 V AC for 1 minute
• between the channels, in groups of	1	1	1

Technical specifications (continued)

	6ES7 212-1BD30-0XB0	6ES7 212-1AD30-0XB0	6ES7 212-1HD30-0XB0
Product-type designation	CPU 1212C AC/DC/Relay	CPU 1212C DC/DC/DC	CPU 1212C AC/DC/Relay
Galvanic isolation digital outputs			
• Galvanic isolation digital outputs	Yes; Relays	Yes	Relays
• between the channels	No	No	No
• between the channels, in groups of	2	2	1
Permissible potential difference			
between different circuits	500 V DC between 24 V DC and 5 V DC	500 V DC between 24 V DC and 5 V DC	500 V DC between 24 V DC and 5 V DC
EMC			
Interference immunity against discharge of static electricity			
• Interference immunity against discharge of static electricity acc. to IEC 61000-4-2	Yes	Yes	Yes
- Test voltage with air discharge	8 kV	8 kV	8 kV
- Test voltage with contact discharge	6 kV	6 kV	6 kV
Interference immunity to cable-borne interference			
• on the supply lines acc. to IEC 61000-4-4	Yes	Yes	Yes
• Interference immunity on signal lines acc. to IEC 61000-4-4	Yes	Yes	Yes
Immunity to surge voltages			
• on the supply lines acc. to IEC 61000-4-5	Yes	Yes	Yes
Immunity to conducted interference, induced by high-frequency fields			
• Interference immunity against high-frequency radiation acc. to IEC 61000-4-6	Yes	Yes	Yes
Emission of radio interference in accordance with EN 55 011			
• Emission of radio interferences acc. to EN 55 011 (limit class A)	Yes; Group 1	Yes; Group 1	Yes; Group 1
• Emission of radio interference acc. to EN 55 011 (limit class B)	Yes	Yes	Yes
Climatic and mechanical conditions for storage and transport			
Climatic conditions for storage and transport			
• Free fall			
- Max. height of fall (in packaging)	0.3 m; five times, in shipping package	0.3 m; five times, in shipping package	0.3 m; five times, in shipping package
• Temperature			
- permissible temperature range	-40 °C ... +70 °C	-40 °C ... +70 °C	-40 °C ... +70 °C
• Relative humidity			
- permissible range (without condensation) at 25 °C	95%	95%	95%

SIMATIC S7-1200

Central processing units

CPU 1212C

Technical specifications (continued)

	6ES7 212-1BD30-0XB0	6ES7 212-1AD30-0XB0	6ES7 212-1HD30-0XB0
Product-type designation	CPU 1212C AC/DC/Relay	CPU 1212C DC/DC/DC	CPU 1212C AC/DC/Relay
Mechanical and climatic conditions during operation			
Climatic conditions during operation			
• Temperature			
- permissible temperature range	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted
- permissible temperature change	5 °C ... 55 °C, 3 °C/min	5 °C ... 55 °C, 3 °C/min	5 °C ... 55 °C, 3 °C/min
• Atmospheric pressure acc. to IEC 60068-2-13			
- permissible atmospheric pressure	1080 ... 795 hPa	1080 ... 795 hPa	1080 ... 795 hPa
- permissible operating altitude	-1000m ... 2000m	-1000m ... 2000m	-1000m ... 2000m
• Concentration of pollutants			
- SO ₂ at RH < 60% without condensation	< 0.5 ppm	< 0.5 ppm	< 0.5 ppm
- H ₂ S at RH < 60% without condensation	< 0.1 ppm	< 0.1 ppm	< 0.1 ppm
Environmental requirements			
Operating temperature			
• Min.	0 °C	0 °C	0 °C
• max.	55 °C	55 °C	55 °C
• vertical installation, min.	0 °C	0 °C	0 °C
• vertical installation, max.	45 °C	45 °C	45 °C
• horizontal installation, min.	0 °C	0 °C	0 °C
• horizontal installation, max.	55 °C	55 °C	55 °C
Storage/transport temperature			
• Min.	-40 °C	-40 °C	-40 °C
• max.	70 °C	70 °C	70 °C
Air pressure			
• Operation, min.	795 hPa	795 hPa	795 hPa
• Operation, max.	1 080 hPa	1 080 hPa	1 080 hPa
• Storage/transport, min.	660 hPa	660 hPa	660 hPa
• Storage/transport, max.	1 080 hPa	1 080 hPa	1 080 hPa
Relative humidity			
• Operation, max.	95 %; no condensation	95 %; no condensation	95 %; no condensation
Vibrations			
• Vibrations	2g panel mount, 1g DIN rail mount	2g panel mount, 1g DIN rail mount	2g panel mount, 1g DIN rail mount
• Operation, checked according to IEC 60068-2-6	Yes	Yes	Yes
Shock test			
• checked according to IEC 60068-2-27	Yes; 15 G, 11 ms pulse, 6 shocks in each of 3 axes	Yes; 15 G, 11 ms pulse, 6 shocks in each of 3 axes	Yes; 15 G, 11 ms pulse, 6 shocks in each of 3 axes
Degree of protection			
IP20	Yes	Yes	Yes
Standards, approvals, certificates			
CE mark	Yes	Yes	Yes
C-TICK	Yes	Yes	Yes
cULus	Yes	Yes	Yes
FM approval	Yes	Yes	Yes

Technical specifications (continued)

	6ES7 212-1BD30-0XB0	6ES7 212-1AD30-0XB0	6ES7 212-1HD30-0XB0
Product-type designation	CPU 1212C AC/DC/Relay	CPU 1212C DC/DC/DC	CPU 1212C AC/DC/Relay
Dimensions and weight			
Dimensions			
• Width	90 mm	90 mm	90 mm
• Height	100 mm	100 mm	100 mm
• Depth	75 mm	75 mm	75 mm
Weight			
• Weight, approx.	425 g	370 g	385 g

Ordering data

Ordering data	Order No.	Order No.
CPU 1212C Compact CPU, AC/DC/relay; integral program/data memory 25 kbyte, load memory 1 Mbyte; wide-range power supply 85 ... 264 V AC; Boolean execution times 0.1 µs per operation; 8 digital inputs, 6 digital outputs (relays), 2 analog inputs; expandable by up to 3 communication modules, 2 signal modules and 1 signal board; digital inputs can be used as HSC at 100 kHz	C 6ES7 212-1BD30-0XB0	Accessories
CPU 1212C Compact CPU, DC/DC/DC; integrated program/data memory 25 kbyte, load memory 1 Mbyte; power supply 24 V DC; Boolean execution times 0.1 µs per operation; 8 digital inputs, 6 digital outputs, 2 analog inputs; expandable by up to 3 communication modules, 2 signal modules, and 1 signal board; digital inputs can be used as HSC at 100 kHz, 24 V DC digital outputs can be used as pulse outputs (PTO) or pulse-width modulated outputs (PWM) at 100 kHz	C 6ES7 212-1AD30-0XB0	SB 1221 signal board 4 inputs, 5 V DC, 200 kHz C 6ES7 221-3AD30-0XB0 4 inputs, 24 V DC, 200 kHz C 6ES7 221-3BD30-0XB0
CPU 1212C Compact CPU, DC/DC/relay; integrated program/data memory 25 kbyte, load memory 1 Mbyte; power supply 24 V DC; Boolean execution times 0.1 µs per operation; 8 digital inputs, 6 digital outputs (relays), 2 analog inputs; expandable by up to 3 communication modules, 2 signal modules, and 1 signal board; digital inputs can be used as HSC at 100 kHz	C 6ES7 212-1HD30-0XB0	SB 1222 signal board 4 outputs, 5 V DC, 0.1 A, 200 kHz C 6ES7 222-1AD30-0XB0 4 outputs, 24 V DC, 0.1 A, 200 kHz C 6ES7 222-1BD30-0XB0
		SB 1223 signal board 2 inputs, 24 V DC, IEC type 1 active high; 2 24 V DC transistor outputs, 0.5 A, 5 W; can be used as HSC at up to 30 kHz C 6ES7 223-0BD30-0XB0 2 inputs, 5 V DC, 200 kHz C 6ES7 223-3AD30-0XB0 2 outputs 5 V DC, 0.1 A, 200 kHz C 6ES7 223-3BD30-0XB0 2 inputs, 24 V DC, 200 kHz C 6ES7 223-3BD30-0XB0 2 outputs 24 V DC, 0.1 A, 200 kHz
		SB 1232 signal board C 6ES7 232-4HA30-0XB0 1 analog output, ±10 V with 12 bits or 0 to 20 mA with 11 bits
		Simulator (optional) see CPU 1211C, page 4/13
		SIMATIC Memory Card (optional) 2 MB C 6ES7 954-8LB00-0AA0 24 MB 6ES7 954-8LF00-0AA0
		Extension cable for two-tier configuration C 6ES7 290-6AA30-0XA0 for connecting digital/analog signal modules; length 2 m
		Starter box CPU 1212C AC/DC/relay B 6ES7 212-1BD30-4YB0 Complete offer SIMATIC S7-1200, starter box, comprising: CPU 1212C AC/DC/relay, simulator, STEP 7 BASIC CD, manual CD, info material, in Systainer
		Terminal block (spare part) see CPU 1211C, page 4/13

B: Subject to export regulations: AL: N and ECCN: EAR99T

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

SIMATIC S7-1200

Central processing units

CPU 1212C

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Ordering data	Order No.	Order No.
S7-1200 automation system, System Manual For SIMATIC S7-1200 and STEP 7 Basic German B 6ES7 298-8FA30-8AH0 English B 6ES7 298-8FA30-8BH0 French B 6ES7 298-8FA30-8CH0 Spanish B 6ES7 298-8FA30-8DH0 Italian B 6ES7 298-8FA30-8EH0 Chinese B 6ES7 298-8FA30-8KH0		STEP 7 Basic engineering software <i>Target system:</i> SIMATIC S7-1200 controllers and the associated I/O. The WinCC Basic which is included permits configuration of the SIMATIC Basic Panels <i>Requirement:</i> MS Windows XP SP3 / MS Windows Vista SP1 <i>Type of delivery:</i> German, English, with online documentation Single license D 6ES7 822-0AA00-0YA0 STEP 7 Basic Software Update Service, 1 year D 6ES7 822-0AA00-0YLO Trial License STEP 7 Basic; on DVD, 14-day trial D 6ES7 822-0AA00-0YA7
S7-1200 automation system, Easy Book Brief instructions German B 6ES7 298-8FA30-8AQ0 English B 6ES7 298-8FA30-8BQ0 French B 6ES7 298-8FA30-8CQ0 Spanish B 6ES7 298-8FA30-8DQ0 Italian B 6ES7 298-8FA30-8EQ0 Chinese B 6ES7 298-8FA30-8KQ0		

B: Subject to export regulations: AL: N and ECCN: EAR99T

D: Subject to export regulations: AL: N and ECCN: 5D992

More information

Brochures

Information material for downloading can be found in the Internet:

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

Overview



- The compact high-performance CPU
- With 24 integral input/outputs
- Expandable by:
 - 1 signal board (SB)
 - 8 signal modules (SM)
 - max. 3 communication modules (CM)

Design

The compact CPU 1214C has:

- 3 device versions with different power supply and control voltages
- Integrated power supply either as wide-range AC or DC power supply (85 to 264 V AC or 24 V DC)
- Integrated 24 V encoder/load current supply: For direct connection of sensors and encoders. With 400 mA, the output current can also be used as load power supply
- 14 integrated digital inputs 24 V DC (current sinking/current sourcing (IEC type 1 current sinking))
- 10 integrated digital outputs, either 24 V DC or relay
- 2 integrated analog inputs 0 to 10 V
- 2 pulse outputs (PTO) with a frequency of up to 100 kHz
- Pulse-width modulated outputs (PWM) with a frequency of up to 100 kHz
- Integrated Ethernet interface (TCP/IP native, ISO-on-TCP)
- 6 fast counters (3 with max. 100 kHz; 3 with max. 30 kHz), with parameterizable enable and reset inputs, can be used simultaneously as up and down counters with 2 separate inputs or for connecting incremental encoders
- Expansion by additional communication interfaces, e.g. RS485 or RS232
- Expansion by analog or digital signals directly on the CPU via signal board (with retention of CPU mounting dimensions)
- Expansion by a wide range of analog and digital input and output signals via signal modules
- Optional memory expansion (SIMATIC Memory Card)
- PID controller with auto-tuning functionality
- Integral real-time clock
- Interrupt inputs: For extremely fast response to rising or falling edges of process signals
- Removable terminals on all modules
- Simulator (optional): For simulating the integrated inputs and for testing the user program

Device versions

Version	Supply voltage	Input voltage DI	Output voltage DO	Output current
• DC/DC/DC	24 V DC	24 V DC	24 V DC	0.5 A, transistor
• DC/DC/relay	24 V DC	24 V DC	5 ... 30 V DC / 5 ... 250 V AC	2 A; 30 W DC / 200 W AC
• AC/DC/relay	85 ... 264 V AC	24 V DC	5 ... 30 V DC / 5 ... 250 V AC	2 A; 30 W DC / 200 W AC

SIMATIC S7-1200

Central processing units

CPU 1214C

Function

- Comprehensive instruction set:
A wide range of operations facilitate programming:
 - basic operations such as binary logic operations, result allocation, save, count, create times, load, transfer, compare, shift, rotate, create complement, call subprogram (with local variables)
 - integral communication commands (e.g. USS protocol, Modbus RTU, S7 communication "T-Send/T-Receive" or Freeport)
 - user-friendly functions such as pulse-width modulation, pulse sequence function, arithmetic functions, floating point arithmetic, PID closed-loop control, jump functions, loop functions and code conversions
 - mathematical functions, e.g. SIN, COS, TAN, LN, EXP
- Counting:
User-friendly counting functions in conjunction with the integrated counters and special commands for high-speed counters open up new application areas for the user
- Interrupt processing:
 - edge-triggered interrupts (activated by rising or falling edges of process signals on interrupt inputs) support a rapid response to process events
 - time-triggered interrupts
 - counter interrupts can be triggered when a setpoint is reached or when the direction of counting changes
 - communication interrupts allow the rapid and easy exchange of information with peripheral devices such as printers or bar code readers
- Password protection
- Test and diagnostics functions:
Easy-to-use functions support testing and diagnostics, e.g. online/offline diagnostics
- "Forcing" of inputs and outputs during testing and diagnostics:
Inputs and outputs can be set independently of cycle and thus permanently, for example, to test the user program
- Motion Control in accordance with PLCopen for simple movements
- Library functionality

Programming

The STEP 7 Basic programming package permits complete programming of all S7-1200 controllers and the associated I/O.

Technical specifications

	6ES7 214-1BE30-0XB0	6ES7 214-1AE30-0XB0	6ES7 214-1HE30-0XB0
Product-type designation	CPU 1214C AC/DC/Relay	CPU 1214C DC/DC/DC	CPU 1214C DC/DC/Relay
Product version			
associated programming package	STEP 7 Basic V10.5	STEP 7 Basic V10.5	STEP 7 Basic V10.5
Supply voltages			
Rated value			
• 24 V DC		Yes	Yes
• permissible range, lower limit (DC)		20.4 V	20.4 V
• permissible range, upper limit (DC)		28.8 V	28.8 V
• 120 V AC	Yes		
• 230 V AC	Yes		
• permissible range, lower limit (AC)	85 V		
• permissible range, upper limit (AC)	264 V		
• permissible frequency range, lower limit	47 Hz		
• permissible frequency range, upper limit	63 Hz		
Load voltage L+			
• Rated value (DC)	24 V	24 V	24 V
• permissible range, lower limit (DC)	5 V	20.4 V	5 V
• permissible range, upper limit (DC)	250 V	28.8 V	250 V
Current consumption			
Current consumption (rated value)	100 mA at 120 VAC 50 mA at 240 VAC		500 mA; Typical
Current consumption, max.	300 mA at 120 VAC 150 mA at 240 VAC	1.5 A; 24 VDC	1.2 A; 24 VDC
Inrush current, max.	20 A; at 264 V	12 A; at 28.8 V	12 A; at 28.8 V
Current output to backplane bus (DC 5 V), max.	1 600 mA; 5 V DC max. for SM and CM	1 600 mA; 5 V DC max. for SM and CM	1 600 mA; 5 V DC max. for SM and CM
Power loss			
Power loss, typ.	14 W	12 W	12 W
Memory			
Available project memory/user memory	50 Kibyte	50 Kibyte	50 Kibyte

Technical specifications (continued)

	6ES7 214-1BE30-0XB0	6ES7 214-1AE30-0XB0	6ES7 214-1HE30-0XB0
Product-type designation	CPU 1214C AC/DC/Relay	CPU 1214C DC/DC/DC	CPU 1214C DC/DC/Relay
Work memory			
• integrated	50 kbyte	50 kbyte	50 kbyte
• expandable	No	No	No
Load memory			
• integrated	2 Mbyte	2 Mbyte	2 Mbyte
• expandable	24 Mbyte; with SIEMENS Memory Card	24 Mbyte; with SIEMENS Memory Card	24 Mbyte; with SIEMENS Memory Card
Backup			
• present	Yes; entire project maintenance-free in the integral EEPROM	Yes; entire project maintenance-free in the integral EEPROM	Yes; entire project maintenance-free in the integral EEPROM
• without battery	Yes	Yes	Yes
CPU/ blocks			
Number of blocks (total)	DBs, FCs, FBs, counters, timers). Up to 65,535 blocks can be addressed. There is no limit, use of the entire work memory	DBs, FCs, FBs, counters, timers). Up to 65,535 blocks can be addressed. There is no limit, use of the entire work memory	DBs, FCs, FBs, counters, timers). Up to 65,535 blocks can be addressed. There is no limit, use of the entire work memory
OB			
• Number, max.	Limited only by RAM for code	Limited only by RAM for code	Limited only by RAM for code
CPU/ processing times			
for bit operations, min.	0.1 µs; / instruction	0.1 µs; / instruction	0.1 µs; / instruction
for word operations, min.	12 µs; / instruction	12 µs; / instruction	12 µs; / instruction
for floating point arithmetic, min.	18 µs; / instruction	18 µs; / instruction	18 µs; / instruction
Data areas and their retentivity			
retentive data area in total (incl. times, counters, flags), max.	2 048 byte	2 048 byte	2 048 byte
Flag			
• Number, max.	8 kbyte; Size of bit memory address area	8 kbyte; Size of bit memory address area	8 kbyte; Size of bit memory address area
Address area			
I/O address area			
• I/O address area, overall	1024 bytes for inputs / 1024 bytes for outputs	1024 bytes for inputs / 1024 bytes for outputs	1024 bytes for inputs / 1024 bytes for outputs
• overall	1 024 byte	1 024 byte	1 024 byte
• Outputs	1 024 byte	1 024 byte	1 024 byte
Process image			
• Inputs, adjustable	1 kbyte	1 kbyte	1 kbyte
• Outputs, adjustable	1 kbyte	1 kbyte	1 kbyte
Digital channels			
• integrated channels (DI)	14	14	14
• integrated channels (DO)	10	10	10
Analog channels			
• Integrated channels (AI)	2	2	2
• Integrated channels (AO)	0	0	0
Hardware configuration			
Number of modules per system, max.	3 comm. modules, 1 signal board, 8 signal modules	3 comm. modules, 1 signal board, 8 signal modules	3 comm. modules, 1 signal board, 8 signal modules

SIMATIC S7-1200

Central processing units

CPU 1214C

Technical specifications (continued)

	6ES7 214-1BE30-0XB0	6ES7 214-1AE30-0XB0	6ES7 214-1HE30-0XB0
Product-type designation	CPU 1214C AC/DC/Relay	CPU 1214C DC/DC/DC	CPU 1214C DC/DC/Relay
Time of day			
Clock			
• Hardware clock (real-time clock)	Yes	Yes	Yes
• Backup time	240 h; Typical	240 h; Typical	240 h; Typical
• Deviation per day, max.	60 s/month at 25°C	60 s/month at 25°C	60 s/month at 25°C
Test commissioning functions			
Status/control			
• Status/control variable	Yes	Yes	Yes
• Variables	Inputs/outputs, memory bits, DB, distributed I/Os, timers, counters	Inputs/outputs, memory bits, DB, distributed I/Os, timers, counters	Inputs/outputs, memory bits, DB, distributed I/Os, timers, counters
Forcing			
• Forcing	Yes	Yes	Yes
Communication functions			
S7 communication			
• supported	Yes	Yes	Yes
• as server	Yes	Yes	Yes
Open IE communication			
• TCP/IP	Yes	Yes	Yes
• ISO-on-TCP (RFC1006)	Yes	Yes	Yes
Number of connections			
• overall	15; dynamically	15; dynamically	15; dynamically
1st interface			
Type of interface	PROFINET	PROFINET	PROFINET
Physics	Ethernet	Ethernet	Ethernet
Isolated	Yes	Yes	Yes
automatic detection of transmission speed	Yes	Yes	Yes
Autonegotiation	Yes	Yes	Yes
Autocrossover	Yes	Yes	Yes
CPU/ programming			
Configuration software			
• STEP 7	STEP 7 Basic V10.5	STEP 7 Basic V10.5	STEP 7 Basic V10.5
Programming language			
• LAD	Yes	Yes	Yes
• FBD	Yes	Yes	Yes
Cycle time monitoring			
• can be set	Yes	Yes	Yes
Digital inputs			
Number of digital inputs	14; Integrated	14; Integrated	14; Integrated
• of which, inputs usable for technological functions	6; HSC (High Speed Counting)	6; HSC (High Speed Counting)	6; HSC (High Speed Counting)
m/p-reading	Yes	Yes	Yes
Number of simultaneously controllable inputs			
• Mounting position - Concurrently controllable inputs, up to 40 °C	14	14	14

Technical specifications (continued)

	6ES7 214-1BE30-0XB0	6ES7 214-1AE30-0XB0	6ES7 214-1HE30-0XB0
Product-type designation	CPU 1214C AC/DC/Relay	CPU 1214C DC/DC/DC	CPU 1214C DC/DC/Relay
Input voltage			
• Rated value, DC	24 V	24 V	24 V
• for signal "0"	5 V DC at 1 mA	5 V DC at 1 mA	5 V DC at 1 mA
• for signal "1"	15 V DC at 2.5 mA	15 V DC at 2.5 mA	15 V DC at 2.5 mA
Input current			
• for signal "1", typ.	1 mA	1 mA	1 mA
Input delay (for rated value of input voltage)			
• for standard inputs - parameterizable	0.2, 0.4, 0.8, 1.6, 3.2, 6.4, and 12.8 ms, selectable in groups of four	0.2, 0.4, 0.8, 1.6, 3.2, 6.4, and 12.8 ms, selectable in groups of four	0.2, 0.4, 0.8, 1.6, 3.2, 6.4, and 12.8 ms, selectable in groups of four
- at "0" to "1", min.	0.2 ms	0.2 ms	0.2 ms
- at "0" to "1", max.	12.8 ms	12.8 ms	12.8 ms
• for interrupt inputs - parameterizable	Yes	Yes	Yes
• for counter/technological functions - parameterizable	Single phase : 3 at 100 kHz, 3 at 30 kHz differential: 3 at 80 kHz, 3 at 30 kHz	Single phase : 3 at 100 kHz, 3 at 30 kHz differential: 3 at 80 kHz, 3 at 30 kHz	Single phase : 3 at 100 kHz, 3 at 30 kHz differential: 3 at 80 kHz, 3 at 30 kHz
Cable length			
• Cable length, shielded, max.	500 m; 50 m for technological functions	500 m; 50 m for technological functions	500 m; 50 m for technological functions
• Cable length unshielded, max.	300 m; For technological functions: No	300 m; For technological functions: No	300 m; For technological functions: No
Digital outputs			
Number of digital outputs	10; Relay	10	10; Relay
• of which high-speed outputs		2; 100 kHz Pulse Train Output	
Short-circuit protection	No; to be provided externally	No; to be provided externally	No; to be provided externally
Limitation of inductive shutdown voltage to		L+ (-48 V)	
Switching capacity of the outputs			
• with resistive load, max.	2 A	0.5 A	2 A
• on lamp load, max.	30 W DC; 200 W AC	5 W	30 W DC; 200 W AC
Output voltage			
• for signal "1", min.		20 V	
Output current			
• for signal "1" rated value		0.5 A	
• for signal "0" residual current, max.		0.1 mA	
Output delay with resistive load			
• 0 to "1", max.	10 ms; max.	1 µs	10 ms; max.
• 1 to "0", max.	10 ms; max.	5 µs	10 ms; max.
Switching frequency			
• of the pulse outputs, with resistive load, max.	1 Hz	100 kHz	1 Hz
Cable length			
• Cable length, shielded, max.	500 m	500 m	500 m
• Cable length unshielded, max.	150 m	150 m	150 m

SIMATIC S7-1200

Central processing units

CPU 1214C

Technical specifications (continued)

	6ES7 214-1BE30-0XB0	6ES7 214-1AE30-0XB0	6ES7 214-1HE30-0XB0
Product-type designation	CPU 1214C AC/DC/Relay	CPU 1214C DC/DC/DC	CPU 1214C DC/DC/Relay
Relay outputs			
Number of relay outputs	10		10
Number of operating cycles	mechanically 10 million, at rated load voltage 100,000		mechanically 10 million, at rated load voltage 100,000
Analog inputs			
Number of analog inputs	2	2	2
Cable length, shielded, max.	100 m; twisted and shielded	100 m; twisted and shielded	100 m; twisted and shielded
Input ranges			
• Voltage	Yes	Yes	Yes
Input ranges (rated values), voltages			
• 0 to +10 V	Yes	Yes	Yes
• Input resistance (0 to 10 V)	≥100 kohms	≥100 kohms	≥100 kohms
Analog value creation			
Integrations and conversion time/ resolution per channel			
• Resolution with overrange (bit including sign), max.	10 bit	10 bit	10 bit
• Integration time, parameterizable	Yes	Yes	Yes
• Conversion time (per channel)	625 μs	625 μs	625 μs
Formation of analog values (in isochronous mode)			
Cable length			
• Max. cable length, shielded	10 m; twisted	10 m; twisted	10 m; twisted
Encoder supply			
24 V encoder supply			
• 24 V	permissible range: 20.4 to 28.8 V	permissible range: 20.4 to 28.8 V	permissible range: 20.4 to 28.8 V
Encoder			
Connectable encoders			
• 2-wire BEROS	Yes	Yes	Yes
Integrated Functions			
Number of counters	6	6	6
Counter frequency (counter) max.	100 kHz	100 kHz	100 kHz
Frequency meter	Yes	Yes	Yes
controlled positioning	Yes	Yes	Yes
PID controller	Yes	Yes	Yes
Number of alarm inputs	4	4	4
Number of pulse outputs		2	
Limit frequency (pulse)		100 kHz	
Operator control and monitoring			
Display			
• integrated	No	No	No
Galvanic isolation			
Galvanic isolation digital inputs			
• Galvanic isolation digital inputs	500 V AC for 1 minute	500 V AC for 1 minute	500 V AC for 1 minute
• between the channels, in groups of	1	1	1

Technical specifications (continued)

	6ES7 214-1BE30-0XB0	6ES7 214-1AE30-0XB0	6ES7 214-1HE30-0XB0
Product-type designation	CPU 1214C AC/DC/Relay	CPU 1214C DC/DC/DC	CPU 1214C DC/DC/Relay
Galvanic isolation digital outputs			
• Galvanic isolation digital outputs	Relays	Yes	Relays
• between the channels	No	No	No
• between the channels, in groups of	2	2	1
Permissible potential difference			
between different circuits	500 V DC between 24 V DC and 5 V DC	500 V DC between 24 V DC and 5 V DC	500 V DC between 24 V DC and 5 V DC
EMC			
Interference immunity against discharge of static electricity			
• Interference immunity against discharge of static electricity acc. to IEC 61000-4-2	Yes	Yes	Yes
- Test voltage with air discharge	8 kV	8 kV	8 kV
- Test voltage with contact discharge	6 kV	6 kV	6 kV
Interference immunity to cable-borne interference			
• on the supply lines acc. to IEC 61000-4-4	Yes	Yes	Yes
• Interference immunity on signal lines acc. to IEC 61000-4-4	Yes	Yes	Yes
Immunity to surge voltages			
• on the supply lines acc. to IEC 61000-4-5	Yes	Yes	Yes
Immunity to conducted interference, induced by high-frequency fields			
• Interference immunity against high-frequency radiation acc. to IEC 61000-4-6	Yes	Yes	Yes
Emission of radio interference in accordance with EN 55 011			
• Emission of radio interferences acc. to EN 55 011 (limit class A)	Yes; Group 1	Yes; Group 1	Yes; Group 1
• Emission of radio interference acc. to EN 55 011 (limit class B)	Yes	Yes	Yes
Climatic and mechanical conditions for storage and transport			
Climatic conditions for storage and transport			
• Free fall			
- Max. height of fall (in packaging)	0.3 m; five times, in shipping package	0.3 m; five times, in shipping package	0.3 m; five times, in shipping package
• Temperature			
- permissible temperature range	-40 °C ... +70 °C	-40 °C ... +70 °C	-40 °C ... +70 °C
• Relative humidity			
- permissible range (without condensation) at 25 °C	95%	95%	95%

SIMATIC S7-1200

Central processing units

CPU 1214C

Technical specifications (continued)

	6ES7 214-1BE30-0XB0	6ES7 214-1AE30-0XB0	6ES7 214-1HE30-0XB0
Product-type designation	CPU 1214C AC/DC/Relay	CPU 1214C DC/DC/DC	CPU 1214C DC/DC/Relay
Mechanical and climatic conditions during operation			
Climatic conditions during operation			
• Temperature			
- permissible temperature range	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted
- permissible temperature change	5 °C ... 55 °C, 3 °C/min	5 °C ... 55 °C, 3 °C/min	5 °C ... 55 °C, 3 °C/min
• Atmospheric pressure acc. to IEC 60068-2-13			
- permissible atmospheric pressure	1080 ... 795 hPa	1080 ... 795 hPa	1080 ... 795 hPa
- permissible operating altitude	-1000m ... 2000m	-1000m ... 2000m	-1000m ... 2000m
• Concentration of pollutants			
- SO ₂ at RH < 60% without condensation	< 0.5 ppm	< 0.5 ppm	< 0.5 ppm
- H ₂ S at RH < 60% without condensation	< 0.1 ppm	< 0.1 ppm	< 0.1 ppm
Environmental requirements			
Operating temperature			
• Min.	0 °C	0 °C	0 °C
• max.	55 °C	55 °C	55 °C
• vertical installation, min.	0 °C	0 °C	0 °C
• vertical installation, max.	45 °C	45 °C	45 °C
• horizontal installation, min.	0 °C	0 °C	0 °C
• horizontal installation, max.	55 °C	55 °C	55 °C
Storage/transport temperature			
• Min.	-40 °C	-40 °C	-40 °C
• max.	70 °C	70 °C	70 °C
Air pressure			
• Operation, min.	795 hPa	795 hPa	795 hPa
• Operation, max.	1 080 hPa	1 080 hPa	1 080 hPa
• Storage/transport, min.	660 hPa	660 hPa	660 hPa
• Storage/transport, max.	1 080 hPa	1 080 hPa	1 080 hPa
Relative humidity			
• Operation, max.	95 %; no condensation	95 %; no condensation	95 %; no condensation
Vibrations			
• Vibrations	2g panel mount, 1g DIN rail mount	2g panel mount, 1g DIN rail mount	2g panel mount, 1g DIN rail mount
• Operation, checked according to IEC 60068-2-6	Yes	Yes	Yes
Shock test			
• checked according to IEC 60068-2-27	Yes; 15 g, 11 ms pulse, 6 shocks in each of 3 axes	Yes; 15 g, 11 ms pulse, 6 shocks in each of 3 axes	Yes; 15 g, 11 ms pulse, 6 shocks in each of 3 axes
Degree of protection			
IP20	Yes	Yes	Yes
Standards, approvals, certificates			
CE mark	Yes	Yes	Yes
C-TICK	Yes	Yes	Yes
cULus	Yes	Yes	Yes
FM approval	Yes	Yes	Yes

Technical specifications (continued)

	6ES7 214-1BE30-0XB0	6ES7 214-1AE30-0XB0	6ES7 214-1HE30-0XB0
Product-type designation	CPU 1214C AC/DC/Relay	CPU 1214C DC/DC/DC	CPU 1214C DC/DC/Relay
Dimensions and weight			
Dimensions			
• Width	110 mm	110 mm	110 mm
• Height	100 mm	100 mm	100 mm
• Depth	75 mm	75 mm	75 mm
Weight			
• Weight, approx.	455 g	415 g	435 g

Ordering data

	Order No.		Order No.
CPU 1214C Compact CPU, AC/DC/relay; integral program/data memory 50 kbyte, load memory 2 Mbyte; wide-range power supply 85 ... 264 V AC; Boolean execution times 0.1 µs per operation; 14 digital inputs, 10 digital outputs (relays), 2 analog inputs; expandable by up to 3 communication modules, 8 signal modules and 1 signal board; digital inputs can be used as HSC at 100 kHz	C 6ES7 214-1BE30-0XB0	Accessories	
		SB 1221 signal board	
		4 inputs, 5 V DC, 200 kHz	C 6ES7 221-3AD30-0XB0
		4 inputs, 24 V DC, 200 kHz	C 6ES7 221-3BD30-0XB0
		SB 1222 signal board	
		4 outputs, 5 V DC, 0.1 A, 200 kHz	C 6ES7 222-1AD30-0XB0
		4 outputs, 24 V DC, 0.1 A, 200 kHz	C 6ES7 222-1BD30-0XB0
		SB 1223 signal board	
		2 inputs, 24 V DC, IEC type 1 active high; 2 24 V DC transistor outputs, 0.5 A, 5 W; can be used as HSC at up to 30 kHz	C 6ES7 223-0BD30-0XB0
		2 inputs, 5 V DC, 200 kHz	C 6ES7 223-3AD30-0XB0
		2 outputs 5 V DC, 0.1 A, 200 kHz	
		2 inputs, 24 V DC, 200 kHz	C 6ES7 223-3BD30-0XB0
		2 outputs 24 V DC, 0.1 A, 200 kHz	
		SB 1232 signal board	C 6ES7 232-4HA30-0XB0
		1 analog output, ±10 V with 12 bits or 0 to 20 mA with 11 bits	
		Simulator (optional)	
		14 input switches, for CPU 1214C	C 6ES7 274-1XH30-0XA0
		SIMATIC Memory Card (optional)	
		2 MB	C 6ES7 954-8LB00-0AA0
		24 MB	6ES7 954-8LF00-0AA0
		Extension cable for two-tier configuration	C 6ES7 290-6AA30-0XA0
		for connecting digital/analog signal modules; length 2 m	
		Terminal block (spare part)	
		For CPU 1214	
		For DI, with 20 screws, tin-plated; 4 units	C 6ES7 292-1AV30-0XA0
		For DO, with 12 screws, tin-plated; 4 units	C 6ES7 292-1AM30-0XA0
		For AI, with 3 screws, tin-plated; 4 units	C 6ES7 292-1BC30-0XA0
CPU 1214C Compact CPU, DC/DC/DC; integrated program/data memory 50 kbyte, load memory 2 Mbyte; power supply 24 V DC; Boolean execution times 0.1 µs per operation; 14 digital inputs, 10 digital outputs, 2 analog inputs; expandable by up to 3 communication modules, 8 signal modules, and 1 signal board; digital inputs can be used as HSC at 100 kHz, 24 V DC digital outputs can be used as pulse outputs (PTO) or pulse-width modulated outputs (PWM) at 100 kHz	C 6ES7 214-1AE30-0XB0		
CPU 1214C Compact CPU, DC/DC/relay; integrated program/data memory 50 kbyte, load memory 2 Mbyte; power supply 24 V DC; Boolean execution times 0.1 µs per operation; 14 digital inputs, 10 digital outputs (relays), 2 analog inputs; expandable by up to 3 communication modules, 8 signal modules, and 1 signal board; digital inputs can be used as HSC at 100 kHz	C 6ES7 214-1HE30-0XB0		

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

SIMATIC S7-1200

Central processing units

CPU 1214C

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Ordering data

S7-1200 automation system, System Manual

For SIMATIC S7-1200 and STEP 7 Basic

	B	Order No.
German	B	6ES7 298-8FA30-8AH0
English	B	6ES7 298-8FA30-8BH0
French	B	6ES7 298-8FA30-8CH0
Spanish	B	6ES7 298-8FA30-8DH0
Italian	B	6ES7 298-8FA30-8EH0
Chinese	B	6ES7 298-8FA30-8KH0

S7-1200 automation system, Easy Book

Brief instructions

	B	Order No.
German	B	6ES7 298-8FA30-8AQ0
English	B	6ES7 298-8FA30-8BQ0
French	B	6ES7 298-8FA30-8CQ0
Spanish	B	6ES7 298-8FA30-8DQ0
Italian	B	6ES7 298-8FA30-8EQ0
Chinese	B	6ES7 298-8FA30-8KQ0

B: Subject to export regulations: AL: N and ECCN: EAR99T

STEP 7 Basic engineering software

Target system:

SIMATIC S7-1200 controllers and the associated I/O.

The WinCC Basic which is included permits configuration of the SIMATIC Basic Panels

Requirement:

MS Windows XP SP3 / MS Windows Vista SP1

Type of delivery:

German, English, with online documentation

	D	Order No.
Single license	D	6ES7 822-0AA00-0YA0
STEP 7 Basic Software Update Service, 1 year	D	6ES7 822-0AA00-0YL0
Trial License STEP 7 Basic; on DVD, 14-day trial	D	6ES7 822-0AA00-0YA7

D: Subject to export regulations: AL: N and ECCN: 5D992

More information

Brochures

Information material for downloading can be found in the Internet:

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

SIMATIC S7-1200

SIPLUS central processing units

SIPLUS CPU 1211C, CPU 1212C, CPU 1214C

Overview SIPLUS CPU 1211C



- The clever compact solution
- With 10 integral input/outputs
- Expandable by:
 - 1 signal board (SB)
 - max. 3 communication modules (CM)

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

For ordering information see page 4/38.

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SIPLUS CPU 1211C			
Order No.	6AG1 211-1BD30-5XB0	6AG1 211-1BD30-5XB0	6AG1 211-1HD30-5XB0
	6AG1 211-1BD30-2XB0	6AG1 211-1BD30-2XB0	6AG1 211-1HD30-2XB0
Order No. based on	6ES7 211-1BD30-0XB0	6ES7 211-1AD30-0XB0	6ES7 211-1HD30-0XB0
Ambient temperature range	-25 ... +55 °C/+70 °C; condensation permissible		
Ambient conditions	Resistant in accordance with EN60721 to chemically (-3C4), mechanically (-3S4) and biologically (-3B2) active substances and compliant with ISA S71.04 G1, G2, G3, GX ¹⁾ . For further information, refer to Environmental conditions of SIPLUS extreme (on pg. 4/4) or go to www.siemens.com/siplus-extreme		
Technical data	The technical data of the standard product apply with the exception of the environmental conditions.		

¹⁾ ISA -S71.04 severity level GX from October 2010

SIMATIC S7-1200

SIPLUS central processing units

SIPLUS CPU 1211C, CPU 1212C, CPU 1214C

Overview SIPLUS CPU 1212C



- The superior compact solution
- With 14 integral input/outputs
- Expandable by:
 - 1 signal board (SB)
 - 2 signal modules (SM)
 - Max. 3 communication modules (CM)

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

For ordering information see page 4/38.

SIPLUS CPU 1212C			
Order No.	6AG1 212-1BD30-5XB0	6AG1 212-1AD30-5XB0	6AG1 212-1HD30-5XB0
	6AG1 212-1BD30-2XB0	6AG1 212-1AD30-2XB0	6AG1 212-1HD30-2XB0
Order No. based on	6ES7 212-1BD30-0XB0	6ES7 212-1AD30-0XB0	6ES7 212-1HD30-0XB0
Ambient temperature range	-25 ... +55 °C/+70 °C; condensation permissible		
Ambient conditions	Resistant in accordance with EN60721 to chemically (-3C4), mechanically (-3S4) and biologically (-3B2) active substances and compliant with ISA S71.04 G1, G2, G3, GX ¹⁾ . For further information, refer to Environmental conditions of SIPLUS extreme (on pg. 4/4) or go to www.siemens.com/siplus-extreme		
Technical data	The technical data of the standard product apply with the exception of the environmental conditions.		

¹⁾ ISA -S71.04 severity level GX from October 2010

SIMATIC S7-1200

SIPLUS central processing units

SIPLUS CPU 1211C, CPU 1212C, CPU 1214C

Overview SIPLUS CPU 1214C



- The compact high-performance CPU
- With 24 integral input/outputs
- Expandable by:
 - 1 signal board (SB)
 - 8 signal modules (SM)
 - max. 3 communication modules (CM)

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

For ordering information see page 4/38.

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SIPLUS CPU 1214C			
Order No.	6AG1 214-1BE30-5XB0	6AG1 214-1AE30-5XB0	6AG1 214-1HE30-5XB0
	6AG1 214-1BE30-2XB0	6AG1 214-1AE30-2XB0	6AG1 214-1HE30-2XB0
Order No. based on	6ES7 214-1BE30-0XB0	6ES7 212-1AE30-0XB0	6ES7 212-1HE30-0XB0
Ambient temperature range	-25 ... +55 °C/+70 °C; condensation permissible		
Ambient conditions	Resistant in accordance with EN60721 to chemically (-3C4), mechanically (-3S4) and biologically (-3B2) active substances and compliant with ISA S71.04 G1, G2, G3, GX ¹⁾ . For further information, refer to Environmental conditions of SIPLUS extreme (on pg. 4/4) or go to www.siemens.com/siplus-extreme		
Technical data	The technical data of the standard product apply with the exception of the environmental conditions.		

¹⁾ ISA -S71.04 severity level GX from October 2010

SIMATIC S7-1200

SIPLUS central processing units

SIPLUS CPU 1211C, CPU 1212C, CPU 1214C

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Ordering data

Order No.

Order No.

SIPLUS CPU 1211C Compact CPU, AC/DC/relay

(extended temperature range and medial exposure)

Compact CPU, AC/DC/relay;
integral program/data memory
25 KB, load memory 1 MB;
wide-range power supply
85 ... 264 V AC;
Boolean execution times 0.1 ms
per operation;
6 digital inputs,
4 digital outputs (relays),
2 analog inputs;
expandable by up to
3 communication modules and
1 signal board;
digital inputs can be used as HSC
at 100 kHz

• Ambient temperature C **6AG1 211-1BD30-2XB0**
-25 ... +70 °C;
number of simultaneously
controllable inputs and outputs
max. 50%;
Signal Board cannot be used

• Ambient temperature C **6AG1 211-1BD30-5XB0**
-25 ... +55 °C;
without restrictions;
Signal Board can be used

SIPLUS CPU 1211C Compact CPU, DC/DC/DC

(extended temperature range and medial exposure)

integral program/data memory
25 KB, load memory 1 MB;
power supply 24 V DC;
Boolean execution times 0.1 ms
per operation;
6 digital inputs,
4 digital outputs,
2 analog inputs;
expandable by up to 3 communi-
cation modules, 2 signal modules
and 1 signal board;
digital inputs can be used as HSC
at 100 kHz, 24 V DC digital
outputs can be used as pulse
outputs (PTO) or pulse-width
modulated outputs (PWM) with
100 kHz

• Ambient temperature C **6AG1 211-1AD30-2XB0**
-25 ... +70 °C;
number of simultaneously
controllable inputs and outputs
max. 50%;
Signal Board cannot be used

• Ambient temperature C **6AG1 211-1AD30-5XB0**
-25 ... +55 °C;
without restrictions;
Signal Board can be used

SIPLUS CPU 1211C Compact CPU, DC/DC/relay

(extended temperature range and medial exposure)

integral program/data memory
25 KB, load memory 1 MB;
power supply 24 V DC;
Boolean execution times 0.1 ms
per operation;
6 digital inputs,
4 digital outputs (relays),
2 analog inputs;
expandable by up to
3 communication modules and
1 signal board;
digital inputs can be used as HSC
at 100 kHz

• Ambient temperature C **6AG1 211-1HD30-2XB0**
-25 ... +70 °C;
number of simultaneously
controllable inputs and outputs
max. 50%;
Signal Board cannot be used

• Ambient temperature C **6AG1 211-1HD30-5XB0**
-25 ... +55 °C;
without restrictions;
Signal Board can be used

SIPLUS CPU 1212C Compact CPU, AC/DC/relay

(extended temperature range and medial exposure)

integral program/data memory
25 KB, load memory 1 MB;
wide-range power supply
85 ... 264 V AC;
Boolean execution times 0.1 ms
per operation;
8 digital inputs,
6 digital outputs (relays),
2 analog inputs;
expandable by up to
3 communication modules,
2 signal modules and 1 signal
board;
digital inputs can be used as HSC
at 100 kHz

• Ambient temperature C **6AG1 212-1BD30-2XB0**
-25 ... +70 °C;
number of simultaneously
controllable inputs and outputs
max. 50%;
Signal Board cannot be used

• Ambient temperature C **6AG1 212-1BD30-5XB0**
-25 ... +55 °C;
without restrictions;
Signal Board can be used

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

SIMATIC S7-1200

SIPLUS central processing units

SIPLUS CPU 1211C, CPU 1212C, CPU 1214C

Ordering data	Order No.	Order No.	
<p>SIPLUS CPU 1212C Compact CPU, DC/DC/DC</p> <p>(extended temperature range and medial exposure)</p> <p>integral program/data memory 25 KB, load memory 1 MB; power supply 24 V DC; Boolean execution times 0.1 ms per operation; 8 digital inputs, 6 digital outputs, 2 analog inputs; expandable by up to 3 communication modules, 2 signal modules and 1 signal board; digital inputs can be used as HSC at 100 kHz, 24 V DC digital outputs can be used as pulse outputs (PTO) or pulse-width modulated outputs (PWM) with 100 kHz</p> <ul style="list-style-type: none"> • Ambient temperature -25 ... +70 °C; number of simultaneously controllable inputs and outputs max. 50%; Signal Board cannot be used • Ambient temperature -25 ... +55 °C; without restrictions; Signal Board can be used 	<p>6AG1 212-1AD30-2XB0</p> <p>6AG1 212-1AD30-5XB0</p>	<p>SIPLUS CPU 1214C Compact CPU, AC/DC/relay</p> <p>(extended temperature range and medial exposure)</p> <p>integral program/data memory 50 KB, load memory 2 MB; wide-range power supply 85 ... 264 V AC; Boolean execution times 0.1 ms per operation; 14 digital inputs, 10 digital outputs (relays), 2 analog inputs; expandable by up to 3 communication modules, 8 signal modules and 1 signal board; digital inputs can be used as HSC at 100 kHz</p> <ul style="list-style-type: none"> • Ambient temperature -25 ... +70 °C; number of simultaneously controllable inputs and outputs max. 50%; Signal Board cannot be used • Ambient temperature -25 ... +55 °C; without restrictions; Signal Board can be used 	<p>6AG1 214-1BE30-2XB0</p> <p>6AG1 214-1BE30-5XB0</p>
<p>SIPLUS CPU 1212C Compact CPU, DC/DC/relay</p> <p>(extended temperature range and medial exposure)</p> <p>integral program/data memory 25 KB, load memory 1 MB; power supply 24 V DC; Boolean execution times 0.1 ms per operation; 8 digital inputs, 6 digital outputs (relays), 2 analog inputs; expandable by up to 3 communication modules, 2 signal modules and 1 signal board; digital inputs can be used as HSC at 100 kHz</p> <ul style="list-style-type: none"> • Ambient temperature -25 ... +70 °C; number of simultaneously controllable inputs and outputs max. 50%; Signal Board cannot be used • Ambient temperature -25 ... +55 °C; without restrictions; Signal Board can be used 	<p>6AG1 212-1HD30-2XB0</p> <p>6AG1 212-1HD30-5XB0</p>	<p>SIPLUS CPU 1214C Compact CPU, DC/DC/DC</p> <p>(extended temperature range and medial exposure)</p> <p>integral program/data memory 50 KB, load memory 2 MB; power supply 24 V DC; Boolean execution times 0.1 ms per operation; 14 digital inputs, 10 digital outputs, 2 analog inputs; expandable by up to 3 communication modules, 8 signal modules and 1 signal board; digital inputs can be used as HSC at 100 kHz, 24 V DC digital outputs can be used as pulse outputs (PTO) or pulse-width modulated outputs (PWM) with 100 kHz</p> <ul style="list-style-type: none"> • Ambient temperature -25 ... +70 °C; number of simultaneously controllable inputs and outputs max. 50%; Signal Board cannot be used • Ambient temperature -25 ... +55 °C; without restrictions; Signal Board can be used 	<p>6AG1 214-1AE30-2XB0</p> <p>6AG1 214-1AE30-5XB0</p>

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

SIMATIC S7-1200

SIPLUS central processing units

SIPLUS CPU 1211C, CPU 1212C, CPU 1214C

Ordering data

Order No.

SIPLUS CPU 1214C

Compact CPU, DC/DC/relay

(extended temperature range and medial exposure)

Compact CPU, DC/DC/relay;
integral program/data memory
50 KB, load memory 2 MB;
power supply 24 V DC;
Boolean execution times 0.1 ms
per operation;
14 digital inputs,
10 digital outputs (relays),
2 analog inputs;
expandable by up to
3 communication modules,
8 signal modules and 1 signal
board;
digital inputs can be used as HSC
at 100 kHz

- Ambient temperature C **6AG1 214-1HE30-2XB0**
-25 ... +70 °C;
number of simultaneously
controllable inputs and outputs
max. 50%;
Signal Board cannot be used
- Ambient temperature C **6AG1 214-1HE30-5XB0**
-25 ... +55 °C;
without restrictions;
Signal Board can be used

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

Order No.

Accessories

see S7-1200 CPUs,
pages 4/13, 4/23, 4/33

Overview



- Digital inputs as supplement to the integral I/O of the CPUs
- For flexible adaptation of the controller to the relevant task
- For subsequent expansion of the system with additional inputs

Application

Digital input modules allow the connection of the controller to digital signals of the process.

This provides users with the following advantages:

- **Optimum adaptation:**
With signal modules which can be mixed as desired, users can adapt their controllers exactly to the relevant task. This avoids superfluous investments. Modules with 8, 16, and 32 input/output channels are available.
- **Flexibility:**
If the task is expanded subsequently, the controller can be upgraded. Updating of the user program is extremely simple.

Function

The SM 1221 digital input signal modules convert the level of the external digital signals from the process into the internal signal level of the S7-1200.

Technical specifications

	6ES7 221-1BF30-0XB0	6ES7 221-1BH30-0XB0
Product type designation	SM 1221 DI 8x24 V DC	SM 1221 DI 16x24 V DC
Supply voltages		
Rated value		
• 24 V DC	Yes	Yes
• permissible range, lower limit (DC)	20.4 V	20.4 V
• permissible range, upper limit (DC)	28.8 V	28.8 V
Power supply to the transmitters		
• present	Yes	Yes
Current consumption		
from backplane bus 5 V DC, max.	105 mA	130 mA
Digital inputs		
• from load voltage L+ (without load), max.	4 mA; per channel	4 mA; per channel
Power loss		
Power loss, typ.	1.5 W	2.5 W
Connection method		
required front connector	Yes	Yes
Digital inputs		
Number of digital inputs	8	16
• in groups of	2	4
Number of simultaneously controllable inputs		
• all mounting positions - Concurrently controllable inputs, up to 40 °C	8	16

	6ES7 221-1BF30-0XB0	6ES7 221-1BH30-0XB0
Product type designation	SM 1221 DI 8x24 V DC	SM 1221 DI 16x24 V DC
Number of simultaneously controllable inputs		
• horizontal installation - up to 40 °C, max. - up to 50 °C, max.	8 8	16 16
• vertical installation - up to 40 °C, max.	8	16
Input characteristic curve acc. to IEC 1131, Type 1	Yes	Yes
Input voltage		
• Rated value, DC	24 V	24 V
• for signal "0"	5 V DC at 1 mA	5 V DC at 1 mA
• for signal "1"	15 V DC at 2.5 mA	15 V DC at 2.5 mA
Input current		
• for signal "0", max. (permissible quiescent current)	1 mA	1 mA
• for signal "1", min.	2.5 mA	2.5 mA
• for signal "1", typ.	4 mA; Typical	4 mA; Typical
Input delay (for rated value of input voltage)		
• for standard inputs - parameterizable	Yes; 0.2, 0.4, 0.8, 1.6, 3.2, 6.4, and 12.8 ms, selectable in groups of four	Yes; 0.2, 0.4, 0.8, 1.6, 3.2, 6.4, and 12.8 ms, selectable in groups of four
• for interrupt inputs - parameterizable	Yes	Yes

SIMATIC S7-1200

Digital modules

SM 1221 digital input module

Technical specifications (continued)

	6ES7 221-1BF30-0XB0	6ES7 221-1BH30-0XB0
Product type designation	SM 1221 DI 8x24 V DC	SM 1221 DI 16x24 V DC
Cable length		
• Cable length, shielded, max.	500 m	500 m
• Cable length unshielded, max.	300 m	300 m
Digital outputs		
Number of digital outputs	0	0
Interrupts/diagnostics/status information		
Alarms		
• Alarms	Yes	Yes
• Diagnostic alarm	Yes	Yes
Diagnoses		
• Diagnostic functions	Yes	Yes
• Monitoring the supply voltage to the electronics	Yes	Yes
Diagnostics indication LED		
• for status of inputs	Yes	Yes
• for maintenance	Yes	Yes
• Status indicator digital input (green)	Yes	Yes
Galvanic isolation		
Galvanic isolation digital inputs		
• between the channels, in groups of	2	4
Climatic and mechanical conditions for storage and transport		
Climatic conditions for storage and transport		
• Free fall		
- Max. height of fall (in packaging)	0.3 m; five times, in shipping package	0.3 m; five times, in shipping package
• Temperature		
- permissible temperature range	-40 °C ... +70 °C	-40 °C ... +70 °C
• Air pressure acc. to IEC 60068-2-13		
- permissible atmospheric pressure	1080 to 660 hPa	1080 to 660 hPa
• Relative humidity		
- permissible range (without condensation) at 25 °C	95%	95%

	6ES7 221-1BF30-0XB0	6ES7 221-1BH30-0XB0
Product type designation	SM 1221 DI 8x24 V DC	SM 1221 DI 16x24 V DC
Mechanical and climatic conditions during operation		
Climatic conditions during operation		
• Temperature		
- permissible temperature range	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted
- permissible temperature change	5 °C ... 55 °C, 3 °C/min	5 °C ... 55 °C, 3 °C/min
Degree of protection		
IP20	Yes	Yes
Standards, approvals, certificates		
CE mark	Yes	Yes
C-TICK	Yes	Yes
FM approval	Yes	Yes
Mechanics		
Type of housing (front)		
• Plastic	Yes	Yes
Dimensions and weight		
Dimensions		
• Width	45 mm	45 mm
• Height	100 mm	100 mm
• Depth	75 mm	75 mm
Weight		
• Weight, approx.	170 g	210 g

Ordering data	Order No.
SM 1221 digital input signal module	
8 inputs, 24 V DC, isolated, current sourcing/sinking	C 6ES7 221-1BF30-0XB0
16 inputs, 24 V DC, isolated, current sourcing/sinking	C 6ES7 221-1BH30-0XB0
Accessories	
Extension cable for two-tier configuration	C 6ES7 290-6AA30-0XA0
for connecting digital/analog signal modules; length 2 m	
Terminal block (spare part)	
for 8/16-channel digital signal modules	
with 7 screws, zinc-plated; 4 pcs.	C 6ES7 292-1AG30-0XA0
S7-1200 automation system, System Manual	
For SIMATIC S7-1200 and STEP 7 Basic	
German	B 6ES7 298-8FA30-8AH0
English	B 6ES7 298-8FA30-8BH0
French	B 6ES7 298-8FA30-8CH0
Spanish	B 6ES7 298-8FA30-8DH0
Italian	B 6ES7 298-8FA30-8EH0
Chinese	B 6ES7 298-8FA30-8KH0
S7-1200 automation system, Easy Book	
Brief instructions	
German	B 6ES7 298-8FA30-8AQ0
English	B 6ES7 298-8FA30-8BQ0
French	B 6ES7 298-8FA30-8CQ0
Spanish	B 6ES7 298-8FA30-8DQ0
Italian	B 6ES7 298-8FA30-8EQ0
Chinese	B 6ES7 298-8FA30-8KQ0
STEP 7 Basic engineering software	
<i>Target system:</i> SIMATIC S7-1200 controllers and the associated I/O. The WinCC Basic which is included permits configuration of the SIMATIC Basic Panels	
<i>Requirement:</i> MS Windows XP SP3 / MS Windows Vista SP1	
<i>Type of delivery:</i> German, English, with online documentation	
Single license	D 6ES7 822-0AA00-0YA0
STEP 7 Basic Software Update Service, 1 year	D 6ES7 822-0AA00-0YLO
Trial License STEP 7 Basic; on DVD, 14-day trial	D 6ES7 822-0AA00-0YA7

B: Subject to export regulations: AL: N and ECCN: EAR99T
 C: Subject to export regulations: AL: N and ECCN: EAR99H
 D: Subject to export regulations: AL: N and ECCN: 5D992

More information

Brochures

Information material for downloading can be found in the Internet:

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

SIMATIC S7-1200

Digital modules

SB 1221 digital input module

Overview



- Digital inputs as a supplement to the integral I/O of SIMATIC S7-1200 CPUs
- Can be plugged directly into the CPU

Application

The SB 1221 Signal Board digital input modules enable connection of the controller to digital process signals.

Design

The Signal Boards are plugged straight into the holder on the front of the S7-1200-CPU.

- Mounting:
Signal Boards are plugged direct into the SIMATIC S7-1200-CPU and linked electrically and mechanically with the CPU in this way.
- The installation dimensions of the CPU remain unchanged.
- On all Signal Boards, replacement is facilitated by removable terminals ("permanent wiring").

Function

The SB 1221 Signal Board digital input/output modules convert the level of the external digital signals from the process to the internal signal level of the S7-1200.

Technical specifications

	6ES7 221-3AD30-0XB0	6ES7 221-3BD30-0XB0
Product type designation	SB 1221 4xDI 5 V DC 200 kHz	SB 1221 4xDI 24 V DC 200 kHz
Supply voltages		
Power supply to the transmitters		
• Supply current, max.	4 mA; per channel	4 mA; per channel
Current consumption		
from backplane bus 5 V DC, typ.	50 mA	50 mA
Power loss		
Power loss, typ.	1 W	1 W
Digital inputs		
Number of digital inputs	4	4
• in groups of	1	1
Number of simultaneously controllable inputs		
• all mounting positions - Concurrently controllable inputs, up to 40 °C	4	4
Input characteristic curve acc. to IEC 1131, Type 1	Yes	
Input characteristic curve acc. to IEC 1131, Type 2		Yes
Input voltage		
• Rated value, DC	5 V	24 V
• for signal "0"	0 to 1 V	0 to 5 V
• for signal "1"	2 to 6 V	15 to 30 V
Input current		
• for signal "0", max. (permissible quiescent current)	3 mA	2 mA
• for signal "1", min.	6 mA	5.8 mA
• for signal "1", typ.		14 mA

	6ES7 221-3AD30-0XB0	6ES7 221-3BD30-0XB0
Product type designation	SB 1221 4xDI 5 V DC 200 kHz	SB 1221 4xDI 24 V DC 200 kHz
Input delay (for rated value of input voltage)		
• for standard inputs - parameterizable	Yes; 0.2, 0.4, 0.8, 1.6, 3.2, 6.4, and 12.8 ms, selectable in groups of four	Yes; 0.2, 0.4, 0.8, 1.6, 3.2, 6.4, and 12.8 ms, selectable in groups of four
- at "0" to "1", max.	2 µs	2.5 µs
• for interrupt inputs - parameterizable	Yes	Yes
• for counter/technological functions - parameterizable	Yes	Yes
Cable length		
• Cable length, shielded, max.	50 m	50 m; Standard input: 500 m, high-speed counters: 50 m
Short-circuit protection	No	
Interrupts/diagnostics/status information		
Alarms		
• Alarms	Yes	Yes
Diagnoses		
• Diagnostic functions	Yes	Yes
Input delay (for rated value of input voltage)		
Diagnostics indication LED		
• for status of inputs	Yes	Yes

Technical specifications (continued)

	6ES7 221-3AD30-0XB0	6ES7 221-3BD30-0XB0
Product type designation	SB 1221 4xDI 5 V DC 200 kHz	SB 1221 4xDI 24 V DC 200 kHz
Climatic and mechanical conditions for storage and transport		
Climatic conditions for storage and transport		
• Free fall - Max. height of fall (in packaging)	0.3 m; five times, in shipping package	0.3 m; five times, in shipping package
• Temperature - permissible temperature range		-40 °C ... +70 °C
• Air pressure acc. to IEC 60068-2-13 - permissible atmospheric pressure	1080 ... 660hPa	1080 ... 660hPa
• Relative humidity - permissible range (without condensation) at 25 °C	95%	95%
Mechanical and climatic conditions during operation		
Climatic conditions during operation		
• Temperature - permissible temperature range	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted
Degree of protection		
IP20	Yes	Yes
Mechanics		
Type of housing (front)		
• Plastic	Yes	Yes
Dimensions and weight		
Dimensions		
• Width	38 mm	38 mm
• Height	62 mm	62 mm
• Depth	21 mm	21 mm
Weight		
• Weight, approx.	40 g	40 g

Ordering data

Order No.

SB 1221 Signal Board digital input modules		
4 inputs, 5 V DC, 200 kHz	C	6ES7 221-3AD30-0XB0
4 inputs, 24 V DC, 200 kHz	C	6ES7 221-3BD30-0XB0
Accessories		
Terminal block (spare part) for Signal Board with 6 screws, gold-plated; 4 pcs.	C	6ES7 292-1BF30-0XA0
S7-1200 automation system, System Manual		
For SIMATIC S7-1200 and STEP 7 Basic		
German	B	6ES7 298-8FA30-8BH0
English	B	6ES7 298-8FA30-8AH0
French	B	6ES7 298-8FA30-8CH0
Spanish	B	6ES7 298-8FA30-8DH0
Italian	B	6ES7 298-8FA30-8EH0
Chinese	B	6ES7 298-8FA30-8KH0
S7-1200 automation system, Easy Book		
Brief instructions		
German	B	6ES7 298-8FA30-8AQ0
English	B	6ES7 298-8FA30-8BQ0
French	B	6ES7 298-8FA30-8CQ0
Spanish	B	6ES7 298-8FA30-8DQ0
Italian	B	6ES7 298-8FA30-8EQ0
Chinese	B	6ES7 298-8FA30-8KQ0
STEP 7 Basic engineering software		
<i>Target system:</i> SIMATIC S7-1200 controllers and the associated I/O. The WinCC Basic which is included permits configuration of the SIMATIC Basic Panels		
<i>Requirement:</i> MS Windows XP SP3 / MS Windows Vista SP1		
<i>Type of delivery:</i> German, English, with online documentation		
Single license	D	6ES7 822-0AA00-0YA0
STEP 7 Basic Software Update Service, 1 year	D	6ES7 822-0AA00-0YL0
Trial License STEP 7 Basic; on DVD, 14-day trial	D	6ES7 822-0AA00-0YA7

B: Subject to export regulations: AL: N and ECCN: EAR99T
 C: Subject to export regulations: AL: N and ECCN: EAR99H
 D: Subject to export regulations: AL: N and ECCN: 5D992

SIMATIC S7-1200

Digital modules

SM 1222 digital output module

Overview



- Digital outputs as supplement to the integral I/O of the CPUs
- For flexible adaptation of the controller to the relevant task
- For subsequent expansion of the system with additional outputs

Application

Digital output modules permit the output of digital signals from the controller to the process.

This provides users with the following advantages:

- **Optimum adaptation:**
With signal modules which can be mixed as desired, users can adapt their controllers exactly to the relevant task. This avoids superfluous investments. Modules with 8, 16, and 32 input/output channels are available.
- **Flexibility:**
If the task is expanded subsequently, the controller can be upgraded. Updating of the user program is extremely simple.

Function

The SM 1222 digital output signal modules convert the internal signal level of the SIMATIC S7-1200 into the external signal level required by the process.

Technical specifications

	6ES7 222-1BF30-0XB0	6ES7 222-1BH30-0XB0	6ES7 222-1HF30-0XB0	6ES7 222-1HH30-0XB0
Product type designation	SM1222 DQ 8x24 V DC	SM1222 DQ 16x24 V DC	SM 1222 DQ 8xRelay	SM1222 DQ 16xRelay
Supply voltages				
Rated value				
• permissible range, lower limit (DC)	20.4 V	20.4 V	5 V	5 V
• permissible range, upper limit (DC)	28.8 V	28.8 V	30 V	30 V
Current consumption				
from backplane bus 5 V DC, max.	120 mA	140 mA	120 mA	135 mA
Digital inputs				
• from load voltage L+ (without load), max.			11 mA / relay coil used	11 mA / relay coil used
Power loss				
Power loss, typ.	1.5 W	2.5 W	4.5 W	8.5 W
Connection method				
required front connector	Yes	Yes	Yes	Yes
Digital inputs				
Number of digital inputs	0	0	0	0
Digital outputs				
Number of digital outputs	8	16	8	16
• in groups of	1	1	2	1
Short-circuit protection	No; to be provided externally	No; to be provided externally	No; to be provided externally	No; to be provided externally
Limitation of inductive shutdown voltage to	typ. (L+) -48 V	typ. (L+) -48 V		
Switching capacity of the outputs				
• with resistive load, max.	0.5 A	0.5 A	2 A	2 A
• on lamp load, max.	5 W	5 W	30 W DC; 200 W AC	30 W DC; 200 W AC

Technical specifications (continued)

	6ES7 222-1BF30-0XB0	6ES7 222-1BH30-0XB0	6ES7 222-1HF30-0XB0	6ES7 222-1HH30-0XB0
Product type designation	SM1222 DQ 8x24 V DC	SM1222 DQ 16x24 V DC	SM 1222 DQ 8xRelay	SM1222 DQ 16xRelay
Output voltage				
• Rated value (AC)			5 to 250 V AC	5 to 250 V AC
• Rated value (DC)	24 V	24 V	5 to 30 V DC	5 to 30 V DC
• for signal "0" (DC), max.	0.1 V; with 10 kohms Load	0.1 V; with 10k ohms Load		
• for signal "1", min.	20 V DC	20 V DC		
Output current				
• for signal "1" rated value	0.5 A	0.5 A		
• for signal "1" permissible range, max.			2 A	2 A
• for signal "0" residual current, max.	10 µA	10 µA		
Output delay with resistive load				
• 0 to "1", max.	50 µs	50 µs	10 ms	10 ms
• 1 to "0", max.	200 µs	200 µs	10 ms	10 ms
Aggregate current of outputs (per group)				
• horizontal installation - up to 50 °C, max.	4 A; Current per mass	8 A; Current per common	10 A; Current per common	10 A; Current per common
Cable length				
• Cable length, shielded, max.	500 m	500 m	500 m	500 m
• Cable length unshielded, max.	150 m	150 m	150 m	150 m
Relay outputs				
Number of relay outputs			8	16
Rated input voltage of relay L+ (DC)			24 V	24 V
Number of operating cycles			mechanically 10 million, at rated load voltage 100,000	mechanically 10 million, at rated load voltage 100,000
Switching capacity of contacts				
• with inductive load, max.	0.5 A	0.5 A	2 A	2 A
• on lamp load, max.	5 W	5 W	30 W DC; 200 W AC	30 W DC; 200 W AC
• with resistive load, max.	0.5 A	0.5 A	2 A	2 A
Interrupts/diagnostics/ status information				
Alarms				
• Alarms	Yes	Yes	Yes	Yes
• Diagnostic alarm	Yes	Yes	Yes	Yes
Diagnoses				
• Diagnostic functions	Yes	Yes	Yes	Yes
• Monitoring the supply voltage to the electronics	Yes	Yes	Yes	Yes
Diagnostics indication LED				
• for status of outputs	Yes	Yes	Yes	Yes
• for maintenance	Yes	Yes	Yes	Yes
• Status indicator digital output (green)	Yes	Yes	Yes	Yes
Galvanic isolation				
Galvanic isolation digital outputs				
• between the channels			Relay, dry contact	Relay, dry contact
• between the channels, in groups of	1	1	2	4
• between the channels and the back-plane bus	500 V AC	500 V AC	1500 V AC for 1 minute	1500 V AC for 1 minute
Permissible potential difference between different circuits			750 V AC for 1 minute	750 V AC for 1 minute

SIMATIC S7-1200

Digital modules

SM 1222 digital output module

Technical specifications (continued)

	6ES7 222-1BF30-0XB0	6ES7 222-1BH30-0XB0	6ES7 222-1HF30-0XB0	6ES7 222-1HH30-0XB0
Product type designation	SM1222 DQ 8x24 V DC	SM1222 DQ 16x24 V DC	SM 1222 DQ 8xRelay	SM1222 DQ 16xRelay
Climatic and mechanical conditions for storage and transport				
Climatic conditions for storage and transport				
• Free fall - Max. height of fall (in packaging)	0.3 m; five times, in shipping package	0.3 m; five times, in shipping package	0.3 m; five times, in shipping package	0.3 m; five times, in shipping package
• Temperature - permissible temperature range	-40 °C ... +70 °C	-40 °C ... +70 °C	-40 °C ... +70 °C	-40 °C ... +70 °C
• Air pressure acc. to IEC 60068-2-13 - permissible atmospheric pressure	1080 to 660hPa	1080 to 660hPa	1080 to 660hPa	1080 to 660hPa
• Relative humidity - permissible range (without condensation) at 25 °C	95%	95%	95%	95%
Mechanical and climatic conditions during operation				
Climatic conditions during operation				
• Temperature - permissible temperature range	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted
- permissible temperature change	5 °C ... 55 °C, 3 °C/min	5 °C ... 55 °C, 3 °C/min	5 °C ... 55 °C, 3 °C/min	5 °C ... 55 °C, 3 °C/min
Degree of protection				
IP20	Yes	Yes	Yes	Yes
Standards, approvals, certificates				
CE mark	Yes	Yes	Yes	Yes
C-TICK	Yes	Yes	Yes	Yes
FM approval	Yes	Yes	Yes	Yes
Mechanics				
Type of housing (front)				
• Plastic	Yes	Yes	Yes	Yes
Dimensions and weight				
Dimensions				
• Width	45 mm	45 mm	45 mm	45 mm
• Height	100 mm	100 mm	100 mm	100 mm
• Depth	75 mm	75 mm	75 mm	75 mm
Weight				
• Weight, approx.	180 g	220 g	190 g	260 g

Ordering data	Order No.	Order No.
SM 1222 digital output signal module		
8 outputs, 24 V DC; 0.5 A, 5 W, isolated	C 6ES7 222-1BF30-0XB0	
16 outputs, 24 V DC; 0.5 A, 5 W, isolated	C 6ES7 222-1BH30-0XB0	
8 relay outputs, 5 ... 30 V DC/ 5 ... 250 V AC, 2 A, 30 W DC/200 W AC	C 6ES7 222-1HF30-0XB0	
16 relay outputs, 5 ... 30 V DC/ 5 ... 250 V AC, 2 A, 30 W DC/200 W AC	C 6ES7 222-1HH30-0XB0	
Accessories		
Extension cable for two-tier configuration	C 6ES7 290-6AA30-0XA0	
for connecting digital/analog signal modules; length 2 m		
Terminal block (spare part)		
for 8/16-channel digital signal modules		
with 7 screws, zinc-plated; 4 pcs.	C 6ES7 292-1AG30-0XA0	
S7-1200 automation system, System Manual		
For SIMATIC S7-1200 and STEP 7 Basic		
German	B 6ES7 298-8FA30-8BH0	
English	B 6ES7 298-8FA30-8AH0	
French	B 6ES7 298-8FA30-8CH0	
Spanish	B 6ES7 298-8FA30-8DH0	
Italian	B 6ES7 298-8FA30-8EH0	
Chinese	B 6ES7 298-8FA30-8KH0	
B: Subject to export regulations: AL: N and ECCN: EAR99T C: Subject to export regulations: AL: N and ECCN: EAR99H		
S7-1200 automation system, Easy Book		
Brief instructions		
German	B 6ES7 298-8FA30-8AQ0	
English	B 6ES7 298-8FA30-8BQ0	
French	B 6ES7 298-8FA30-8CQ0	
Spanish	B 6ES7 298-8FA30-8DQ0	
Italian	B 6ES7 298-8FA30-8EQ0	
Chinese	B 6ES7 298-8FA30-8KQ0	
STEP 7 Basic engineering software		
<i>Target system:</i> SIMATIC S7-1200 controllers and the associated I/O. The WinCC Basic which is included permits configuration of the SIMATIC Basic Panels		
<i>Requirement:</i> MS Windows XP SP3 / MS Windows Vista SP1		
<i>Type of delivery:</i> German, English, with online documentation		
Single license	D 6ES7 822-0AA00-0YA0	
STEP 7 Basic Software Update Service, 1 year	D 6ES7 822-0AA00-0YL0	
Trial License STEP 7 Basic; on DVD, 14-day trial	D 6ES7 822-0AA00-0YA7	
D: Subject to export regulations: AL: N and ECCN: 5D992		

More information

Brochures

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

SIMATIC S7-1200

Digital modules

SB 1222 digital output module

Overview



- Digital outputs as a supplement to the integral I/O of SIMATIC S7-1200 CPUs
- Can be plugged directly into the CPU

Application

The SB 1222 Signal Board digital output modules enable the digital signals of the controller to be output to the process.

Design

The Signal Boards are plugged straight into the holder on the front of the S7-1200-CPU.

- Mounting:
Signal Boards are plugged direct into the SIMATIC S7-1200-CPU and linked electrically and mechanically with the CPU in this way.
- The installation dimensions of the CPU remain unchanged.
- On all Signal Boards, replacement is facilitated by removable terminals ("permanent wiring").

Function

The SB 1222 Signal Board digital input/output modules convert the internal signal level of the S7-1200 to the external signal level required for the process.

Technical specifications

	6ES7 222-1AD30-0XB0	6ES7 222-1BD30-0XB0
Product type designation	SB 1222 4xDQ 5 V DC 200 kHz	SB 1222 4xDQ 24 V DC 200 kHz
Supply voltages		
Power supply to the transmitters		
• Supply current, max.	4 mA; per channel	4 mA; per channel
Current consumption		
from backplane bus 5 V DC, typ.	50 mA	50 mA
Power loss		
Power loss, typ.	1 W	1 W
Digital outputs		
Number of digital outputs	4	4
• in groups of	1	1
Short-circuit protection	No	No
Switching capacity of the outputs		
• with resistive load, max.	0.1 A	0.1 A
Output voltage		
• Rated value (DC)	5 V	24 V
• for signal "0" (DC), max.	0.4 V	0.1 V; with 10k ohms load
• for signal "1", min.	L+ (-0.5 V)	20 V
• for signal "1" (DC), max.	6 V	
Output current		
• for signal "1" rated value	0.1 A	0.1 A
• for signal "1" permissible range, max.	0.11 A	
• for signal "0" residual current, max.		10 µA

	6ES7 222-1AD30-0XB0	6ES7 222-1BD30-0XB0
Product type designation	SB 1222 4xDQ 5 V DC 200 kHz	SB 1222 4xDQ 24 V DC 200 kHz
Load resistance range		
• upper limit	5 Ω	10 Ω
Cable length		
• Cable length, shielded, max.	50 m	50 m
Interrupts/diagnostics/status information		
Alarms		
• Alarms	Yes	Yes
Diagnoses		
• Diagnostic functions	Yes	Yes
Diagnostics indication LED		
• for status of outputs	Yes	Yes
Climatic and mechanical conditions for storage and transport		
Climatic conditions for storage and transport		
• Free fall		
- Max. height of fall (in packaging)	0.3 m; five times, in shipping package	0.3 m; five times, in shipping package
• Atmospheric pressure acc. to IEC 60068-2-13		
- permissible atmospheric pressure	1080 bis 660hPa	1080 bis 660hPa
• Relative humidity		
- permissible range (without condensation) at 25 °C	95%	95%

Technical specifications (continued)

	6ES7 222-1AD30-0XB0	6ES7 222-1BD30-0XB0
Product type designation	SB 1222 4xDQ 5 V DC 200 kHz	SB 1222 4xDQ 24 V DC 200 kHz
Mechanical and climatic conditions during operation		
Climatic conditions during operation		
• Temperature		
- permissible temperature range	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted
Degree of protection		
IP20	Yes	Yes

	6ES7 222-1AD30-0XB0	6ES7 222-1BD30-0XB0
Product type designation	SB 1222 4xDQ 5 V DC 200 kHz	SB 1222 4xDQ 24 V DC 200 kHz
Mechanics		
Type of housing (front)		
• Plastic	Yes	Yes
Dimensions and weight		
Dimensions		
• Width	38 mm	38 mm
• Height	62 mm	62 mm
• Depth	21 mm	21 mm
Weight		
• Weight, approx.	40 g	40 g

Ordering data

Ordering data	Order No.
SB 1222 Signal Board digital output modules	
4 outputs, 5 V DC, 0.1 A, 200 kHz	C 6ES7 222-1AD30-0XB0
4 outputs, 24 V DC, 0.1 A, 200 kHz	C 6ES7 222-1BD30-0XB0
Accessories	
Terminal block (spare part)	
for Signal Board	
with 6 screws, gold-plated; 4 pcs.	C 6ES7 292-1BF30-0XA0
S7-1200 automation system, System Manual	
For SIMATIC S7-1200 and STEP 7 Basic	
German	B 6ES7 298-8FA30-8BH0
English	B 6ES7 298-8FA30-8AH0
French	B 6ES7 298-8FA30-8CH0
Spanish	B 6ES7 298-8FA30-8DH0
Italian	B 6ES7 298-8FA30-8EH0
Chinese	B 6ES7 298-8FA30-8KH0

B: Subject to export regulations: AL: N and ECCN: EAR99T
C: Subject to export regulations: AL: N and ECCN: EAR99H

Order No.

S7-1200 automation system, Easy Book	
Brief instructions	
German	B 6ES7 298-8FA30-8AQ0
English	B 6ES7 298-8FA30-8BQ0
French	B 6ES7 298-8FA30-8CQ0
Spanish	B 6ES7 298-8FA30-8DQ0
Italian	B 6ES7 298-8FA30-8EQ0
Chinese	B 6ES7 298-8FA30-8KQ0
STEP 7 Basic engineering software	
<i>Target system:</i> SIMATIC S7-1200 controllers and the associated I/O. The WinCC Basic which is included permits configuration of the SIMATIC Basic Panels	
<i>Requirement:</i> MS Windows XP SP3 / MS Windows Vista SP1	
<i>Type of delivery:</i> German, English, with online documentation	
Single license	D 6ES7 822-0AA00-0YA0
STEP 7 Basic Software Update Service, 1 year	D 6ES7 822-0AA00-0YL0
Trial License STEP 7 Basic; on DVD, 14-day trial	D 6ES7 822-0AA00-0YA7

D: Subject to export regulations: AL: N and ECCN: 5D992

SIMATIC S7-1200

Digital modules

SM 1223 digital input/output module

Overview



- Digital inputs and outputs as supplement to the integral I/O of the CPUs
- For flexible adaptation of the controller to the relevant task
- For subsequent expansion of the system with additional inputs and outputs

Application

Digital input/output modules permit:

- Connection of the controller to digital signals of the process
- Output of digital signals from the controller to the process

This provides users with the following advantages:

- **Optimum adaptation:**
With signal modules which can be mixed as desired, users can adapt their controllers exactly to the relevant task. This avoids superfluous investments. Modules with 8, 16, and 32 input/output channels are available.
- **Flexibility:**
If the task is expanded subsequently, the controller can be upgraded. Updating of the user program is extremely simple

Function

The SM 1223 digital input/output signal modules convert

- the level of the external digital signals from the process into the internal signal level of the S7-1200 and
- the internal signal level of the S7-1200 into the external signal level required by the process.

Technical specifications

	6ES7 223-1BH30-0XB0	6ES7 223-1BL30-0XB0	6ES7 223-1PH30-0XB0	6ES7 223-1PL30-0XB0
Product type designation	SM 1223 DI 8x24 V DC, DQ 8x24 V DC	SM 1223 DI 16x24 V DC, DQ 16x24 V DC	SM 1223 DI 8x24 V DC, DQ 8xRelay	SM 1223 DI 16x24 V DC, DQ 16xRelay
Supply voltages				
Rated value				
• 24 V DC	Yes	Yes	Yes	Yes
• permissible range, lower limit (DC)	20.4 V	20.4 V	20.4 V	20.4 V
• permissible range, upper limit (DC)	28.8 V	28.8 V	28.8 V	28.8 V
Power supply to the transmitters				
• present	Yes	Yes	Yes	Yes
Current consumption				
from backplane bus 5 V DC, max.	145 mA	185 mA	145 mA	180 mA
Digital inputs				
• from load voltage L+ (without load), max.	4 mA; per channel	4 mA; per channel	4 mA / input 11 mA / relay	4 mA / input 11 mA / relay
Power loss				
Power loss, typ.	2.5 W	4.5 W	5.5 W	10 W
Connection method				
required front connector	Yes	Yes	Yes	Yes
Digital inputs				
Number of digital inputs	8	16	8	16
• in groups of	2	2	2	2
Number of simultaneously controllable inputs				
• all mounting positions - Concurrently controllable inputs, up to 40 °C	8	16	8	16

Technical specifications (continued)

	6ES7 223-1BH30-0XB0	6ES7 223-1BL30-0XB0	6ES7 223-1PH30-0XB0	6ES7 223-1PL30-0XB0
Product type designation	SM 1223 DI 8x24 V DC, DQ 8x24 V DC	SM 1223 DI 16x24 V DC, DQ 16x24 V DC	SM 1223 DI 8x24 V DC, DQ 8xRelay	SM 1223 DI 16x24 V DC, DQ 16xRelay
Number of simultaneously controllable inputs				
• horizontal installation				
- up to 40 °C, max.	8	16	8	16
- up to 50 °C, max.	8	16	8	16
• vertical installation				
- up to 40 °C, max.	8	16	8	16
Input characteristic curve acc. to IEC 1131, Type 1	Yes	Yes	Yes	Yes
Input voltage				
• Rated value, DC	24 V	24 V	24 V	24 V
• for signal "0"	5 V DC at 1 mA	5 V DC at 1 mA	5 V DC at 1 mA	5 V DC at 1 mA
• for signal "1"	15 V DC at 2.5 mA	15 V DC at 2.5 mA	15 V DC at 2.5 mA	15 V DC at 2.5 mA
Input current				
• for signal "0", max. (permissible quiescent current)	1 mA	1 mA	1 mA	1 mA
• for signal "1", min.	2.5 mA	2.5 mA	2.5 mA	2.5 mA
• for signal "1", typ.	4 mA; Typical	4 mA; Typical	4 mA; Typical	4 mA; Typical
Input delay (for rated value of input voltage)				
• for standard inputs				
- parameterizable	Yes; 0.2, 0.4, 0.8, 1.6, 3.2, 6.4, and 12.8 ms, selectable in groups of four	Yes; 0.2, 0.4, 0.8, 1.6, 3.2, 6.4, and 12.8 ms, selectable in groups of four	Yes; 0.2, 0.4, 0.8, 1.6, 3.2, 6.4, and 12.8 ms, selectable in groups of four	Yes; 0.2, 0.4, 0.8, 1.6, 3.2, 6.4, and 12.8 ms, selectable in groups of four
• for interrupt inputs				
- parameterizable	Yes	Yes	Yes	Yes
Cable length				
• Cable length, shielded, max.	500 m	500 m	500 m	500 m
• Cable length unshielded, max.	300 m	300 m	300 m	300 m
Digital outputs				
Number of digital outputs	8	16	8	16
• in groups of	1	1	2	4
Short-circuit protection	No; to be provided externally	No; to be provided externally	No; to be provided externally	No; to be provided externally
Limitation of inductive shutdown voltage to	L+ (-48 V)	L+ (-48 V)		
Switching capacity of the outputs				
• with resistive load, max.	0.5 A	0.5 A	2 A	2 A
• on lamp load, max.	5 W	5 W	30 W DC; 200 W AC	30 W DC; 200 W AC
Output voltage				
• Rated value (AC)			5 to 250 V AC	5 to 250 V AC
• Rated value (DC)	24 V	24 V	5 to 30 V DC	5 to 30 V DC
• for signal "0" (DC), max.	0.1 V; with 10 kohms Load	0.1 V; with 10 kohms Load		
• for signal "1", min.	20 V DC	20 V DC		
Output current				
• for signal "1" permissible range, max.	0.5 A	0.5 A	2 A	2 A
• for signal "0" residual current, max.	10 µA	10 µA		
Output delay with resistive load				
• 0 to "1", max.	50 µs	50 µs	10 ms	10 ms
• 1 to "0", max.	200 µs	200 µs	10 ms	10 ms

SIMATIC S7-1200

Digital modules

SM 1223 digital input/output module

Technical specifications (continued)

	6ES7 223-1BH30-0XB0	6ES7 223-1BL30-0XB0	6ES7 223-1PH30-0XB0	6ES7 223-1PL30-0XB0
Product type designation	SM 1223 DI 8x24 V DC, DQ 8x24 V DC	SM 1223 DI 16x24 V DC, DQ 16x24 V DC	SM 1223 DI 8x24 V DC, DQ 8xRelay	SM 1223 DI 16x24 V DC, DQ 16xRelay
Aggregate current of outputs (per group)				
• horizontal installation - up to 50 °C, max.	4 A; Current per mass	8 A; Current per mass	10 A; Current per mass	8 A; Current per mass
Cable length				
• Cable length, shielded, max.	500 m	500 m	500 m	500 m
• Cable length unshielded, max.	150 m	150 m	150 m	150 m
Relay outputs				
Number of relay outputs			8	16
Rated input voltage of relay L+ (DC)			24 V	24 V
Number of operating cycles			mechanically 10 million, at rated load voltage 100 000	mechanically 10 million, at rated load voltage 100 000
Switching capacity of contacts				
• with inductive load, max.	0.5 A	0.5 A	2 A	2 A
• on lamp load, max.	5 W	5 W	30 W DC; 200 W AC	30 W DC; 200 W AC
• with resistive load, max.	0.5 A	0.5 A	2 A	2 A
Interrupts/diagnostics/ status information				
Alarms				
• Alarms	Yes	Yes	Yes	Yes
• Diagnostic alarm	Yes	Yes	Yes	Yes
Diagnoses				
• Diagnostic functions	Yes	Yes	Yes	Yes
• Monitoring the supply voltage to the electronics	Yes	Yes	Yes	Yes
Diagnostics indication LED				
• for status of inputs	Yes	Yes	Yes	Yes
• for status of outputs	Yes	Yes	Yes	Yes
• for maintenance	Yes	Yes	Yes	Yes
• Status indicator digital output (green)	Yes	Yes	Yes	Yes
• Status indicator digital input (green)	Yes	Yes	Yes	Yes
Galvanic isolation				
Galvanic isolation digital inputs				
• between the channels, in groups of	2	2	2	2
Galvanic isolation digital outputs				
• between the channels			Relays	Relays
• between the channels, in groups of	1	1	2	4
• between the channels and the back-plane bus	500 V AC	500 V AC	1500 V AC for 1 minute	1500 V AC for 1 minute
Permissible potential difference				
between different circuits			750 V AC for 1 minute	750 V AC for 1 minute
Climatic and mechanical conditions for storage and transport				
Climatic conditions for storage and transport				
• Free fall - Max. height of fall (in packaging)	0.3 m; five times, in shipping package	0.3 m; five times, in shipping package	0.3 m; five times, in shipping package	0.3 m; five times, in shipping package

Technical specifications (continued)

	6ES7 223-1BH30-0XB0	6ES7 223-1BL30-0XB0	6ES7 223-1PH30-0XB0	6ES7 223-1PL30-0XB0
Product type designation	SM 1223 DI 8x24 V DC, DQ 8x24 V DC	SM 1223 DI 16x24 V DC, DQ 16x24 V DC	SM 1223 DI 8x24 V DC, DQ 8xRelay	SM 1223 DI 16x24 V DC, DQ 16xRelay
Climatic conditions for storage and transport				
• Temperature				
- permissible temperature range	-40 °C ... +70 °C	-40 °C ... +70 °C	-40 °C ... +70 °C	-40 °C ... +70 °C
• Atmospheric pressure acc. to IEC 60068-2-13				
- permissible atmospheric pressure	1080 to 660hPa	1080 to 660hPa	1080 to 660hPa	1080 to 660hPa
• Relative humidity				
- permissible range (without condensation) at 25 °C	95%	95%	95%	95%
Mechanical and climatic conditions during operation				
Climatic conditions during operation				
• Temperature				
- permissible temperature range	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted
- permissible temperature change	5 °C ... 55 °C, 3 °C/min	5 °C ... 55 °C, 3 °C/min	5 °C ... 55 °C, 3 °C/min	5 °C ... 55 °C, 3 °C/min
Degree of protection				
IP20	Yes	Yes	Yes	Yes
Standards, approvals, certificates				
CE mark	Yes	Yes	Yes	Yes
C-TICK	Yes	Yes	Yes	Yes
FM approval	Yes	Yes	Yes	Yes
Mechanics				
Type of housing (front)				
• Plastic	Yes	Yes	Yes	Yes
Dimensions and weight				
Dimensions				
• Width	45 mm	70 mm	45 mm	70 mm
• Height	100 mm	100 mm	100 mm	100 mm
• Depth	75 mm	75 mm	75 mm	75 mm
Weight				
• Weight, approx.	210 g	310 g	230 g	350 g

SIMATIC S7-1200

Digital modules

SM 1223 digital input/output module

4

Ordering data	Order No.	Ordering data	Order No.
SM 1223 digital input/output signal module 8 inputs, 24 V DC, IEC type 1 current sinking; 8 24 V DC transistor outputs, 0.5 A, 5 W 16 inputs, 24 V DC, IEC type 1 current sinking; 16 24 V DC transistor outputs, 0.5 A, 5 W 8 inputs, 24 V DC, IEC type 1 current sinking; 8 relay outputs, 5 ... 30 V DC/5 ... 250 V AC, 2 A, 30 W DC/200 W AC 16 inputs, 24 V DC, IEC type 1 current sinking; 16 relay outputs, 5 ... 30 V DC/5 ... 250 V AC, 2 A, 30 W DC/200 W AC	C 6ES7 223-1BH30-0XB0 C 6ES7 223-1BL30-0XB0 C 6ES7 223-1PH30-0XB0 C 6ES7 223-1PL30-0XB0	S7-1200 automation system, System Manual For SIMATIC S7-1200 and STEP 7 Basic German B 6ES7 298-8FA30-8AH0 English B 6ES7 298-8FA30-8BH0 French B 6ES7 298-8FA30-8CH0 Spanish B 6ES7 298-8FA30-8DH0 Italian B 6ES7 298-8FA30-8EH0 Chinese B 6ES7 298-8FA30-8KH0	
Accessories Extension cable for two-tier configuration for connecting digital/analog signal modules; length 2 m	C 6ES7 290-6AA30-0XA0	S7-1200 automation system, Easy Book Brief instructions German B 6ES7 298-8FA30-8AQ0 English B 6ES7 298-8FA30-8BQ0 French B 6ES7 298-8FA30-8CQ0 Spanish B 6ES7 298-8FA30-8DQ0 Italian B 6ES7 298-8FA30-8EQ0 Chinese B 6ES7 298-8FA30-8KQ0	
Terminal block (spare part) for 8/16-channel digital signal modules with 7 screws, zinc-plated; 4 pcs.	C 6ES7 292-1AG30-0XA0	STEP 7 Basic engineering software <i>Target system:</i> SIMATIC S7-1200 controllers and the associated I/O. The WinCC Basic which is included permits configuration of the SIMATIC Basic Panels <i>Requirement:</i> MS Windows XP SP3 / MS Windows Vista SP1 <i>Type of delivery:</i> German, English, with online documentation Single license D 6ES7 822-0AA00-0YA0 STEP 7 Basic Software Update Service, 1 year D 6ES7 822-0AA00-0YL0 Trial License STEP 7 Basic; on DVD, 14-day trial D 6ES7 822-0AA00-0YA7	

B: Subject to export regulations: AL: N and ECCN: EAR99T
 C: Subject to export regulations: AL: N and ECCN: EAR99H

D: Subject to export regulations: AL: N and ECCN: 5D992

More information

Brochures

Information material for downloading can be found in the Internet:

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

Overview



- Digital inputs and outputs as supplement to the integral I/O of the SIMATIC S7-1200 CPUs
- Can be plugged direct into the CPU

Application

The SB 1223 digital input/output signal module permits:

- Connection of the controller to digital signals of the process
- Output of digital signals from the controller to the process.

Design

The signal boards are plugged directly into the receptacle on the front of each S7-1200 CPU.

- Mounting:
Signal boards are plugged directly into the SIMATIC S7-1200 CPU and are thus electrically and mechanically connected to the CPU
- The CPU mounting dimensions remain unchanged
- All signal boards are easy to replace thanks to removable connecting terminals ("independent wiring")

Function

The SB 1223 digital input/output signal board converts

- the level of the external digital signals from the process into the internal signal level of the S7-1200 and
- the internal signal level of the S7-1200 into the external signal level required by the process

Technical specifications

	6ES7 223-0BD30-0XB0	6ES7 223-3AD30-0XB0	6ES7 223-3BD30-0XB0
Product type designation	SB 1223 DI 2x24 V DC, DQ 2x24 V DC	SB 1223 2xDI / 2xDQ 5 V DC 200kHz	SB 1223 2xDI / 2xDQ 24 V DC 200kHz
Supply voltages			
Rated value			
• permissible range, lower limit (DC)	20.4 V		
• permissible range, upper limit (DC)	30 V		
Power supply to the transmitters			
• Supply current, max.	4 mA; per channel	4 mA; per channel	4 mA; per channel
Current consumption			
from backplane bus 5 V DC, typ.	50 mA	50 mA	50 mA
Power loss			
Power loss, typ.	1 W	1 W	1 W
Digital inputs			
Number of digital inputs	2	2	2
• in groups of	1	1	1
Number of simultaneously controllable inputs			
• all mounting positions - Concurrently controllable inputs, up to 40 °C	2	2	2
Input characteristic curve acc. to IEC 1131, Type 1	Yes	Yes	Yes
Input voltage			
• Rated value, DC	24 V	5 V	24 V
• for signal "0"	0 to 5 V	0 to 1 V	0 to 5 V
• for signal "1"	15 to 30 V	2 to 6 V	15 to 30 V
Input current			
• for signal "0", max. (permissible quiescent current)	1 mA	3 mA	2 mA
• for signal "1", min.		6 mA	5.8 mA
• for signal "1", typ.	0.5 A		14 mA

SIMATIC S7-1200

Digital modules

SB 1223 digital input/output module

Technical specifications (continued)

	6ES7 223-0BD30-0XB0	6ES7 223-3AD30-0XB0	6ES7 223-3BD30-0XB0
Product type designation	SB 1223 DI 2x24 V DC, DQ 2x24 V DC	SB 1223 2xDI / 2xDQ 5 V DC 200kHz	SB 1223 2xDI / 2xDQ 24 V DC 200kHz
Input delay (for rated value of input voltage)			
• for standard inputs - parameterizable	Yes; 0.2, 0.4, 0.8, 1.6, 3.2, 6.4, and 12.8 ms, selectable in groups of four	Yes; 0.2, 0.4, 0.8, 1.6, 3.2, 6.4, and 12.8 ms, selectable in groups of four	Yes; 0.2, 0.4, 0.8, 1.6, 3.2, 6.4, and 12.8 ms, selectable in groups of four
- at "0" to "1", max.	2 µs	2 µs	2.5 µs
- at "1" to "0", max.	10 µs		
• for interrupt inputs - parameterizable	Yes	Yes	Yes
• for counter/technological functions - parameterizable	Yes	Yes	Yes
Cable length			
• Cable length, shielded, max.	500 m	50 m	50 m for technological functions
• Cable length unshielded, max.	300 m		
Digital outputs			
Number of digital outputs	2	2	2
• in groups of	1	1	1
Short-circuit protection	No	No	No
Switching capacity of the outputs			
• with resistive load, max.	0.5 A	0.1 A	0.1 A
• on lamp load, max.	5 W		
Output voltage			
• Rated value (DC)	24 V	5 V	24 V
• for signal "0" (DC), max.	0.1 V; with 10k ohms load	0.4 V	0.1 V; with 10 kohms load
• for signal "1", min.	20 V	L+ (-0.5 V)	20 V
• for signal "1" (DC), max.		6 V	
Output current			
• for signal "1" rated value	0.5 A	0.1 A	0.1 A
• for signal "1" permissible range, max.		0.11 A	
• for signal "0" residual current, max.	10 µA		10 µA
Load resistance range			
• upper limit	0.6 Ω	5 Ω	10 Ω
Cable length			
• Cable length, shielded, max.	500 m	50 m	50 m
• Cable length unshielded, max.	150 m		
Interrupts/diagnostics/ status information			
Alarms			
• Alarms	Yes	Yes	Yes
Diagnoses			
• Diagnostic functions	Yes	Yes	Yes
Diagnostics indication LED			
• for status of inputs	Yes	Yes	Yes
• for status of outputs	Yes	Yes	Yes

Technical specifications (continued)

	6ES7 223-0BD30-0XB0	6ES7 223-3AD30-0XB0	6ES7 223-3BD30-0XB0
Product type designation	SB 1223 DI 2x24 V DC, DQ 2x24 V DC	SB 1223 2xDI / 2xDQ 5 V DC 200kHz	SB 1223 2xDI / 2xDQ 24 V DC 200kHz
Climatic and mechanical conditions for storage and transport			
Climatic conditions for storage and transport			
• Free fall - Max. height of fall (in packaging)	0.3 m; five times, in shipping package	0.3 m; five times, in shipping package	0.3 m; five times, in shipping package
• Air pressure acc. to IEC 60068-2-13 - permissible atmospheric pressure	1080 to 660 hPa	1080 to 660 hPa	1080 to 660 hPa
• Relative humidity - permissible range (without condensation) at 25 °C	95%	95%	95%
Mechanical and climatic conditions during operation			
Climatic conditions during operation			
• Temperature - permissible temperature range	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted
Degree of protection			
IP20	Yes	Yes	Yes
Mechanics			
Type of housing (front)			
• Plastic	Yes	Yes	Yes
Dimensions and weight			
Dimensions			
• Width	38 mm	38 mm	38 mm
• Height	62 mm	62 mm	62 mm
• Depth	21 mm	21 mm	21 mm
Weight			
• Weight, approx.	40 g	40 g	40 g

SIMATIC S7-1200

Digital modules

SB 1223 digital input/output module

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Ordering data

SB 1223 digital input/output signal board

2 inputs, 24 V DC, IEC type 1 current sinking;
2 24 V DC transistor outputs, 0.5 A, 5 W;
can be used as HSC at up to 30 kHz

C **6ES7 223-0BD30-0XB0**

2 inputs, 5 V DC, 200 kHz
2 outputs 5 V DC, 0.1 A, 200 kHz

C **6ES7 223-3AD30-0XB0**

2 inputs, 24 V DC, 200 kHz
2 outputs 24 V DC, 0.1 A, 200 kHz

C **6ES7 223-3BD30-0XB0**

Accessories

Terminal block (spare part)

for signal board

with 6 screws, gold-plated;
4 pcs.

C **6ES7 292-1BF30-0XA0**

S7-1200 automation system, System Manual

For SIMATIC S7-1200 and STEP 7 Basic

German

B **6ES7 298-8FA30-8AH0**

English

B **6ES7 298-8FA30-8BH0**

French

B **6ES7 298-8FA30-8CH0**

Spanish

B **6ES7 298-8FA30-8DH0**

Italian

B **6ES7 298-8FA30-8EH0**

Chinese

B **6ES7 298-8FA30-8KH0**

B: Subject to export regulations: AL: N and ECCN: EAR99T

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

S7-1200 automation system, Easy Book

Brief instructions

German

B **6ES7 298-8FA30-8AQ0**

English

B **6ES7 298-8FA30-8BQ0**

French

B **6ES7 298-8FA30-8CQ0**

Spanish

B **6ES7 298-8FA30-8DQ0**

Italian

B **6ES7 298-8FA30-8EQ0**

Chinese

B **6ES7 298-8FA30-8KQ0**

STEP 7 Basic engineering software

Target system:

SIMATIC S7-1200 controllers and the associated I/O.

The WinCC Basic which is included permits configuration of the SIMATIC Basic Panels

Requirement:

MS Windows XP SP3 / MS Windows Vista SP1

Type of delivery:

German, English, with online documentation

Single license

D **6ES7 822-0AA00-0YA0**

STEP 7 Basic Software Update Service, 1 year

D **6ES7 822-0AA00-0YL0**

Trial License STEP 7 Basic; on DVD, 14-day trial

D **6ES7 822-0AA00-0YA7**

D: Subject to export regulations: AL: N and ECCN: 5D992

More information

Brochures

Information material for downloading can be found in the Internet:

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

Overview SIPLUS SM 1221 digital input modules



- Digital inputs as supplement to the integral I/O of the CPUs
- For flexible adaptation of the controller to the relevant task
- For subsequent expansion of the system with additional inputs

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

SIPLUS SM 1221	
Order No.	6AG1 221-1BF30-2XB0 6AG1 221-1BH30-2XB0
Order No. based on	6ES7 221-1BF30-0XB0 6ES7 221-1BH30-0XB0
Ambient temperature range	-25 ... +70 °C; condensation permissible
Ambient conditions	Resistant in accordance with EN60721 to chemically (-3C4), mechanically (-3S4) and biologically (-3B2) active substances and compliant with ISA S71.04 G1, G2, G3, GX ¹⁾ . For further information, refer to Environmental conditions of SIPLUS extreme (on pg. 4/4) or go to www.siemens.com/siplus-extreme
Technical data	The technical data of the standard product apply with the exception of the environmental conditions.

¹⁾ ISA -S71.04 severity level GX from October 2010

Overview SIPLUS SM 1222 digital output modules



- Digital outputs as supplement to the integral I/O of the CPUs
- For flexible adaptation of the controller to the relevant task
- For subsequent expansion of the system with additional outputs

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

SIPLUS SM 1222				
Order No.	6AG1 222-1BF30-2XB0	6AG1 222-1BH30-2XB0	6AG1 222-1HF30-2XB0	6AG1 222-1HH30-2XB0
Order No. based on	6ES7 222-1BF30-0XB0	6ES7 222-1BH30-0XB0	6ES7 222-1HF30-0XB0	6ES7 222-1HH30-0XB0
Ambient temperature range	-25 ... +70 °C; condensation permissible			
Ambient conditions	Resistant in accordance with EN60721 to chemically (-3C4), mechanically (-3S4) and biologically (-3B2) active substances and compliant with ISA S71.04 G1, G2, G3, GX ¹⁾ . For further information, refer to Environmental conditions of SIPLUS extreme (on pg. 4/4) or go to www.siemens.com/siplus-extreme			
Technical data	The technical data of the standard product apply with the exception of the environmental conditions.			

¹⁾ ISA -S71.04 severity level GX from October 2010

SIMATIC S7-1200

SIPLUS digital modules

SIPLUS digital modules
SM 1221, SM 1222, SM 1223

Overview SIPLUS SM 1223 digital input/output module



- Digital inputs and outputs as supplement to the integral I/O of the CPUs
- For flexible adaptation of the controller to the relevant task
- For subsequent expansion of the system with additional inputs and outputs

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

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SIPLUS SM 1223				
Order No.	6AG1 223-1BH30-2XB0	6AG1 223-1PH30-2XB0	6AG1 223-1PL30-2XB0	6AG1 223-1BL30-2XB0
Order No. based on	6ES7 223-1BH30-0XB0	6ES7 223-1PH30-0XB0	6ES7 223-1PL30-0XB0	6ES7 223-1BL30-0XB0
Ambient temperature range	-25 ... +70 °C; condensation permissible			
Ambient conditions	Resistant in accordance with EN60721 to chemically (-3C4), mechanically (-3S4) and biologically (-3B2) active substances and compliant with ISA S71.04 G1, G2, G3, GX ¹⁾ . For further information, refer to Environmental conditions of SIPLUS extreme (on pg. 4/4) or go to www.siemens.com/siplus-extreme			
Technical data	The technical data of the standard product apply with the exception of the environmental conditions.			

¹⁾ ISA -S71.04 severity level GX from October 2010

Ordering data	Order No.	Ordering data	Order No.
SIPLUS SM 1221 Digital input module (extended temperature range and medial exposure) 8 inputs, 24 V DC, isolated, current sourcing/sinking; from +60 °C to +70 °C number of simultaneously controllable inputs and outputs max. 50% 16 inputs, 24 V DC, isolated, current sourcing/sinking; from +60 °C to +70 °C number of simultaneously controllable inputs and outputs max. 50%	6AG1 221-1BF30-2XB0 6AG1 221-1BH30-2XB0	SIPLUS SM 1223 Digital input/output module (extended temperature range and medial exposure) 8 inputs, 24 V DC, IEC type 1 current sinking; 8 24 V DC transistor outputs, 0.5 A, 5 W from +60 °C to +70 °C number of simultaneously controllable inputs and outputs max. 50% 16 inputs, 24 V DC, IEC type 1 current sinking; 16 24 V DC transistor outputs, 0.5 A, 5 W	6AG1 223-1BH30-2XB0 6AG1 223-1BL30-2XB0
SIPLUS SM 1222 Digital output module (extended temperature range and medial exposure) 8 outputs, 24 V DC; 0.5 A, 5 W, isolated 16 outputs, 24 V DC; 0.5 A, 5 W, isolated 8 relay outputs, 5 ... 30 V DC/5 ... 250 V AC, 2 A, 30 W DC/200 W AC; from +60 °C to +70 °C number of simultaneously controllable inputs and outputs max. 50% 16 relay outputs, 5 ... 30 V DC/5 ... 250 V AC, 2 A, 30 W DC/200 W AC; from +60 °C to +70 °C number of simultaneously controllable inputs and outputs max. 50%	6AG1 222-1BF30-2XB0 6AG1 222-1BH30-2XB0 6AG1 222-1HF30-2XB0 6AG1 222-1HH30-2XB0	8 inputs, 24 V DC, IEC type 1 current sinking; 16 relay outputs, 5 ... 30 V DC/5 ... 250 V AC, 2 A, 30 W DC/200 W AC; from +60 °C to +70 °C number of simultaneously controllable inputs and outputs max. 50% 16 inputs, 24 V DC, IEC type 1 current sinking; 16 relay outputs, 5 ... 30 V DC/5 ... 250 V AC, 2 A, 30 W DC/200 W AC; from +60 °C to +70 °C number of simultaneously controllable inputs and outputs max. 50%	6AG1 223-1PH30-2XB0 6AG1 223-1PL30-2XB0
		Accessories	see S7-1200 digital modules, pages 4/45, 4/49, 4/56

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

SIMATIC S7-1200

SIPLUS digital modules

SIPLUS SB 1223 digital input/output module

Overview



- Digital inputs and outputs as supplement to the integral I/O of the SIMATIC S7-1200 CPUs
- Can be plugged direct into the CPU

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

SIPLUS SB 1223	
Order No.	6AG1 223-0BD30-5XB0
Order No. based on	6ES7 223-0BD30-0XB0
Ambient temperature range	-25 ... +55 °C; condensation permissible
Ambient conditions	Resistant in accordance with EN60721 to chemically (-3C4), mechanically (-3S4) and biologically (-3B2) active substances and compliant with ISA S71.04 G1, G2, G3, GX ¹⁾ . For further information, refer to Environmental conditions of SIPLUS extreme (on pg. 4/4) or go to www.siemens.com/siplus-extreme
Technical data	The technical data of the standard product apply with the exception of the environmental conditions.

¹⁾ ISA -S71.04 severity level GX from October 2010

Ordering data

Order No.

Digital input/output module Signal Board SIPLUS SB 1223

(extended temperature range and medial exposure)

2 inputs, 24 V DC, IEC type 1 C
current sinking;
two 24 V DC transistor outputs,
0.5 A, 5 W;
can be used as HSC at up to
30 kHz

6AG1 223-0BD30-5XB0

Accessories

see S7-1200 digital modules,
page 4/60

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

SIMATIC S7-1200

Analog modules

SM 1231 analog input module

Overview



- Analog inputs for SIMATIC S7-1200
- With extremely short conversion times
- For connecting analog sensors without additional amplifiers
- For solving even more complex automation tasks

Application

The SM 1231 analog input signal modules allow the connection of the controller to analog signals of the process.

This provides users with the following advantages:

- Optimal adaptation:
With analog signal modules, users can optimally adapt their controllers even to more complex tasks.
- Direct connection of sensors:
Up to 14 bit resolution and different input ranges permit the connection of sensors without additional amplifier.
- Flexibility:
If the task is expanded subsequently, the controller can be upgraded. Updating of the user program is extremely simple.

Design

The signal modules have the same design features as the basic devices.

- Installation on DIN rails:
The modules are snapped onto the rail next to the CPU on the right and are electrically and mechanically connected to each other and to the CPU by the integral slide mechanism.
- Direct installation:
Horizontal or vertical mounting on DIN rail or direct mounting in the cabinet using integral lugs.

Function

The SM 1231 analog input signal modules convert analog signals from the process into digital signals for internal processing by the SIMATIC S7-1200.

Technical specifications

	6ES7 231-4HD30-0XB0	6ES7 231-4HF30-0XB0
Product type designation	SM 1231 AI 4 x13 bit	SM 1231 AI 8 x 13 bit
Supply voltages		
Rated value		
• 24 V DC	Yes	Yes
Current consumption		
Current consumption, typ.	45 mA	45 mA
from backplane bus 5 V DC, typ.	80 mA	90 mA
Power loss		
Power loss, typ.	1.5 W	1.5 W
Connection method		
required front connector	Yes	Yes
Analog inputs		
Number of analog inputs	4; Current or voltage differential inputs	8; Current or voltage differential inputs
permissible input frequency for current input (destruction limit), max.	± 35 V	± 35 V
permissible input current for voltage input (destruction limit), max.	40 mA	40 mA
Cycle time (all channels) max.	625 µs	625 µs
Technical unit for temperature measurement adjustable		
• Voltage	Yes; ±10 V, ±5 V, ±2.5 V	Yes; ±10 V, ±5 V, ±2.5 V
• Current	Yes; 0 to 20 mA	Yes; 0 to 20 mA
• Thermocouple	No	No
• Resistance thermometer	No	No
• Resistance	No	No
Input ranges (rated values), voltages		
• -10 V to +10 V	Yes	Yes
• Input resistance (-10 V to +10 V)	≥9 Mohms	≥9 Mohms
• -2.5 V to +2.5 V	Yes	Yes
• Input resistance (-2.5 V to +2.5 V)	≥9 Mohms	≥9 Mohms
• -5 V to +5 V	Yes	Yes
• Input resistance (-5 V to +5 V)	≥9 Mohms	≥9 Mohms
Input ranges (rated values), currents		
• 0 to 20 mA	Yes	Yes
• Input resistance (0 to 20 mA)	≥ 250 ohms	≥ 250 ohms
Voltage input		
• permissible input voltage for voltage input (destruction limit), max.	35 V	35 V

Technical specifications (continued)

	6ES7 231-4HD30-0XB0	6ES7 231-4HF30-0XB0
Product type designation	SM 1231 AI 4 x13 bit	SM 1231 AI 8 x 13 bit
Current input		
• permissible input current for current input (destruction limit), max.	40 mA	40 mA
Temperature compensation		
• Temperature compensation parameterizable	No	No
Analog outputs		
Number of analog outputs	0	0
Analog value creation		
Integrations and conversion time/ resolution per channel		
• Resolution with overrange (bit including sign), max.	12 bit; + sign	12 bit; + sign
• Integration time, parameterizable	Yes	Yes
• Interference voltage suppression for interference frequency f1 in Hz	40 dB, DC to 60 V for interference frequency 50 / 60 Hz	40 dB, DC to 60 V for interference frequency 50 / 60 Hz
Smoothing of measured values		
• parameterizable	Yes	Yes
• Step: None	Yes	Yes
• Step: Low	Yes	Yes
• Step: Medium	Yes	Yes
• Step: High	Yes	Yes
Errors/accuracies		
Temperature error (relative to input area)	25°C ±0.1% to 55°C ±0.2% total measurement range	25°C ±0.1% to 55°C ±0.2% total measurement range
Basic error limit (operational limit at 25 °C)		
• Voltage, relative to input area	+/- 0,1 %	+/- 0,1 %
• Current, relative to input area	+/- 0,1 %	+/- 0,1 %
Interference voltage suppression for $f = n \times (f1 \pm 1\%)$, f1 = interference frequency		
• common mode voltage, max.	12 V	12 V
Interrupts/diagnostics/ status information		
Alarms		
• Alarms	Yes	Yes
• Diagnostic alarm	Yes	Yes
Diagnoses		
• Diagnostic functions	Yes	Yes
• Monitoring the supply voltage to the electronics	Yes	Yes
• Wire break	No	No

	6ES7 231-4HD30-0XB0	6ES7 231-4HF30-0XB0
Product type designation	SM 1231 AI 4 x13 bit	SM 1231 AI 8 x 13 bit
Diagnostics indication LED		
• for status of inputs	Yes	Yes
• for maintenance	Yes	Yes
Galvanic isolation		
Galvanic isolation analog outputs		
• between the channels and the power supply of the electronics	No	No
Climatic and mechanical conditions for storage and transport		
Climatic conditions for storage and transport		
• Free fall		
- Max. height of fall (in packaging)	0.3 m; five times, in shipping package	0.3 m; five times, in shipping package
• Temperature		
- permissible temperature range	-40 °C ... +70 °C	-40 °C ... +70 °C
• Atmospheric pressure acc. to IEC 60068-2-13		
- permissible atmospheric pressure	1080 to 660 hPa	1080 to 660 hPa
• Relative humidity		
- permissible range (without condensation) at 25 °C	95%	95%
Mechanical and climatic conditions during operation		
Climatic conditions during operation		
• Temperature		
- permissible temperature range	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted
• Air pressure acc. to IEC 60068-2-13		
- permissible atmospheric pressure	1080 ... 795 hPa	1080 ... 795 hPa
• Concentration of pollutants		
- SO2 at RH < 60% without condensation	< 0.5 ppm	< 0.5 ppm
- H2S at RH < 60% without condensation	< 0.1 ppm	< 0.1 ppm
Degree of protection		
IP20	Yes	Yes
Standards, approvals, certificates		
CE mark	Yes	Yes
C-TICK	Yes	Yes
FM approval	Yes	Yes

SIMATIC S7-1200

Analog modules

SM 1231 analog input module

Technical specifications (continued)

	6ES7 231-4HD30-0XB0	6ES7 231-4HF30-0XB0
Product type designation	SM 1231 AI 4 x13 bit	SM 1231 AI 8 x 13 bit
Mechanics		
Type of housing (front)		
• Plastic	Yes	Yes
Dimensions and weight		
Dimensions		
• Width	45 mm	45 mm
• Height	100 mm	100 mm
• Depth	75 mm	75 mm
Weight		
• Weight, approx.	180 g	180 g

More information

Brochures

Information material for downloading can be found in the Internet:

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

Ordering data

Order No.

SM 1231 analog input signal module		
4 analog inputs ±10 V, ±5 V, ±2.5 V, or 0 ... 20 mA; 12 bits + sign	C	6ES7 231-4HD30-0XB0
8 analog inputs ±10 V, ±5 V, ±2.5 V, or 0 to 20 mA; 12 bits + sign	C	6ES7 231-4HF30-0XB0
Accessories		
Extension cable for two-tier configuration	C	6ES7 290-6AA30-0XA0
for connecting digital/analog signal modules; length 2 m		
Terminal block (spare part)		
for 8/16-channel analog signal modules		
with 7 screws, gold-plated; 4 pcs.	C	6ES7 292-1BG30-0XA0
S7-1200 automation system, System Manual		
For SIMATIC S7-1200 and STEP 7 Basic		
German	B	6ES7 298-8FA30-8AH0
English	B	6ES7 298-8FA30-8BH0
French	B	6ES7 298-8FA30-8CH0
Spanish	B	6ES7 298-8FA30-8DH0
Italian	B	6ES7 298-8FA30-8EH0
Chinese	B	6ES7 298-8FA30-8KH0
S7-1200 automation system, Easy Book		
Brief instructions		
German	B	6ES7 298-8FA30-8AQ0
English	B	6ES7 298-8FA30-8BQ0
French	B	6ES7 298-8FA30-8CQ0
Spanish	B	6ES7 298-8FA30-8DQ0
Italian	B	6ES7 298-8FA30-8EQ0
Chinese	B	6ES7 298-8FA30-8KQ0
STEP 7 Basic engineering software		
<i>Target system:</i> SIMATIC S7-1200 controllers and the associated I/O. The WinCC Basic which is included permits configuration of the SIMATIC Basic Panels		
<i>Requirement:</i> MS Windows XP SP3 / MS Windows Vista SP1		
<i>Type of delivery:</i> German, English, with online documentation		
Single license	D	6ES7 822-0AA00-0YA0
STEP 7 Basic Software Update Service, 1 year	D	6ES7 822-0AA00-0YL0
Trial License STEP 7 Basic; on DVD, 14-day trial	D	6ES7 822-0AA00-0YA7

B: Subject to export regulations: AL: N and ECCN: EAR99T

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

D: Subject to export regulations: AL: N and ECCN: 5D992

Overview



- Analog outputs for SIMATIC S7-1200
- With extremely short conversion times
- For connecting analog actuators without additional amplifiers
- For solving even more complex automation tasks

Application

SM 1232 analog output signal modules permit the use of analog outputs.

This provides users with the following advantages:

- **Optimal adaptation:**
With analog signal modules, users can optimally adapt their controllers even to more complex tasks
- **Direct connection of actuators:**
Up to 14 bit resolution permit the connection of actuators without an additional amplifier
- **Flexibility:**
If the task is expanded subsequently, the controller can be upgraded. Updating of the user program is extremely simple

Design

The signal modules have the same design features as the basic devices.

- **Installation on DIN rails:**
The modules are snapped onto the rail next to the CPU on the right and are electrically and mechanically connected to each other and to the CPU by the integral slide mechanism.
- **Direct installation:**
Horizontal or vertical mounting on DIN rail or direct mounting in the cabinet using integral lugs.

Function

SM 1232 analog output signal modules convert digital signals of the SIMATIC S7-1200 into signals for controlling the respective process.

Technical specifications

	6ES7 232-4HB30-0XB0	6ES7 232-4HD30-0XB0
Product type designation	SM 1232 AQ 2x14 bit	SM 1232 AQ 4 x 14bit
Supply voltages		
Rated value		
• 24 V DC	Yes	Yes
Current consumption		
Current consumption, typ.	45 mA	45 mA
from backplane bus 5 V DC, typ.	80 mA	80 mA
Power loss		
Power loss, typ.	1.5 W	1.5 W
Connection method		
required front connector	Yes	Yes
Analog inputs		
Number of analog inputs	0	
Analog outputs		
Number of analog outputs	2; Current or voltage	4; Current or voltage
Output ranges, voltage		
• -10 to +10 V	Yes	Yes

	6ES7 232-4HB30-0XB0	6ES7 232-4HD30-0XB0
Product type designation	SM 1232 AQ 2x14 bit	SM 1232 AQ 4 x 14bit
Output ranges, current		
• 0 to 20 mA	Yes	Yes
Load impedance (in rated range of output)		
• with voltage outputs, min.	1 000 Ω	1 000 Ω
• with current outputs, max.	600 Ω	600 Ω
Analog value creation		
Measurement principle	Differential	Differential
Integrations and conversion time/ resolution per channel		
• Resolution (incl. overrange)	Voltage: 14 bits; Current : 13 bits	Voltage: 14 bits; Current : 13 bits
• Integration time, parameterizable	Yes	Yes
• Interference voltage suppression for interference frequency f1 in Hz	40 dB, DC to 60 V for interference frequency 50 / 60 Hz	40 dB, DC to 60 V for interference frequency 50 / 60 Hz

SIMATIC S7-1200

Analog modules

SM 1232 analog output module

Technical specifications (continued)

	6ES7 232-4HB30-0XB0	6ES7 232-4HD30-0XB0
Product type designation	SM 1232 AQ 2x14 bit	SM 1232 AQ 4 x 14bit
Errors/accuracies		
Temperature error (relative to output area)	25°C ±0.3% to 55°C ±0.6% total measurement range	25°C ±0.3% to 55°C ±0.6% total measurement range
Basic error limit (operational limit at 25 °C)		
• Voltage, relative to output area	+/- 0,3 %	+/- 0,3 %
• Current, relative to output area	+/- 0,3 %	+/- 0,3 %
Interference voltage suppression for $f = n \times (f_l \pm 1\%)$, $f_l =$ interference frequency		
• common mode voltage, max.	12 V	12 V
Interrupts/diagnostics/status information		
Alarms		
• Alarms	Yes	Yes
• Diagnostic alarm	Yes	Yes
Diagnoses		
• Diagnostic functions	Yes	Yes
• Monitoring the supply voltage to the electronics	Yes	Yes
• Wire break	Yes	Yes
• Short circuit	Yes	Yes
Diagnostics indication LED		
• for status of inputs	Yes	Yes
• for maintenance	Yes	Yes
Climatic and mechanical conditions for storage and transport		
Climatic conditions for storage and transport		
• Free fall		
- Max. height of fall (in packaging)	0.3 m; five times, in shipping package	0.3 m; five times, in shipping package
• Temperature		
- permissible temperature range	-40 °C ... +70 °C	-40 °C ... +70 °C
• Atmospheric pressure acc. to IEC 60068-2-13		
- permissible atmospheric pressure	1080 to 660hPa	1080 to 660hPa
• Relative humidity		
- permissible range (without condensation) at 25 °C	95%	95%

	6ES7 232-4HB30-0XB0	6ES7 232-4HD30-0XB0
Product type designation	SM 1232 AQ 2x14 bit	SM 1232 AQ 4 x 14bit
Mechanical and climatic conditions during operation		
Climatic conditions during operation		
• Temperature		
- permissible temperature range	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted
• Air pressure acc. to IEC 60068-2-13		
- permissible atmospheric pressure	1080 ... 795 hPa	1080 ... 795 hPa
• Concentration of pollutants		
- SO ₂ at RH < 60% without condensation	< 0.5 ppm	< 0.5 ppm
- H ₂ S at RH < 60% without condensation	< 0.1 ppm	< 0.1 ppm
Degree of protection		
IP20	Yes	Yes
Standards, approvals, certificates		
CE mark	Yes	Yes
C-TICK	Yes	Yes
FM approval	Yes	Yes
Mechanics		
Type of housing (front)		
• Plastic	Yes	Yes
Dimensions and weight		
Dimensions		
• Width	45 mm	45 mm
• Height	100 mm	100 mm
• Depth	75 mm	75 mm
Weight		
• Weight, approx.	180 g	180 g

Ordering data	Order No.
SM 1232 analog output signal module 2 analog outputs, ±10 V with 14 bits or 0 ... 20 mA with 13 bits 4 analog outputs, ±10 V with 14 bits or 0 to 20 mA with 13 bits	C 6ES7 232-4HB30-0XB0 C 6ES7 232-4HD30-0XB0
Accessories	
Extension cable for two-tier configuration for connecting digital/analog signal modules; length 2 m	C 6ES7 290-6AA30-0XA0
S7-1200 automation system, System Manual	
For SIMATIC S7-1200 and STEP 7 Basic	
German	B 6ES7 298-8FA30-8AH0
English	B 6ES7 298-8FA30-8BH0
French	B 6ES7 298-8FA30-8CH0
Spanish	B 6ES7 298-8FA30-8DH0
Italian	B 6ES7 298-8FA30-8EH0
Chinese	B 6ES7 298-8FA30-8KH0
S7-1200 automation system, Easy Book	
Brief instructions	
German	B 6ES7 298-8FA30-8AQ0
English	B 6ES7 298-8FA30-8BQ0
French	B 6ES7 298-8FA30-8CQ0
Spanish	B 6ES7 298-8FA30-8DQ0
Italian	B 6ES7 298-8FA30-8EQ0
Chinese	B 6ES7 298-8FA30-8KQ0
STEP 7 Basic engineering software	
<i>Target system:</i> SIMATIC S7-1200 controllers and the associated I/O. The WinCC Basic which is included permits configuration of the SIMATIC Basic Panels	
<i>Requirement:</i> MS Windows XP SP3 / MS Windows Vista SP1	
<i>Type of delivery:</i> German, English, with online documentation	
Single license	D 6ES7 822-0AA00-0YA0
STEP 7 Basic Software Update Service, 1 year	D 6ES7 822-0AA00-0YL0
Trial License STEP 7 Basic; on DVD, 14-day trial	D 6ES7 822-0AA00-0YA7

B: Subject to export regulations: AL: N and ECCN: EAR99T

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

D: Subject to export regulations: AL: N and ECCN: 5D992

More information**Brochures**

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

SIMATIC S7-1200

Analog modules

SB 1232 analog output module

Overview



- Analog output for the SIMATIC S7-1200
- Can be plugged direct into the CPU

Application

The SB 1232 analog output signal board permits the use of analog outputs.

Technical specifications

6ES7 232-4HA30-0XB0	
Product type designation	SB 1232 1 x AO
Supply voltages	
Power supply to the transmitters	
• Supply current, max.	25 mA
Current consumption	
from backplane bus 5 V DC, typ.	15 mA
Power loss	
Power loss, typ.	1.5 W
Analog outputs	
Number of analog outputs	1
Cycle time (all channels) max.	Voltage: 300 μ S (R), 750 μ S (1 μ F) Current: 600 ms (1 mH); 2 ms (10 mH)
Output ranges, voltage	
• -10 to +10 V	Yes
Output ranges, current	
• 0 to 20 mA	Yes

This provides users with the following advantages:

- **Optimal adaptation:**
Signal boards can be used where space is limited or if only a few additional inputs/outputs are required. Each S7-1200 CPU can be modularly expanded by a signal board. This does not increase the mounting space required for the controller.
- **Direct connection of sensors and actuators:**
Up to 14 bit resolution and different output ranges permit the connection of actuators without additional amplifier.
- **Flexibility:**
If the task is expanded subsequently, the controller can be upgraded. Updating of the user program is extremely simple.

Design

The signal boards are plugged directly into the receptacle on the front of each S7-1200 CPU.

- **Mounting:**
Signal boards are plugged directly into the SIMATIC S7-1200 CPU and are thus electrically and mechanically connected to the CPU.
- The CPU mounting dimensions remain unchanged.
- All signal boards are easy to replace thanks to removable connecting terminals ("independent wiring").

Function

The SB 1232 analog output signal board converts digital signals of the S7-1200 into analog signals for the process.

6ES7 232-4HA30-0XB0	
Product type designation	SB 1232 1 x AO
Load impedance (in rated range of output)	
• with voltage outputs, min.	1 000 Ω
• with current outputs, max.	600 Ω
Analog value creation	
Measurement principle	Differential
Integrations and conversion time/ resolution per channel	
• Resolution (incl. overrange)	V / 12 bits, I / 11 bits
Smoothing of measured values	
• parameterizable	Yes
Analog value generation (in isochronous mode)	
Cable length	
• Max. cable length, shielded	10 m; twisted
Errors/accuracies	
Temperature error (relative to output area)	25°C \pm 0.5% ... 55°C \pm 1%

Technical specifications (continued)

6ES7 232-4HA30-0XB0	
Product type designation	SB 1232 1 x AO
Interrupts/diagnostics/status information	
Alarms	
• Alarms	Yes
Diagnoses	
• Diagnostic functions	Yes
Diagnosics indication (LED)	
• for status of outputs	Yes
Climatic and mechanical conditions for storage and transport	
Climatic conditions for storage and transport	
• Free fall	
- Max. height of fall (in packaging)	0.3 m; five times, in shipping package
• Atmospheric pressure acc. to IEC 60068-2-13	
- permissible atmospheric pressure	1080 to 660hPa
• Relative humidity	
- permissible range (without condensation) at 25 °C	95%
Mechanical and climatic conditions during operation	
Climatic conditions during operation	
• Temperature	
- permissible temperature range	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted
Degree of protection	
IP20	Yes
Mechanics	
Type of housing (front)	
• Plastic	Yes
Dimensions and weight	
Dimensions	
• Width	38 mm
• Height	62 mm
• Depth	21 mm
Weight	
• Weight, approx.	40 g

Ordering data

Order No.

SB 1232 analog output signal board		
1 analog output, ±10 V with 12 bits or 0 ... 20 mA with 11 bits	C	6ES7 232-4HA30-0XB0
Accessories		
Terminal block (spare part)		
for signal board		
with 6 screws, gold-plated; 4 pcs.	C	6ES7 292-1BF30-0XA0
S7-1200 automation system, System Manual		
For SIMATIC S7-1200 and STEP 7 Basic		
German	B	6ES7 298-8FA30-8AH0
English	B	6ES7 298-8FA30-8BH0
French	B	6ES7 298-8FA30-8CH0
Spanish	B	6ES7 298-8FA30-8DH0
Italian	B	6ES7 298-8FA30-8EH0
Chinese	B	6ES7 298-8FA30-8KH0
S7-1200 automation system, Easy Book		
Brief instructions		
German	B	6ES7 298-8FA30-8AQ0
English	B	6ES7 298-8FA30-8BQ0
French	B	6ES7 298-8FA30-8CQ0
Spanish	B	6ES7 298-8FA30-8DQ0
Italian	B	6ES7 298-8FA30-8EQ0
Chinese	B	6ES7 298-8FA30-8KQ0
STEP 7 Basic engineering software		
<i>Target system:</i> SIMATIC S7-1200 controllers and the associated I/O. The WinCC Basic which is included permits configuration of the SIMATIC Basic Panels		
<i>Requirement:</i> MS Windows XP SP3 / MS Windows Vista SP1		
<i>Type of delivery:</i> German, English, with online documentation		
Single license	D	6ES7 822-0AA00-0YA0
STEP 7 Basic Software Update Service, 1 year	D	6ES7 822-0AA00-0YL0
Trial License STEP 7 Basic; on DVD, 14-day trial	D	6ES7 822-0AA00-0YA7

B: Subject to export regulations: AL: N and ECCN: EAR99T
 C: Subject to export regulations: AL: N and ECCN: EAR99H
 D: Subject to export regulations: AL: N and ECCN: 5D992

More information

Brochures

Information material for downloading can be found in the Internet:

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

SIMATIC S7-1200

Analog modules

SM 1234 analog input/output module

Overview



- Analog inputs and outputs for the SIMATIC S7-1200
- With extremely short conversion times
- For connecting analog actuators and sensors without additional amplifiers
- For solving even more complex automation tasks

Application

SM 1234 analog input/outputs permit the use of analog inputs/outputs.

This provides users with the following advantages:

- Optimal adaptation:
With analog and digital expansion modules, users can optimally match their controllers even to more complex tasks
- Direct connection of sensors and actuators:
Up to 14 bit resolution plus sign and different input/output ranges permit the connection of sensors and actuators without an additional amplifier
- Flexibility:
If the task is expanded subsequently, the controller can be upgraded. Updating of the user program is extremely simple

Design

The SM 1234 analog input/output signal modules have the same design features as the basic devices.

- Installation on DIN rails:
The modules are snapped onto the rail next to the CPU on the right and are electrically and mechanically connected to each other and to the CPU by the integral slide mechanism.
- Direct installation:
Horizontal or vertical mounting on DIN rail or direct mounting in the cabinet using integral lugs.

Function

The SM 1234 analog input/output signal modules

- convert analog signals from the process into digital signals for internal processing by the SIMATIC S7-1200.
- convert digital signals of the SIMATIC S7-1200 into signals for controlling the respective process.

Technical specifications

6ES7 234-4HE30-0XB0	
Product type designation	SM 1234 AI 4 x13 bit AQ 2 x14 bit
Supply voltages	
Rated value	
• 24 V DC	Yes
Current consumption	
Current consumption, typ.	60 mA
from backplane bus 5 V DC, typ.	80 mA
Power loss	
Power loss, typ.	2 W
Connection method	
required front connector	Yes
Analog inputs	
Number of analog inputs	4; Current or voltage differential inputs
permissible input frequency for current input (destruction limit), max.	± 35 V
permissible input current for voltage input (destruction limit), max.	40 mA
Cycle time (all channels) max.	625 µs
Technical unit for temperature measurement adjustable	
• Voltage	Yes; ±10 V, ±5 V, ±2.5 V
• Current	Yes; 0 to 20 mA
• Thermocouple	No
• Resistance thermometer	No
• Resistance	No
Input ranges (rated values), voltages	
• -10 V to +10 V	Yes
• Input resistance (-10 V to +10 V)	≥9 Mohms
• -2.5 V to +2.5 V	Yes
• Input resistance (-2.5 V to +2.5 V)	≥9 Mohms
• -5 V to +5 V	Yes
• Input resistance (-5 V to +5 V)	≥9 Mohms
Input ranges (rated values), currents	
• 0 to 20 mA	Yes
• Input resistance (0 to 20 mA)	≥ 250 ohms
Voltage input	
• permissible input voltage for voltage input (destruction limit), max.	35 V

Technical specifications (continued)

6ES7 234-4HE30-0XB0	
Product type designation	SM 1234 AI 4 x13 bit AQ 2 x14 bit
Current input	
• permissible input current for current input (destruction limit), max.	40 mA
Temperature compensation	
• Temperature compensation parameterizable	No
Analog outputs	
Number of analog outputs	2; Current or voltage
Output ranges, voltage	
• -10 to +10 V	Yes
Output ranges, current	
• 0 to 20 mA	Yes
Load impedance (in rated range of output)	
• with voltage outputs, min.	1 000 Ω
• with current outputs, max.	600 Ω
Analog value creation	
Measurement principle	Differential
Integrations and conversion time/ resolution per channel	
• Resolution (incl. overrange)	Voltage: 14 bits; Current : 13 bits
• Resolution with overrange (bit including sign), max.	12 bit; + sign
• Integration time, parameterizable	Yes
• Interference voltage suppression for interference frequency f1 in Hz	40 dB, DC to 60 V for interference frequency 50 / 60 Hz
Smoothing of measured values	
• parameterizable	Yes
• Step: None	Yes
• Step: Low	Yes
• Step: Medium	Yes
• Step: High	Yes
Errors/accuracies	
Temperature error (relative to input area)	25°C ±0.1% to 55°C ±0.2% total measurement range
Temperature error (relative to output area)	25°C ±0.3% to 55°C ±0.6% total measurement range
Basic error limit (operational limit at 25 °C)	
• Voltage, relative to input area	+/- 0,1 %
• Current, relative to input area	+/- 0,1 %

6ES7 234-4HE30-0XB0	
Product type designation	SM 1234 AI 4 x13 bit AQ 2 x14 bit
Basic error limit (operational limit at 25 °C)	
• Voltage, relative to output area	+/- 0,3 %
• Current, relative to output area	+/- 0,3 %
Interference voltage suppression for $f = n \times (f_l \pm 1\%)$, $f_l =$ interference frequency	
• common mode voltage, max.	12 V
Interrupts/diagnostics/status information	
Alarms	
• Alarms	Yes
• Diagnostic alarm	Yes
Diagnoses	
• Diagnostic functions	Yes
• Monitoring the supply voltage to the electronics	Yes
• Wire break	Yes
• Short circuit	Yes
Diagnostics indication (LED)	
• for status of inputs	Yes
• for status of outputs	Yes
• for maintenance	Yes
Galvanic isolation	
Galvanic isolation analog outputs	
• between the channels and the power supply of the electronics	No
Climatic and mechanical conditions for storage and transport	
Climatic conditions for storage and transport	
• Free fall	
- Max. height of fall (in packaging)	0.3 m; five times, in shipping package
• Temperature	
- permissible temperature range	-40 °C ... +70 °C
• Atmospheric pressure acc. to IEC 60068-2-13	
- permissible atmospheric pressure	1080 to 660 hPa
• Relative humidity	
- permissible range (without condensation) at 25 °C	95%

SIMATIC S7-1200

Analog modules

SM 1234 analog input/output module

Technical specifications (continued)

6ES7 234-4HE30-0XB0	
Product type designation	SM 1234 AI 4 x13 bit AQ 2 x14 bit
Mechanical and climatic conditions during operation	
Climatic conditions during operation	
• Temperature	
- permissible temperature range	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted
• Atmospheric pressure acc. to IEC 60068-2-13	
- permissible atmospheric pressure	1080 ... 795 hPa
• Concentration of pollutants	
- SO ₂ at RH < 60% without condensation	< 0.5 ppm
- H ₂ S at RH < 60% without condensation	< 0.1 ppm
Degree of protection	
IP20	Yes
Standards, approvals, certificates	
CE mark	Yes
C-TICK	Yes
FM approval	Yes
Mechanics	
Type of housing (front)	
• Plastic	Yes
Dimensions and weight	
Dimensions	
• Width	45 mm
• Height	100 mm
• Depth	75 mm
Weight	
• Weight, approx.	220 g

Ordering data

Order No.

SM 1234 analog input/output signal module		
4 analog inputs, ±10 V, ±5 V, ±2.5 V, or 0 ... 20 mA, 12 bits + sign; 2 analog outputs, ±10 V with 14 bits or 0 ... 20 mA with 13 bits	C	6ES7 234-4HE30-0XB0
Accessories		
Extension cable for two-tier configuration	C	6ES7 290-6AA30-0XA0
for connecting digital/analog signal modules; length 2 m		
S7-1200 automation system, System Manual		
For SIMATIC S7-1200 and STEP 7 Basic		
German	B	6ES7 298-8FA30-8AH0
English	B	6ES7 298-8FA30-8BH0
French	B	6ES7 298-8FA30-8CH0
Spanish	B	6ES7 298-8FA30-8DH0
Italian	B	6ES7 298-8FA30-8EH0
Chinese	B	6ES7 298-8FA30-8KH0
S7-1200 automation system, Easy Book		
Brief instructions		
German	B	6ES7 298-8FA30-8AQ0
English	B	6ES7 298-8FA30-8BQ0
French	B	6ES7 298-8FA30-8CQ0
Spanish	B	6ES7 298-8FA30-8DQ0
Italian	B	6ES7 298-8FA30-8EQ0
Chinese	B	6ES7 298-8FA30-8KQ0
STEP 7 Basic engineering software		
<i>Target system:</i> SIMATIC S7-1200 controllers and the associated I/O. The WinCC Basic which is included permits configuration of the SIMATIC Basic Panels		
<i>Requirement:</i> MS Windows XP SP3 / MS Windows Vista SP1		
<i>Type of delivery:</i> German, English, with online documentation		
Single license	D	6ES7 822-0AA00-0YA0
STEP 7 Basic Software Update Service, 1 year	D	6ES7 822-0AA00-0YLO
Trial License STEP 7 Basic; on DVD, 14-day trial	D	6ES7 822-0AA00-0YA7

B: Subject to export regulations: AL: N and ECCN: EAR99T
C: Subject to export regulations: AL: N and ECCN: EAR99H
D: Subject to export regulations: AL: N and ECCN: 5D992

More information

Brochures

Information material for downloading can be found in the Internet:

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

Overview

- To measure temperatures easily and with high accuracy
- 7 common thermocouple types can be used
- Also for measurement of analog signals with low level (± 80 mV)
- Easy to retrofit in existing systems

Field of application

The SM 1231 thermocouple module is a highly accurate temperature sensor using standard thermocouples. Low-level analog signals in the range of ± 80 mV can also be detected. The SM 1231 thermocouple modules can be used with the CPU of the S7-1200 series.

Construction

The SM 1231 thermocouple modules have the same construction features as other modules in the S7-1200 series: Mounting on DIN rails:

- The modules are snapped onto the rails next to the CPU on the right and are connected to each other and to the CPU 12xx by means of the integrated backplane bus.
- Direct installation: The module can also be screwed directly to the wall using the pre-drilled holes. This installation method is recommended in cases of high vibration load.
- Thermocouples: In each case, 4 thermocouples of types J, K, T, E, R, S and N can be used. They are connected directly to the module without amplifiers.
- Installation site
- Thermocouple modules should be installed in locations with low fluctuations in temperature to ensure the highest measurement and repeat accuracy.

Function

- Different measuring ranges: Thermocouples of types J, K, T, E, R, S and N; Analog signal recording ± 80 mV.
- Testing for open lines.
- Faults caused by contact voltages at the connection between thermocouple and module are prevented; when recording analog signals (± 80 mV), the compensation is automatically deactivated.
- Temperature scale: The measured temperature can be displayed in $^{\circ}\text{C}$ or $^{\circ}\text{F}$.

Technical specifications

6ES7 231-5QD30-0XB0	
Product type designation	Thermocouple module SM 1231
Current consumption	
from load voltage L+ (no-load), max.	60 mA
from 5 V DC backplane bus, max.	87 mA
Power loss	
Power loss, typ.	1.8 W
Connection system	
pluggable IO terminals	Yes
Analog inputs	
Number of analog inputs	4
Max. cable length, shielded	100 m; to sensor
Cable loop resistance	100 Ω
Refresh time (all channels)	405 ms
Input ranges (rated values), voltages	
• -80 mV to +80 mV	Yes
Input ranges (rated values), thermocouples	
• Type E	Yes
• Type J	Yes
• Type K	Yes
• Type N	Yes
• Type R	Yes
• Type S	Yes
• Type T	Yes
Input ranges (rated values), resistors	
• permissible input voltage for voltage input (destruction limit), max.	30 V
Formation of analog values	
Measuring principle	Sigma-Delta
Integration and conversion time/ resolution per channel	
• Resolution with overrange (bits including sign), max.	16 bits; temperature 0.1 $^{\circ}\text{C}$ / 0.1 $^{\circ}\text{F}$
• Noise suppression for interference frequency f1 in Hz	85 dB at 50 / 60 / 400 Hz
Range of conversion values that can be displayed	
• bipolar signals	-27 648 to +27 648
Errors/accuracies	
Cold connection point	+/-1.5 $^{\circ}\text{C}$
Repeat accuracy in settled state at 25 $^{\circ}\text{C}$ (relative to input range)	+/- 0.05 %
Operational limit over entire temperature range	
• Voltage, related to the output range	+/- 0.1 %

SIMATIC S7-1200

Analog modules

SM 1231 Thermocouple module

Technical specifications (continued)

6ES7 231-5QD30-0XB0	
Product type designation	Thermocouple module SM 1231
Noise suppression for $f = n \times (f_l \pm 1 \%)$, $f_l =$ interfering frequency	
• Common-mode voltage, max.	120 V; AC
• Common-mode interference, min.	120 dB; at AC 120 V
Isolation	
Isolation of analog inputs	
• Isolation analog inputs	Yes
Dimensions and weight	
Dimensions	
• Width	71.2 mm
• Height	80 mm
• Depth	62 mm
Weight	

Ordering data

Order No.

Thermocouple module SM 1231 C		6ES7 231-5QD30-0XB0
Inputs +/- 80 mV, resolution 15 bit + sign, thermocouple types J, K, S, T, R, E, N; 4 inputs		
Accessories		
S7-1200 automation system, System Manual		
For SIMATIC S7-1200 and STEP 7 Basic		
German	B	6ES7 298-8FA30-8AH0
English	B	6ES7 298-8FA30-8BH0
French	B	6ES7 298-8FA30-8CH0
Spanish	B	6ES7 298-8FA30-8DH0
Italian	B	6ES7 298-8FA30-8EH0
Chinese	B	6ES7 298-8FA30-8KH0
S7-1200 automation system, Easy Book		
Brief instructions		
German	B	6ES7 298-8FA30-8AQ0
English	B	6ES7 298-8FA30-8BQ0
French	B	6ES7 298-8FA30-8CQ0
Spanish	B	6ES7 298-8FA30-8DQ0
Italian	B	6ES7 298-8FA30-8EQ0
Chinese	B	6ES7 298-8FA30-8KQ0
STEP 7 Basic engineering software		
<i>Target system:</i> SIMATIC S7-1200 controllers and the associated I/O. The WinCC Basic which is included permits configuration of the SIMATIC Basic Panels		
<i>Requirement:</i> MS Windows XP SP3 / MS Windows Vista SP1		
<i>Type of delivery:</i> German, English, with online documentation		
Single license	D	6ES7 822-0AA00-0YA0
STEP 7 Basic Software Update Service, 1 year	D	6ES7 822-0AA00-0YL0
Trial License STEP 7 Basic; on DVD, 14-day trial	D	6ES7 822-0AA00-0YA7
B: Subject to export regulations: AL: N and ECCN: EAR99T C: Subject to export regulations: AL: N and ECCN: EAR99H D: Subject to export regulations: AL: N and ECCN: 5D992		

More information

Brochures

Information material for downloading can be found in the Internet:

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

Overview

- To measure temperatures easily and with high accuracy
- 4 inputs
- The most common resistance temperature detectors can be used
- Easy to retrofit in existing systems

Field of application

The SM 1231 RTD modules permit high-precision temperature recording using standard resistance temperature detectors. They can be used with CPU 1211, 1212 and 1214.

Construction

The SM 1231 RTD modules have the same construction features as other modules in the S7-1200 series:

- Mounting on DIN rails:
The modules are snapped onto the rails next to the CPU on the right and are connected to each other and to the CPU 12xx by means of the integrated backplane bus.
- Direct installation:
The module can also be screwed directly to the wall using the pre-drilled holes. This installation method is recommended in cases of high vibration load.
- The most common resistance temperature detectors can be used: Pt 100, Pt 200, Pt 500, Pt 1000, Pt 10000, Ni 100, Ni 120, Ni 1000, Cu 10, FS 150, FS 30, FS 600. The resistance temperature detectors are connected directly to the module without amplifiers, whereby they must all be of the same type. The detectors can be connected with 2, 3 or 4 lines.
- Installation site:
The RTD module should be installed in locations with low fluctuations in temperature to ensure the highest measurement and repeat accuracy.
- DIP switches:
The required settings, e.g. selection of the connected resistance detectors, are made using the DIP switches on the module.

Function

- Resistance temperature detectors of types Pt 100, Pt 200, Pt 500, Pt 1000, Pt 10000, Ni 100, Ni 120, Ni 1000, Cu 10, FS 150, FS 30, FS 600.
- Temperature scale:
The measured temperature can be displayed in °C or °F.

Technical specifications

6ES7 231-5PD30-0XB0	
Product type designation	SM 1231 RTD signal module
Current consumption	
from load voltage L+ (no load), max.	60 mA
from 5 V DC backplane bus, max.	87 mA
Power loss	
Power loss, typ.	1.8 W; sensor: 1 mW
Connection system	
pluggable IO terminals	Yes
Analog inputs	
Number of analog inputs	4
Max. cable length, shielded	100 m; to sensor
Cable loop resistance	20 Ω; max. 2.7 Ω for Cu
Refresh time (all channels)	405 ms; 700 ms for Pt10000
Input ranges (rated values), resistance thermometer	
• Cu 10	Yes
• Ni 10	Yes
• Ni 1000	Yes
• Ni 120	Yes
• Pt 100	Yes
• Pt 1000	Yes
• Pt 10000	Yes
• Pt 200	Yes
• Pt 500	Yes
Input ranges (rated values), resistors	
• 0 to 150 Ω	Yes
• 0 to 300 Ω	Yes
• 0 to 600 Ω	Yes
• permissible input voltage for voltage input (destruction limit), max.	30 V; DC 30 V (sensor), DC 5 V (source)
Formation of analog values	
Measuring principle	Sigma-Delta
Integration and conversion time/resolution per channel	
• Resolution with overrange (bits including sign), max.	16 bits; temperature 0.1 °C / 0.1 °F
• Noise suppression for interference frequency f1 in Hz	85 dB at 50 / 60 / 400 Hz
Range of conversion values that can be displayed	
• bipolar signals	-27 648 to +27 648
Errors/accuracies	
Repeat accuracy in settled state at 25 °C (relative to input range)	+/- 0.05 %

SIMATIC S7-1200

Analog modules

SM 1231 RTD signal module

Technical specifications (continued)

6ES7 231-5PD30-0XB0	
Product type designation	SM 1231 RTD signal module
Operational limit over entire temperature range	
• Voltage, related to the output range	+/- 0.1 %
Noise suppression for $f = n \times (f_l \pm 1 \%)$, f_l = interfering frequency	
• Common-mode voltage, max.	0 V
• Common-mode interference, min.	120 dB; at AC 120 V
Isolation	
Isolation of analog inputs	
• Isolation analog inputs	Yes
Dimensions and weight	
Dimensions	
• Width	71.2 mm
• Height	80 mm
• Depth	62 mm
Weight	
• Weight, approx.	210 g

Ordering data

Order No.

SM 1231 RTD signal module	C	6ES7 231-5PD30-0XB0
4 inputs for resistance temperature detectors Pt100/200/500/1000/10000, Ni100/120/1000, Cu10; resistors 150/300/600 ohms, resolution 15 bits + sign		
Accessories		
S7-1200 automation system, System Manual		
For SIMATIC S7-1200 and STEP 7 Basic		
German	B	6ES7 298-8FA30-8AH0
English	B	6ES7 298-8FA30-8BH0
French	B	6ES7 298-8FA30-8CH0
Spanish	B	6ES7 298-8FA30-8DH0
Italian	B	6ES7 298-8FA30-8EH0
Chinese	B	6ES7 298-8FA30-8KH0
S7-1200 automation system, Easy Book		
Brief instructions		
German	B	6ES7 298-8FA30-8AQ0
English	B	6ES7 298-8FA30-8BQ0
French	B	6ES7 298-8FA30-8CQ0
Spanish	B	6ES7 298-8FA30-8DQ0
Italian	B	6ES7 298-8FA30-8EQ0
Chinese	B	6ES7 298-8FA30-8KQ0
STEP 7 Basic engineering software		
<i>Target system:</i> SIMATIC S7-1200 controllers and the associated I/O. The WinCC Basic which is included permits configuration of the SIMATIC Basic Panels		
<i>Requirement:</i> MS Windows XP SP3 / MS Windows Vista SP1		
<i>Type of delivery:</i> German, English, with online documentation		
Single license	D	6ES7 822-0AA00-0YA0
STEP 7 Basic Software Update Service, 1 year	D	6ES7 822-0AA00-0YL0
Trial License STEP 7 Basic; on DVD, 14-day trial	D	6ES7 822-0AA00-0YA7

B: Subject to export regulations: AL: N and ECCN: EAR99T
 C: Subject to export regulations: AL: N and ECCN: EAR99H
 D: Subject to export regulations: AL: N and ECCN: 5D992

More information

Brochures

Information material for downloading can be found in the Internet:

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

SIMATIC S7-1200

SIPLUS analog modules

SIPLUS SM 1231, SM 1232, SM 1234

Overview SIPLUS SM 1231 analog input module



- Analog inputs for SIMATIC S7-1200
- With extremely short conversion times
- For connecting analog sensors without additional amplifiers
- For solving even more complex automation tasks

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

SIPLUS SM 1231	
Order No.	6AG1 231-4HD30-2XB0
Order No. based on	6ES7 231-4HD30-0XB0
Ambient temperature range	-25 ... +70 °C; condensation permissible
Ambient conditions	Resistant in accordance with EN60721 to chemically (-3C4), mechanically (-3S4) and biologically (-3B2) active substances and compliant with ISA S71.04 G1, G2, G3, GX ¹⁾ . For further information, refer to Environmental conditions of SIPLUS extreme (on pg. 4/4) or go to www.siemens.com/siplus-extreme
Technical data	The technical data of the standard product apply with the exception of the environmental conditions.

¹⁾ ISA -S71.04 severity level GX from October 2010

Overview SIPLUS SM 1232 analog output module



- Analog outputs for SIMATIC S7-1200
- With extremely short conversion times
- For connecting analog actuators without additional amplifiers
- For solving even more complex automation tasks

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

SIPLUS SM 1232	
Order No.	6AG1 232-4HB30-2XB0
Order No. based on	6ES7 232-4HB30-0XB0
Ambient temperature range	-25 ... +70 °C; condensation permissible
Ambient conditions	Resistant in accordance with EN60721 to chemically (-3C4), mechanically (-3S4) and biologically (-3B2) active substances and compliant with ISA S71.04 G1, G2, G3, GX ¹⁾ . For further information, refer to Environmental conditions of SIPLUS extreme (on pg. 4/4) or go to www.siemens.com/siplus-extreme
Technical data	The technical data of the standard product apply with the exception of the environmental conditions.

¹⁾ ISA -S71.04 severity level GX from October 2010

SIMATIC S7-1200

SIPLUS analog modules

SIPLUS SM 1231, SM 1232, SM 1234

Overview SIPLUS SM 1234 analog input/output module



- Analog inputs and outputs for the SIMATIC S7-1200
- With extremely short conversion times
- For connecting analog actuators and sensors without additional amplifiers
- For solving even more complex automation tasks

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

SIPLUS SM 1234	
Order No.	6AG1 234-4HE30-2XB0
Order No. based on	6ES7 234-4HE30-0XB0
Ambient temperature range	-25 ... +70 °C; condensation permissible
Ambient conditions	Resistant in accordance with EN60721 to chemically (-3C4), mechanically (-3S4) and biologically (-3B2) active substances and compliant with ISA S71.04 G1, G2, G3, GX ¹⁾ . For further information, refer to Environmental conditions of SIPLUS extreme (on pg. 4/4) or go to www.siemens.com/siplus-extreme
Technical data	The technical data of the standard product apply with the exception of the environmental conditions.

¹⁾ ISA -S71.04 severity level GX from October 2010

Ordering data

Order No.

Analog input module Signal Module SIPLUS SM 1231 (extended temperature range and medial exposure) 4 analog inputs ± 10 V, ± 5 V, ± 2.5 V, or 0 ... 20 mA 12 bit + sign; from +60 °C to +70 °C number of simultaneously controllable inputs and outputs max. 50%	C	6AG1 231-4HD30-2XB0
Analog output module Signal Module SIPLUS SM 1232 (extended temperature range and medial exposure) 2 analog outputs, ± 10 V with 14 bit or 0 ... 20 mA with 13 bit; from +60 °C to +70 °C number of simultaneously controllable inputs and outputs max. 50%	C	6AG1 232-4HB30-2XB0
Analog input/output module Signal Module SIPLUS SM 1234 (extended temperature range and medial exposure) 4 analog inputs, ± 10 V, ± 5 V, ± 2.5 V, or 0 ... 20 mA, 12 bit + sign; 2 analog outputs, ± 10 V with 14 bit or 0 ... 20 mA with 13 bit	C	6AG1 234-4HE30-2XB0

Accessories

see S7-1200 analog modules, pages 4/66, 4/69, 4/74

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

SIMATIC S7-1200

SIPLUS analog modules

SIPLUS SB 1232 analog output module

Overview



- Analog output for the SIMATIC S7-1200
- Can be plugged direct into the CPU

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

SIPLUS SB 1232	
Order No.	6AG1 232-4HA30-5XB0
Order No. based on	6ES7 232-4HA30-0XB0
Ambient temperature range	-25 ... +55 °C; condensation permissible
Ambient conditions	Resistant in accordance with EN60721 to chemically (-3C4), mechanically (-3S4) and biologically (-3B2) active substances and compliant with ISA S71.04 G1, G2, G3, GX ¹⁾ . For further information, refer to Environmental conditions of SIPLUS extreme (on pg. 4/4) or go to www.siemens.com/siplus-extreme
Technical data	The technical data of the standard product apply with the exception of the environmental conditions.

¹⁾ ISA -S71.04 severity level GX from October 2010

Ordering data

Order No.

Analog output module Signal Board SIPLUS SB 1232

(extended temperature range and medial exposure)

1 analog output, ±10 V with 12 bit or 0 ... 20 mA with 11 bit

C

6AG1 232-4HA30-5XB0

Accessories

see S7-1200 analog modules, page 4/71

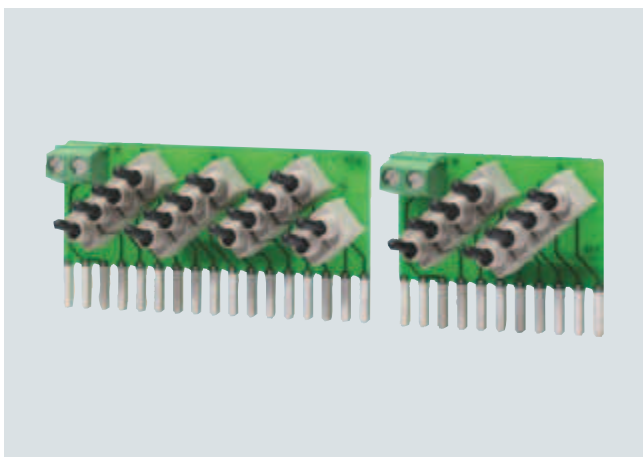
C: Subject to export regulations: AL: N and ECCN: EAR99H

SIMATIC S7-1200

Special modules

SIM 1274 simulator

Overview



- Simulator module for program testing during commissioning and ongoing operation
- Simulation of 8 or 14 inputs

Application

The SM 1274 simulator modules for SIMATIC S7-1200 provide users with the opportunity for testing user programs during commissioning and ongoing operation.

Design

The input simulators are mounted on the terminal block instead of the digital inputs.

The front of the module contains:

- Input status selector switch
- Connecting brackets for secure connection with the terminal block

Function

Program execution can be specifically influenced by setting the inputs. The CPU reads the set input signal statuses, and processes them in the user program. The subsequent response of the controller allows conclusions to be drawn concerning program execution.

Technical specifications

	6ES7 274-1XH30-0XA0	6ES7 274-1XF30-0XA0
Product type designation	SIM 1274 14 Ch DI Simulator	SIM 1274 8 Ch DI Simulator
Supply voltages		
Rated value		
• 24 V DC	Yes	Yes
Degree of protection		
IP20	Yes	Yes

Ordering data

Order No.

Digital input simulator SIM 1274 simulator module (optional)

with 14 input switches,
for CPU 1214C

C **6ES7 274-1XH30-0XA0**

with 8 input switches,
for CPU 1211C, CPU 1212C

C **6ES7 274-1XF30-0XA0**

Accessories

S7-1200 automation system, System Manual

For SIMATIC S7-1200 and
STEP 7 Basic

German B **6ES7 298-8FA30-8AH0**

English B **6ES7 298-8FA30-8BH0**

French B **6ES7 298-8FA30-8CH0**

Spanish B **6ES7 298-8FA30-8DH0**

Italian B **6ES7 298-8FA30-8EH0**

Chinese B **6ES7 298-8FA30-8KH0**

S7-1200 automation system, Easy Book

Brief instructions

German B **6ES7 298-8FA30-8AQ0**

English B **6ES7 298-8FA30-8BQ0**

French B **6ES7 298-8FA30-8CQ0**

Spanish B **6ES7 298-8FA30-8DQ0**

Italian B **6ES7 298-8FA30-8EQ0**

Chinese B **6ES7 298-8FA30-8KQ0**

STEP 7 Basic engineering software

Target system:
SIMATIC S7-1200 controllers and
the associated I/O.

The WinCC Basic which is
included permits configuration of
the SIMATIC Basic Panels

Requirement:
MS Windows XP SP3 /
MS Windows Vista SP1

Type of delivery:
German, English,
with online documentation

Single license D **6ES7 822-0AA00-0YA0**

STEP 7 Basic Software Update
Service, 1 year D **6ES7 822-0AA00-0YL0**

Trial License STEP 7 Basic;
on DVD, 14-day trial D **6ES7 822-0AA00-0YA7**

B: Subject to export regulations: AL: N and ECCN: EAR99T

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

D: Subject to export regulations: AL: N and ECCN: 5D992

More information

Brochures

Information material for downloading can be found in the
Internet:

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

Overview



- For quick, high-performance serial data exchange via point-to-point connection
- Implemented protocols: ASCII, USS drive protocol, Modbus RTU
- Additional protocols can also be loaded
- Simple parameterization with STEP 7 Basic

Application

The CM 1241 communication modules are used for quick, high-performance serial data exchange via point-to-point connection.

Point-to-point connection is possible to, e.g.:

- SIMATIC S7 automation systems and the systems of many other manufacturers
- Printers
- Robot controls
- Modems
- Scanners
- Bar code readers, etc.

Design

The CM 1241 communication modules have the same design features as the basic devices.

- Installation on DIN rails:
The modules are snapped onto the rail next to the CPU on the right and are electrically and mechanically connected to each other and to the CPU by the integral slide mechanism.
- Direct installation:
Horizontal or vertical mounting on DIN rail or direct mounting in the cabinet using integral lugs.

The communication modules are equipped with the following:

- Status LEDs for indicating "Send", "Receive" and "Error"
- Communication interfaces:
Available for the RS232 and RS485 physical transmission media

Function

The following standard protocols are available on the CM 1241 communication modules:

- ASCII:
For interfacing to third-party systems with simple transmission protocols, e.g. protocols with start and end characters or with block check characters. The interface handshake signals can be called and controlled via the user program.
- MODBUS:
For communication according to the MODBUS protocol with RTU format:
 - MODBUS master:
Master-slave interfacing with SIMATIC S7 as master.
 - MODBUS slave:
Master-slave interfacing with SIMATIC S7 as slave; message frame traffic from slave to slave not possible.
- USS drive protocol:
Instructions for connection of USS protocol drives are especially supported. In this case, drives exchange data over RS485. It is then possible to control these drives, and to read and write parameters.

Further drivers for downloading are also available.

Parameterization

Parameterization of the CM 1241 communication module is particularly user-friendly and simple with STEP 7 Basic:

- The user assigns the module characteristics via a parameterization environment integrated in STEP 7 Basic, e.g.:
 - the implemented protocol drivers that are used.
 - the driver-specific characteristics that are used.

Technical specifications

	6ES7 241-1CH30-0XB0	6ES7 241-1AH30-0XB0
Product type designation	CM 1241 RS485	CM 1241 RS232
Supply voltages		
Rated value		
• 24 V DC	Yes	Yes
• permissible range, lower limit (DC)	20.4 V	20.4 V
• permissible range, upper limit (DC)	28.8 V	28.8 V
Current consumption		
Current consumption, max.	220 mA; from L5+; logic	220 mA; from L5+; logic
Power loss		
Power loss, typ.	1.1 W	1.1 W
Interfaces		
Number of interfaces	1	1
Interface physics, RS 232C (V.24)		Yes
Interface physics, RS 422/RS 485 (X.27)	Yes	
Point-to-point		
Cable length, max.	1 000 m	10 m

SIMATIC S7-1200

Communication

CM 1241 communication module

Technical specifications (continued)

	6ES7 241-1CH30-0XB0	6ES7 241-1AH30-0XB0
Product type designation	CM 1241 RS485	CM 1241 RS232
Integrated protocol driver		
• ASCII	Yes; available as library function	
• USS	Yes; available as library function	
Climatic and mechanical conditions for storage and transport		
Climatic conditions for storage and transport		
• Free fall		
- Max. height of fall (in packaging)	0.3 m; five times, in shipping package	0.3 m; five times, in shipping package
• Temperature		
- permissible temperature range	-40 °C ... +70 °C	-40 °C ... +70 °C
• Air pressure acc. to IEC 60068-2-13		
- permissible atmospheric pressure	1080 to 660hPa	1080 to 660hPa
• Relative humidity		
- permissible range (without condensation) at 25 °C	95%	95%
Mechanical and climatic conditions during operation		
Climatic conditions during operation		
• Temperature		
- permissible temperature range	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted	0 °C ... 55 °C when horizontally mounted 0 °C ... 45 °C when vertically mounted
- permissible temperature change	5 °C ... 55 °C, 3 °C/ min	5 °C ... 55 °C, 3 °C/ min
• Air pressure acc. to IEC 60068-2-13		
- permissible atmospheric pressure	1080 ... 795 hPa	1080 ... 795 hPa
Software		
Runtime software		
• Target system		
- S7-1200	Yes	Yes
Dimensions and weight		
Dimensions		
• Width	30 mm	30 mm
• Height	100 mm	100 mm
• Depth	75 mm	75 mm
Weight		
• Weight, approx.	150 g	150 g

Ordering data

Order No.

CM 1241 communication module		
Communication module for point-to-point connection, with one RS485 interface	C	6ES7 241-1CH30-0XB0
Communication module for point-to-point connection, with one RS232 interface	C	6ES7 241-1AH30-0XB0
Accessories		
S7-1200 automation system, System Manual		
For SIMATIC S7-1200 and STEP 7 Basic		
German	B	6ES7 298-8FA30-8AH0
English	B	6ES7 298-8FA30-8BH0
French	B	6ES7 298-8FA30-8CH0
Spanish	B	6ES7 298-8FA30-8DH0
Italian	B	6ES7 298-8FA30-8EH0
Chinese	B	6ES7 298-8FA30-8KH0
S7-1200 automation system, Easy Book		
Brief instructions		
German	B	6ES7 298-8FA30-8AQ0
English	B	6ES7 298-8FA30-8BQ0
French	B	6ES7 298-8FA30-8CQ0
Spanish	B	6ES7 298-8FA30-8DQ0
Italian	B	6ES7 298-8FA30-8EQ0
Chinese	B	6ES7 298-8FA30-8KQ0
STEP 7 Basic engineering software		
<i>Target system:</i> SIMATIC S7-1200 controllers and the associated I/O. The WinCC Basic which is included permits configuration of the SIMATIC Basic Panels		
<i>Requirement:</i> MS Windows XP SP3 / MS Windows Vista SP1		
<i>Type of delivery:</i> German, English, with online documentation		
Single license	D	6ES7 822-0AA00-0YA0
STEP 7 Basic Software Update Service, 1 year	D	6ES7 822-0AA00-0YL0
Trial License STEP 7 Basic; on DVD, 14-day trial	D	6ES7 822-0AA00-0YA7

B: Subject to export regulations: AL: N and ECCN: EAR99T
 C: Subject to export regulations: AL: N and ECCN: EAR99H
 D: Subject to export regulations: AL: N and ECCN: 5D992

More information

Brochures

Information material for downloading can be found in the Internet:

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

Overview



- Unmanaged switch for connecting a SIMATIC S7-1200 to an Industrial Ethernet network with a line, tree or star topology
- Multiplication of Ethernet interfaces on a SIMATIC S7-1200 for additional connection of up to three programming devices, operator controls, and further Ethernet nodes
- Simple, space-saving mounting on the SIMATIC S7-1200 mounting rail
- Low-cost solution for implementing small, local Ethernet networks
- Connection without any problems using RJ45 standard connectors
- Simple and fast status display via LEDs on the device
- Integral autocrossover function permits use of uncrossed connecting cables

Benefits



- Reduction in assembly costs and mounting space compared to use of external network components
- Fast commissioning, as no configuration is necessary
- Flexible expansion of the network by simply inserting the CSM

Application

The CSM 1277 is an Industrial Ethernet switch of compact design for use in the SIMATIC S7-1200. The CSM 1277 can be used to multiply the Ethernet interface of the SIMATIC S7-1200 for simultaneous communication with operator panels, programming devices, other controllers, or the office world.

The CSM 1277 and the SIMATIC S7-1200 controller can be used to implement simple automation networks at low cost.

Design

The CSM 1277 compact switch module offers all advantages of the SIMATIC S7-1200 design:

- Compact design; the rugged plastic enclosure contains:
 - 4 x RJ45 sockets for connecting to Industrial Ethernet
 - 3-pole plug-in terminal strip for connection of the external 24 V DC supply on the top
 - LEDs for diagnostics and for status display of the Industrial Ethernet ports
- Simple mounting on the mounting rail of the S7-1200
- Fanless and therefore low-maintenance design
- The module can be replaced without using a programming device

Function

- Multiplication of Ethernet interfaces of the SIMATIC S7-1200
- Design of a small, local Industrial Ethernet network with three further nodes
- Automatic detection of data transfer rate by means of auto-sensing and autocrossover functions
- LEDs for diagnostics and for status display

Network topology and network configuration

Various network topologies can be implemented using the CSM 1277 compact switch module:

- Connection of SIMATIC S7-1200 in linear topology: at least one RJ45 connection of the SIMATIC S7-1200 remains vacant, e.g. for connecting a programming device (PG)
- Connection of SIMATIC S7-1200 to a higher-level network in a tree/star topology: at least two RJ45 connections of the SIMATIC S7-1200 remain vacant, e.g. for connecting a programming device/operator panel (PG/OP)
- Design of a small, local network with a SIMATIC S7-1200 and three further Ethernet nodes

Configuration

The CSM 1277 compact switch module is an unmanaged switch and need not be configured.

Diagnostics

The following information is displayed on LEDs on the device:

- Power
- Port status
- Data traffic

SIMATIC S7-1200

Communication

CSM 1277 unmanaged

Technical specifications

6GK7 277-1AA00-0AA0	
Product type designation	CSM 1277
Data transmission rate	
Transmission rate 1	10 Mbit/s
Transmission rate 2	100 Mbit/s
Interfaces	
Maximum number of electrical/optical connections for network components or terminal equipment	4
Number of electrical connections	
• For network components or terminal equipment	4
• For power supply	1
Design of electrical connection	
• For network components or terminal equipment	RJ45 port
• For power supply	3-pin terminal block
Supply voltage, current consumption, power loss	
Type of power supply	DC
Supply voltage, external	24 V
• Minimum	19.2 V
• Maximum	28.8 V
Current consumption, maximum	0.07 A
Product component: fusing of power supply input	Yes
Type of fusing of power supply input	0.5 A / 60 V
Effective power loss at 24 V with DC	1.6 W
Permitted ambient conditions	
Ambient temperature	
• During operating phase	0 ... 60 °C
• During storage	-40 ... +70 °C
• During transport	-40 ... +70 °C
Relative humidity at 25 °C without condensation during operating phase, maximum	95 %
IP degree of protection	IP 20

6GK7 277-1AA00-0AA0	
Product type designation	CSM 1277
Design, dimensions and weights	
Type of construction	SIMATIC S7-1200 device design
Width	45 mm
Height	100 mm
Depth	75 mm
Net weight	0.15 kg
Type of mounting	
• 35 mm DIN rail mounting	Yes
• Wall mounting	No
• S7-300 rail mounting	No
Product properties, functions, components General	
Product function: switch-managed	No
Standards, specifications, approvals	
Standard	
• For EMC from FM	FM3611: Class 1, Division 2, Group A, B, C, D / T., CL-1, Zone 2, GP. IIC, T.. Ta
• For Ex zone	EN 600079-15:2005, EN 600079-0:2006, II 3 G Ex nA II T4, KEMA 08 ATEX 0003 X
• For CSA and UL safety	UL 508, CSA C22.2 No. 142
• For emitted interference	EN 61000-6-4
• For noise immunity	EN 61000-6-2
Certificate of suitability	EN 61000-6-2, EN 61000-6-4
• CE mark	Yes
• C-Tick	Yes

Ordering data	Order No.		Order No.
CSM 1277 compact switch module Unmanaged switch for connecting a SIMATIC S7-1200 and up to three further nodes to Industrial Ethernet with 10/100 Mbit/s; 4 x RJ45 ports; external 24 V DC power supply, diagnostics on LEDs, S7-1200 module including electronic manual on CD-ROM	6GK7 277-1AA00-0AA0	IE FC TP Standard Cable GP 2 x 2 (Type A) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/IE FC RJ45 Plug; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order quantity 20 m	6XV1 840-2AH10
Accessories IE TP Cord RJ45/RJ45 TP cable 4 x 2 with 2 RJ45 connectors <ul style="list-style-type: none"> • 0.5 m • 1 m • 2 m • 6 m • 10 m 	6XV1 870-3QE50 6XV1 870-3QH10 6XV1 870-3QH20 6XV1 870-3QH60 6XV1 870-3QN10	IE FC stripping tool Preadjusted stripping tool for fast stripping of the Industrial Ethernet FC cables	6GK1 901-1GA00
		IE FC Outlet RJ45 For connecting Industrial Ethernet FC cables and TP cords; graduated prices for 10 and 50 units or more	6GK1 901-1FC00-0AA0
		SIMATIC NET Manual Collection Electronic manuals on communications systems, protocols, products; on DVD; German/English	6GK1 975-1AA00-3AA0

More information

To assist in selecting the right Industrial Ethernet switches as well as configuration of modular variants, the Switch Selection Tool is available as a free download at:

<http://support.automation.siemens.com/WW/view/en/39134641>

SIMATIC S7-1200

SIPLUS communication

SIPLUS CM 1241 communication module

Overview



- For quick, high-performance serial data exchange via point-to-point connection
- Implemented protocols: ASCII, USS drive protocol, Modbus RTU
- Additional protocols can also be loaded
- Simple parameterization with STEP 7 Basic

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

SIPLUS CM 1241		
Order No.	6AG1 241-1CH30-2XB0	6AG1 241-1AH30-2XB0
Order No. based on	6ES7 241-1CH30-0XB0	6ES7 241-1AH30-0XB0
Ambient temperature range	-25 ... +70 °C; condensation permissible	
Ambient conditions	Resistant in accordance with EN60721 to chemically (-3C4), mechanically (-3S4) and biologically (-3B2) active substances and compliant with ISA S71.04 G1, G2, G3, GX ¹⁾ . For further information, refer to Environmental conditions of SIPLUS extreme (on pg. 4/4) or go to www.siemens.com/siplus-extreme	
Technical data	The technical data of the standard product apply with the exception of the environmental conditions.	

¹⁾ ISA -S71.04 severity level GX from October 2010

Ordering data

Order No.

SIPLUS CM 1241 communication module

(extended temperature range and medial exposure)

Communication module for point-to-point connection, with one RS485 interface

C

6AG1 241-1CH30-2XB0

Communication module for point-to-point connection, with one RS232 interface

C

6AG1 241-1AH30-2XB0

Accessories

see CM 1241 communication module, page 4/84

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

SIMATIC S7-1200

Power supplies

PM 1207 power supply

Overview



- Stabilized power supply for SIMATIC S7-1200
- In S7-1200 design
- Input 120/230 V AC, output 24 V DC/2.5 A

Technical specifications

	PM 1207 power supply
Order No.	6EP1 332-1SH71
Input voltage, rated value	120/230 V AC (autoranging)
• Range	85...132 V/176...264 V AC
Mains buffering	> 20 ms (at 93/187 V)
Line frequency, rated value	50/60 Hz
• Range	47...63 Hz
Input current, rated value	1.2/0.67 A
• Switch-on current (25 °C)	< 13 A
• Recommended miniature circuit-breaker	16 A characteristic B, 10 A characteristic C
Output voltage, rated value	24 V DC
• Tolerance	± 3%
• Residual ripple	< 150 mVpp
• Adjustment range	No
Output current, rated value	2.5 A
Approx. efficiency at rated values	83%
Connectable in parallel	Yes, 2 units
Electronic short-circuit protection	Yes, automatic restart
Radio suppression level (EN 55022)	Class B
Status display	Green LED for "24 V OK"
Line harmonic limitation (EN 61000-3-2)	Not applicable
Degree of protection (EN 60529)	IP20
Safety class	Class 1
Galvanic isolation	SELV acc. to EN 60950 and EN 50178
Ambient temperature	0 ... +60 °C
Transport/storage temperature	-25 ... +85 °C
Mounting	Standard mounting rail EN 60715 35x7.5/15
Dimensions (W x H x D) in mm	70 x 100 x 75
Approx. weight	0.3 kg
Certification	CE, cULus

Ordering data

Order No.

PM 1207 power supply

Input 120/230 V AC,
output 24 V DC/2.5 A

6EP1 332-1SH71

SIMATIC S7-1200

SIPLUS power supplies

SIPLUS PM 1207 power supply

Overview



- Stabilized power supply for SIMATIC S7-1200
- In S7-1200 design
- Input 120/230 V AC, output 24 V DC/2.5 A

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

SIPLUS PM 1207	
Order No.	6AG1 332-1SH71-7AA0
Order No. based on	6EP1 332-1SH71
Ambient temperature range	-25 ... +70 °C; condensation permissible
Ambient conditions	Resistant in accordance with EN60721 to chemically (-3C4), mechanically (-3S4) and biologically (-3B2) active substances and compliant with ISA S71.04 G1, G2, G3, GX ¹⁾ . For further information, refer to Environmental conditions of SIPLUS extreme (on pg. 4/4) or go to www.siemens.com/siplus-extreme
Technical data	The technical data of the standard product apply with the exception of the environmental conditions.

¹⁾ ISA -S71.04 severity level GX from October 2010

Ordering data

SIPLUS PM 1207 power supply

(extended temperature range and medial exposure)

Input 120/230 V AC,
 output 24 V DC/2.5 A;
 Derating from +55°C ... +70 °C
 to 1.5 A output current

Order No.

6AG1 332-1SH71-7AA0

SIMATIC S7-1200

Operator control and monitoring

Basic Panels

Overview



- The ideal entry level series of 3.8" to 15" for operating and monitoring compact machines and plants
- Clear process representation thanks to use of pixel-graphics displays
- Intuitive operation using Touch and tactile function keys
- Equipped with all the necessary basic functions such as alarm logging, recipe management, plots, vector graphics, and language switching
- Simple connection to the controller via integral Ethernet interface or separate version with RS485/422

Benefits

- Integral component of Totally Integrated Automation (TIA): Increased productivity, minimum engineering overhead, reduction in life-cycle costs
 - Can be used even where installation space is restricted thanks to vertical configuring (4" and 6" devices)
 - Short configuring and commissioning times
 - Service-friendly thanks to maintenance-free design and long service life of the backlighting display
- Simple and user-friendly representation of process values thanks to, for example, input/output fields, vector graphics, trend curves, bar charts, text and bitmaps
- Graphics library available with off-the-shelf picture objects
- Can be used worldwide:
 - 32 languages can be configured (incl. Asian and Cyrillic character sets)
 - You can switch between up to 5 languages online
 - Language-dependent texts and graphics

Application

The SIMATIC HMI Basic Panels can be used wherever compact machines and plants are controlled and monitored locally - in production, process and building automation alike. They are used in the most diverse sectors and applications.

Design

The SIMATIC HMI Basic Panels are installation-compatible with the existing touch devices of the product family of Panels and Multi Panels.

- KTP400 Basic mono
 - 3.8" STN mono
 - 1 Ethernet interface (TCP/IP)
 - Touch screen and 4 tactile function keys
- KTP600 Basic mono
 - 5.7" STN mono
 - 1 Ethernet interface (TCP/IP)
 - Touch screen and 6 tactile function keys
- KTP600 Basic color
 - 5.7" TFT with 256 colors
 - 1 Ethernet interface (TCP/IP) or 1 RS 485/422 interface (separate version)
 - Touch screen and 6 tactile function keys
- KTP1000 Basic color
 - 10.4" TFT with 256 colors
 - 1 Ethernet interface (TCP/IP) or 1 RS 485/422 interface (separate version)
 - Touch screen and 8 tactile function keys
- TP1500 Basic color
 - 15.1" TFT with 256 colors
 - 1 Ethernet interface (TCP/IP)
 - Touch screen
- No slot for SD/CF/MultiMedia Card, no USB interface

Function

- Input/output fields for displaying and modifying process parameters
- Buttons are used for direct triggering of functions and actions. Up to 16 functions can be configured simultaneously on buttons.
- Graphics can be used as icons instead of text to "label" function keys or buttons. They can also be used as full-screen background images. The configuration tool contains a library with extensive graphics and diverse objects. All editors with an OLE interface can be used as graphic editors, e.g. PaintShop, Designer or CorelDraw, etc.
- Vector graphics Simple geometric basic forms (line, circle and rectangle) can be created direct in the configuring tool
- Fixed texts for labeling function keys, process images and process values in different font sizes
- Curve functions and bars are used for graphical display of dynamic values
- Language switching:
 - 5 online languages, 32 configuration languages including Asian and Cyrillic character sets
 - language-dependent texts and graphics
- User administration (security) in accordance with the requirements of the different sectors
 - authentication with user ID and password
 - user-group-specific rights

SIMATIC S7-1200

Operator control and monitoring

Basic Panels

Function (continued)

- Signaling system
 - discrete alarms
 - analog messages
 - freely definable message classes (e.g. status/fault messages) for defining acknowledgment response and displaying message events
 - message history
- Recipe management
- Help texts for process screens, messages and variables
- Arithmetic functions
- Limit value monitoring for reliable process control of inputs and outputs
- Indicator light for indicating machine and plant statuses
- Scheduler for global function execution in case of global events
- Template concept for creation of screen templates (screen elements configured in the template appear in every screen)
- Simple maintenance and configuration thanks to:
 - backup/restore of configuration, operating system and firmware on a PC using ProSave
 - configuration download via MPI/PROFIBUS DP or Ethernet
 - automatic transfer identification
 - individual contrast setting and calibration (except KTP600)
 - clean screen
 - no battery required

Configuration

Configuration is implemented with the engineering software SIMATIC WinCC flexible 2008 Compact or with WinCC Basic V10.5, which is a component of STEP 7 Basic V10.5 (only PROFINET-based device versions).

Integration

The Basic Panels can be connected to:

- SIMATIC S7 controllers
- Non-Siemens controllers (applies for DP devices)
 - Allen Bradley DF1
 - Modicon Modbus RTU
 - Mitsubishi FX¹⁾
 - Omron Hostlink/Multilink¹⁾
- Non-Siemens controllers (non-Siemens drivers for PN devices)
 - Modicon Modbus TCP/IP¹⁾

¹⁾ WinCC flexible 2008 SP2 and higher

Note:

Further information can be found under "System interfaces".

Technical specifications

	6AV6 647-0AA11-3AX0	6AV6 647-0AB11-3AX0	6AV6 647-0AD11-3AX0	6AV6 647-0AF11-3AX0	6AV6 647-0AG11-3AX0
Product type designation	KTP400 Basic mono PN	KTP600 Basic mono PN	KTP600 Basic color PN	KTP1000 Basic color PN	TP1500 Basic color PN
Supply voltage					
Supply voltage	24 V DC	24 V DC	24 V DC	24 V DC	24 V DC
permissible range	+19.2 V to +28.8 V DC	+19.2 V to +28.8 V DC	+19.2 V to +28.8 V DC	+19.2 V to +28.8 V DC	+19.2 V to +28.8 V DC
Rated current	0.07 A	0.24 A	0.35 A	0.6 A	0.24 A
Memory					
Type	Flash / RAM	Flash / RAM	Flash / RAM	Flash / RAM	Flash / RAM
Usable memory for user data	512 KB usable memory for user data	512 KB usable memory for user data	512 KB usable memory for user data	1024 KB usable memory for user data	1024 KB usable memory for user data
Time of day					
Clock					
• Type	Software clock, not battery backed	Software clock, not battery backed	Software clock, not battery backed	Software clock, not battery backed	Software clock, not battery backed
Protocols					
Protocols (terminal link)					
• Sm@rtAccess	No	No	No	No	No
Configuration					
Configuration tool	WinCC flexible Compact Version 2008 SP1 or higher or WinCC Basic V10.5 (to be ordered separately)	WinCC flexible Compact Version 2008 SP1 or higher or WinCC Basic V10.5 (to be ordered separately)	WinCC flexible Compact Version 2008 SP1 or higher or WinCC Basic V10.5 (to be ordered separately)	WinCC flexible Compact Version 2008 SP1 or higher or WinCC Basic V10.5 (to be ordered separately)	WinCC flexible Compact Version 2008 SP1 or higher or WinCC Basic V10.5 (to be ordered separately)

Technical specifications (continued)

	6AV6 647-0AA11-3AX0	6AV6 647-0AB11-3AX0	6AV6 647-0AD11-3AX0	6AV6 647-0AF11-3AX0	6AV6 647-0AG11-3AX0
Product type designation	KTP400 Basic mono PN	KTP600 Basic mono PN	KTP600 Basic color PN	KTP1000 Basic color PN	TP1500 Basic color PN
Display					
Display type	STN, gray scales	STN, gray scales	TFT, 256 colors	TFT, 256 colors	TFT, 256 colors
Size	3.8" (76.8 mm x 57.6 mm)	5.7" (115.2 mm x 86.4 mm)	5.7" (115.2 mm x 86.4 mm)	10.4" (211.2 mm x 158.4 mm)	15" (304.1 mm x 228.1 mm)
Resolution (WxH in pixel)	320 x 240	320 x 240	320 x 240	640 x 480	1024 x 768
Backlighting					
• MTBF backlighting (at 25 °C)	Approx. 30000 hours	about 50,000 hours	about 50,000 hours	about 50,000 hours	about 50,000 hours
Operating mode					
Control elements	Membrane keyboard	Membrane keyboard	Membrane keyboard	Membrane keyboard	Touch screen
Function keys, programmable	4 function keys	6 function keys	6 function keys	8 function keys	None
Connection for mouse/keyboard/barcode reader	- / - / -	- / - / -	- / - / -	- / - / -	- / - / -
Touch operation					
• Touch screen	analog, resistive	analog, resistive	analog, resistive	analog, resistive	analog, resistive
• Numeric/alphabetical input	Yes (on-screen keyboard) / Yes (on-screen keyboard)	Yes (on-screen keyboard) / Yes (on-screen keyboard)	Yes (on-screen keyboard) / Yes (on-screen keyboard)	Yes (on-screen keyboard) / Yes (on-screen keyboard)	Yes (on-screen keyboard) / Yes (on-screen keyboard)
Ambient conditions					
Mounting position	vertical	vertical	vertical	vertical	vertical
maximum permissible angle of inclination without external ventilation	+/- 35 °	+/- 35 °	+/- 35 °	+/- 35 °	+/- 35 °
max. relative humidity (in %)	90 %	90 %	90 %	90 %	90 %
Temperature					
• Operation (vertical installation)	0 °C to +50 °C	0 °C to +50 °C	0 °C to +50 °C	0 °C to +50 °C	0 °C to +50 °C
• Operation (max. tilt angle)	0 °C to +40 °C	0 °C to +40 °C	0 °C to +40 °C	0 °C to +40 °C	0 °C to +40 °C
• Transport, storage	-20 °C to +60 °C	-20 °C to +60 °C	-20 °C to +60 °C	-20 °C to +60 °C	-20 °C to +60 °C
Degree of protection					
Front	IP65, NEMA 4, NEMA 4x, NEMA 12 (when installed)	IP65, NEMA 4, NEMA 4x, NEMA 12 (when installed)	IP65, NEMA 4, NEMA 4x, NEMA 12 (when installed)	IP65, NEMA 4, NEMA 4x, NEMA 12 (when installed)	IP65, NEMA 4, NEMA 4x, NEMA 12 (when installed)
Rear	IP20	IP20	IP20	IP20	IP20
Certifications & standards					
Certifications	CE, UL, cULus, NEMA 4, NEMA 4x, NEMA 12	CE, UL, cULus, NEMA 4, NEMA 4x, NEMA 12	CE, UL, cULus, NEMA 4, NEMA 4x, NEMA 12	CE, UL, cULus, NEMA 4, NEMA 4x, NEMA 12	CE, UL, cULus, NEMA 4, NEMA 4x, NEMA 12
I/O					
I/O devices	None	None	None	None	None
Type of output					
LED colors	None	None	None	None	None
Acoustics	Sound signal	Sound signal	Sound signal	Sound signal	Sound signal
Interfaces					
Interfaces	1 x Ethernet (RJ45)	1 x Ethernet (RJ45)	1 x Ethernet (RJ45)	1 x Ethernet (RJ45)	1 x Ethernet (RJ45)
PC card slot	No	No	No	No	No
CF card slot	No	No	No	No	No
Multi Media Card slot	No	No	No	No	No
USB	No	No	No	No	No
Ethernet	1 x Ethernet (RJ45)	1 x Ethernet (RJ45)	1 x Ethernet (RJ45)	1 x Ethernet (RJ45)	1 x Ethernet (RJ45)

SIMATIC S7-1200

Operator control and monitoring

Basic Panels

Technical specifications (continued)

	6AV6 647-0AA11-3AX0	6AV6 647-0AB11-3AX0	6AV6 647-0AD11-3AX0	6AV6 647-0AF11-3AX0	6AV6 647-0AG11-3AX0
Product type designation	KTP400 Basic mono PN	KTP600 Basic mono PN	KTP600 Basic color PN	KTP1000 Basic color PN	TP1500 Basic color PN
Processor					
Processor	RISC 32 bit, 75 MHz	RISC 32 bit, 75 MHz	RISC 32 bit, 75 MHz	RISC 32-bit, 200 MHz	RISC 32-bit, 200 MHz
Functionality under WinCC flexible					
Applications/options	None	None	None	None	None
Number of Visual Basic Scripts	Not possible	Not possible	Not possible	Not possible	Not possible
Task planner	Yes	Yes	Yes	Yes	Yes
Help system	Yes	Yes	Yes	Yes	Yes
Status/control	Not possible	Not possible	Not possible	Not possible	Not possible
Message system					
• Number of messages	200	200	200	200	200
• Bit messages	Yes	Yes	Yes	Yes	Yes
• Analog messages	Yes	Yes	Yes	Yes	Yes
• Message buffer	Ring buffer (n x 256 entries), non-retentive ¹⁾	Ring buffer (n x 256 entries), non-retentive ¹⁾	Ring buffer (n x 256 entries), non-retentive ¹⁾	Ring buffer (n x 256 entries), non-retentive ¹⁾	Ring buffer (n x 256 entries), non-retentive ¹⁾
Recipes					
• Recipes	5	5	5	5	5
• Data records per recipe	20	20	20	20	20
• Entries per data record	20	20	20	20	20
• Recipe memory	40 KB integrated Flash	40 KB integrated Flash	40 KB integrated Flash	40 KB integrated Flash	40 KB integrated Flash
Number of process images					
• Process images	50	50	50	50	50
• Variables	250 ¹⁾²⁾	500 ¹⁾²⁾	500 ¹⁾²⁾	500 ¹⁾²⁾	500 ¹⁾²⁾
• Limit values	Yes	Yes	Yes	Yes	Yes
• Multiplexing	Yes	Yes	Yes	Yes	Yes
Image elements					
• Text objects	500 text elements	500 text elements	500 text elements	500 text elements	500 text elements
• Graphics object	Bit maps, icons, icon (full-screen), vector graphics	Bit maps, icons, icon (full-screen), vector graphics	Bit maps, icons, icon (full-screen), vector graphics	Bit maps, icons, icon (full-screen), vector graphics	Bit maps, icons, icon (full-screen), vector graphics
• dynamic objects	Diagrams	Diagrams	Diagrams	Diagrams	Diagrams
Lists					
• Text lists	150	150	150	150	150
• Graphics list	100	100	100	100	100
• Libraries	Yes	Yes	Yes	Yes	Yes
Security					
• Number of user groups	50	50	50	50	50
• Passwords exportable	No	No	No	No	No
• Number of user rights	32	32	32	32	32
Data carrier support					
• PC card	No	No	No	No	No
• CF card	No	No	No	No	No
• Multi Media Card	No	No	No	No	No
Recording					
• Recording/Printing	PROFINET	PROFINET	PROFINET	PROFINET	PROFINET

¹⁾ WinCC flexible 2008 SP2 and higher

²⁾ WinCC Basic V10.5 SP2 and higher (component of STEP 7 Basic V10.5 SP2)

Technical specifications (continued)

	6AV6 647-0AA11-3AX0	6AV6 647-0AB11-3AX0	6AV6 647-0AD11-3AX0	6AV6 647-0AF11-3AX0	6AV6 647-0AG11-3AX0
Product type designation	KTP400 Basic mono PN	KTP600 Basic mono PN	KTP600 Basic color PN	KTP1000 Basic color PN	TP1500 Basic color PN
Fonts					
• Keyboard fonts	US American (English)	US American (English)	US American (English)	US American (English)	US American (English)
Languages					
• Online languages	5	5	5	5	5
• Configuration languages	D, GB, F, I, E, CHN "traditional", CHN "simplified", DK, FIN, GR, J, KP / ROK, NL, N, PL, P, RUS, S, CZ / SK, TR, H	D, GB, F, I, E, CHN "traditional", CHN "simplified", DK, FIN, GR, J, KP / ROK, NL, N, PL, P, RUS, S, CZ / SK, TR, H	D, GB, F, I, E, CHN "traditional", CHN "simplified", DK, FIN, GR, J, KP / ROK, NL, N, PL, P, RUS, S, CZ / SK, TR, H	D, GB, F, I, E, CHN "traditional", CHN "simplified", DK, FIN, GR, J, KP / ROK, NL, N, PL, P, RUS, S, CZ / SK, TR, H	D, GB, F, I, E, CHN "traditional", CHN "simplified", DK, FIN, GR, J, KP / ROK, NL, N, PL, P, RUS, S, CZ / SK, TR, H
• Character sets	Tahoma, WinCC flexible Standard, symbol languages	Tahoma, WinCC flexible Standard, symbol languages	Tahoma, WinCC flexible Standard, symbol languages	Tahoma, WinCC flexible Standard, symbol languages	Tahoma, WinCC flexible Standard, symbol languages
Transfer (upload/download)					
• Transfer of configuration	Ethernet, automatic transfer recognition	Ethernet, automatic transfer recognition	Ethernet, automatic transfer recognition	Ethernet, automatic transfer recognition	Ethernet, automatic transfer recognition
Process coupling					
• Connection to controller	S7-200, S7-1200 ²⁾ , S7-300/400, Modicon (Modbus TCP/IP) ¹⁾ , see catalog ST 80, chapter "System interfaces"	S7-200, S7-1200 ²⁾ , S7-300/400, Modicon (Modbus TCP/IP) ¹⁾ , see catalog ST 80, chapter "System interfaces"	S7-200, S7-1200 ²⁾ , S7-300/400, Modicon (Modbus TCP/IP) ¹⁾ , see catalog ST 80, chapter "System interfaces"	S7-200, S7-1200 ²⁾ , S7-300/400, Modicon (Modbus TCP/IP) ¹⁾ , see catalog ST 80, chapter "System interfaces"	S7-200, S7-1200 ²⁾ , S7-300/400, Modicon (Modbus TCP/IP) ¹⁾ , see catalog ST 80, chapter "System interfaces"
Expandability/openness					
• Open Platform Program	No	No	No	No	No
Dimensions					
Front of enclosure (W x H)	140 mm x 116 mm	214 mm x 158 mm	214 mm x 158 mm	335 mm x 275 mm	400 mm x 310 mm
Mounting cutout/ Device depth (W x H/D) in mm	123 mm x 99 mm/ 40 mm device depth	197 mm x 141 mm/ 44 mm device depth	197 mm x 141 mm/ 44 mm device depth	310 mm x 248 mm/ 60 mm device depth	367 mm x 289 mm/ 60 mm device depth
Weight					
Weight					
• Weight	0.32 kg	1.07 kg	1.07 kg	2.65 kg	4.2 kg

1) WinCC flexible 2008 SP2 and higher

2) WinCC Basic V10.5 SP2 and higher (component of STEP 7 Basic V10.5 SP2)

SIMATIC S7-1200

Operator control and monitoring

Basic Panels

4

Ordering data	Order No.
SIMATIC KTP400 Basic mono PN B	6AV6 647-0AA11-3AX0
Starter kit for SIMATIC KTP400 Basic mono PN D	6AV6 652-7AA01-3AA0
SIMATIC KTP600 Basic mono PN B	6AV6 647-0AB11-3AX0
Starter kit for SIMATIC KTP600 Basic mono PN D	6AV6 652-7BA01-3AA0
SIMATIC KTP600 Basic color PN B	6AV6 647-0AD11-3AX0
Starter kit for SIMATIC KTP600 Basic color PN D	6AV6 652-7DA01-3AA0
SIMATIC KTP1000 Basic color PN B	6AV6 647-0AF11-3AX0
Starter kit for SIMATIC KTP1000 Basic color PN D	6AV6 652-7FA01-3AA0
SIMATIC TP1500 Basic color PN B	6AV6 647-0AG11-3AX0
Starter kits consist of:	
<ul style="list-style-type: none"> the relevant SIMATIC KTP Basic Panel SIMATIC WinCC flexible Compact engineering software SIMATIC HMI Manual Collection (DVD), 5 languages (English, French, German, Italian, Spanish), comprising: all currently available user manuals, manuals and communication manuals for SIMATIC HMI Ethernet cable on PN devices 	
Starter kit SIMATIC S7-1200 + KTP400 Basic D	6AV6 651-7AA01-3AA0
consisting of: <ul style="list-style-type: none"> SIMATIC HMI KTP400 Basic mono PN SIMATIC S7-1200 CPU 1212C AC/DC/Rly SIMATIC S7-1200 Simulator Module SIM 1274 SIMATIC STEP 7 BASIC CD SIMATIC S7-1200 HMI Manual Collection CD Ethernet CAT5 cable, 2 m 	
Starter kit SIMATIC S7-1200 + KTP600 Basic D	6AV6 651-7DA01-3AA0
consisting of: <ul style="list-style-type: none"> SIMATIC HMI KTP600 Basic color PN SIMATIC S7-1200 CPU 1212C AC/DC/Rly SIMATIC S7-1200 Simulator Module SIM 1274 SIMATIC STEP 7 BASIC CD SIMATIC S7-1200 HMI Manual Collection CD Ethernet CAT5 cable, 2 m 	

A: Subject to export regulations: AL: N and ECCN: EAR99S
 B: Subject to export regulations: AL: N and ECCN: EAR99T

Configuration	Order No.
<ul style="list-style-type: none"> All device versions: with SIMATIC WinCC flexible Compact PROFINET-based device versions: with WinCC Basic V10.5 (component of STEP 7 Basic V10.5) 	<p>see catalog ST 80</p> <p>see STEP 7 Basic, page 7/2</p>
Documentation (to be ordered separately)	
<p>You can find the manual for the Basic Panels on the Internet at http://support.automation.siemens.com</p>	
WinCC flexible Compact/Standard/Advanced User Manual	
<ul style="list-style-type: none"> German English French Italian Spanish 	<p>6AV6 691-1AB01-3AA0</p> <p>6AV6 691-1AB01-3AB0</p> <p>6AV6 691-1AB01-3AC0</p> <p>6AV6 691-1AB01-3AD0</p> <p>6AV6 691-1AB01-3AE0</p>
User Manual WinCC flexible Communication	
<ul style="list-style-type: none"> German English French Italian Spanish 	<p>6AV6 691-1CA01-3AA0</p> <p>6AV6 691-1CA01-3AB0</p> <p>6AV6 691-1CA01-3AC0</p> <p>6AV6 691-1CA01-3AD0</p> <p>6AV6 691-1CA01-3AE0</p>
SIMATIC HMI Manual Collection A	6AV6 691-1SA01-0AX0
Electronic documentation, on DVD	
<p>5 languages (English, French, German, Italian and Spanish); contains: all currently available user manuals, manuals and communication manuals for SIMATIC HMI</p>	
Accessories	
Accessories for supplementary ordering	See catalog ST 80, HMI software

D: Subject to export regulations: AL: N and ECCN: 5D992

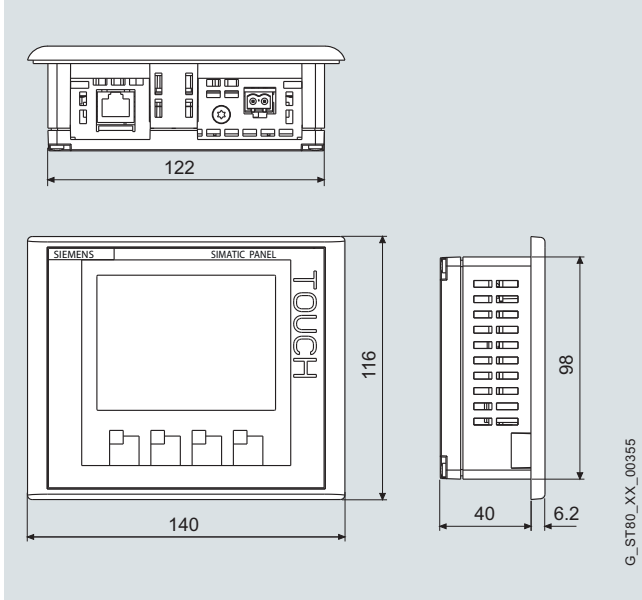
SIMATIC S7-1200

Operator control and monitoring

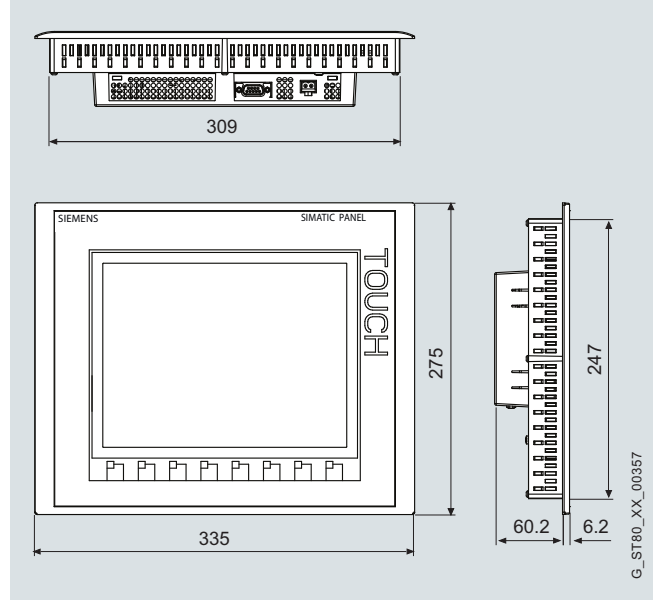
Basic Panels

Dimensional drawings

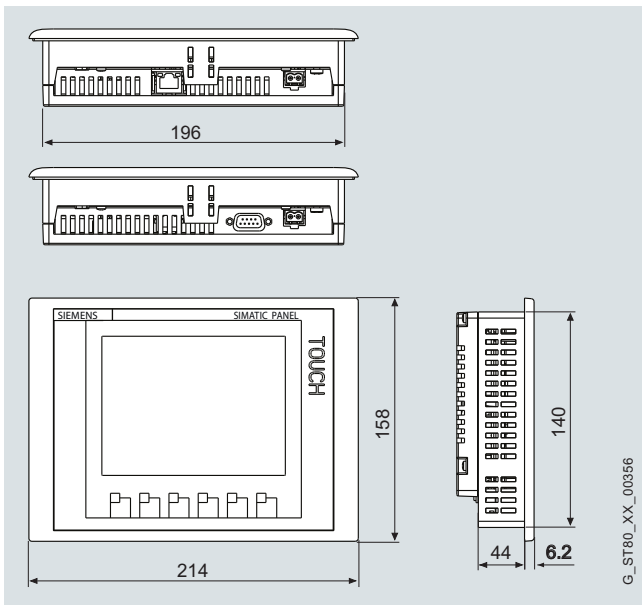
All dimensions in mm.



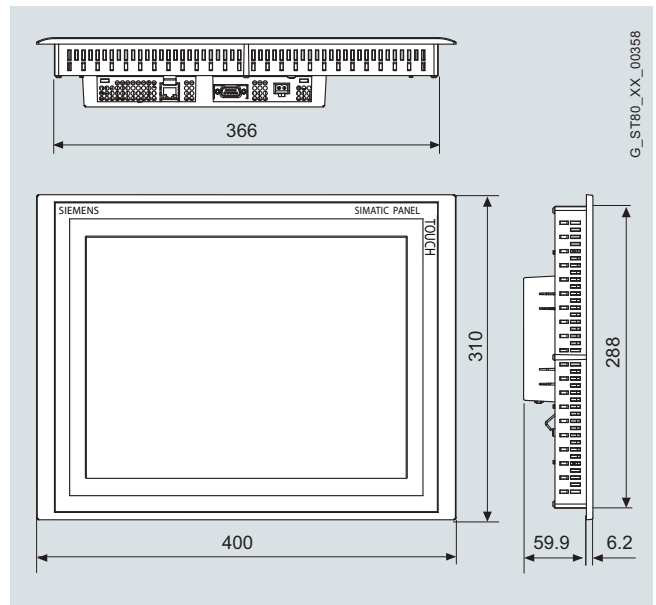
KTP400 Basic



KTP1000 Basic



KTP600 Basic



TP1500 Basic

More information

Additional information is available in the internet under:

<http://www.siemens.com/panels>

Note:

Do you require a specific modification to or supplement for the products described here? Look in the catalog ST 80 under "Customized products". We provide information there about additional and generally available sector products, and about the customer-specific modification and adaptation options.

SIMATIC S7-1200

Software

Software

Overview

- Software for the SIMATIC S7-1200
- Functions for all phases of the automation project:
 - configuring and parameterizing the hardware
 - specifying the communication
 - programming in LAD (Ladder Diagram) and FBD (Function Block Diagram)
 - configuration of the visualization
 - test, commissioning, and service

Additional informationen see page 7/2.

The following is available:

- STEP 7 Basic

SIMATIC Software

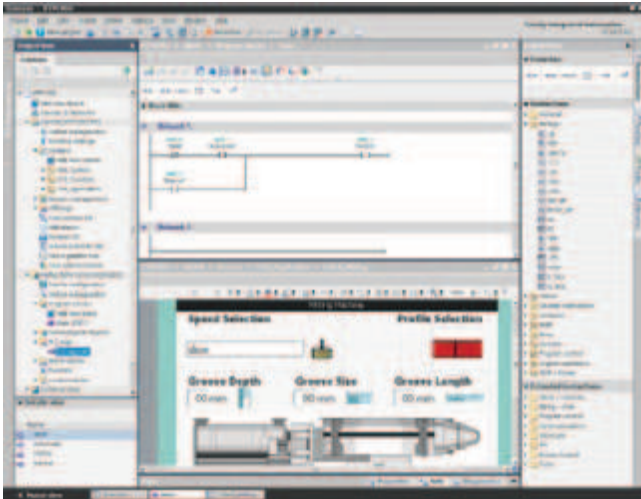
Standard tools

STEP 7 Basic

Overview



STEP 7 Basic, portal view



STEP 7 Basic, project view

The STEP 7 Basic software is the engineering system for programming the SIMATIC S7-1200. The WinCC Basic engineering system included in the package additionally allows configuration of SIMATIC HMI Basic Panels on the S7-1200.

STEP 7 Basic thus provides support in all phases of the automation project:

- Configuring and parameterizing the hardware
- Specifying the communication
- Programming in LAD (Ladder Diagram) and FBD (Function Block Diagram)
- Configuration of the visualization
- Test, commissioning, and service

Benefits

Optimized interaction of controller and HMI engineering

Efficient solving of complete automation task through:

- Integrated handling of controller programming and HMI configuration in one engineering framework
- Common data management
- Integral WinCC Basic configuration environment; the application can be supplemented seamlessly by SIMATIC HMI Basic Panels.

Fast startup using the portal view

The portal view facilitates navigation:

- It is also possible for beginners to access each task rapidly and specifically.
- In the event of maintenance, fast access to the online views directly in the portal overview; previous downloading of a project is unnecessary.

Intuitive user interface

Use of STEP 7 Basic is extremely intuitive:

- Editors matched to the tasks and sequence
- Use of the latest Windows technologies

Application

STEP 7 Basic is the engineering system for automation systems with SIMATIC S7-1200. In addition to programming of the controller, it permits configuration of the connected SIMATIC HMI Basic Panels in association with the integral WinCC Basic. It is thus possible to use the full performance of these systems simply and conveniently with just one tool.

STEP 7 Basic can be used for:

- Programming of the SIMATIC S7-1200 controller family: CPU 1211C, CPU 1212C, CPU 1214C
- Configuration of the PROFINET-based SIMATIC HMI Basic Panels: KTP400 Basic, KTP600 Basic mono and KTP600 Basic color, KTP1000 Basic, TP1500 Basic; KTP400 Basic and KTP600 Basic can also be configured for upright mounting.

Function

Device & network configuration

- Clear configuration of network and device functionalities in specialized views of the editor
- Device view
 - photorealistic representation and configuration of the hardware modules
 - clipboard for modules;
 - for simple intermediate storage of respective module parameters
 - catalog;
 - includes all panels, CPUs, and modules with firmware versions
- Network view
 - clear total view of all devices and network components used
 - intelligent drag&drop function for generation of connections

Controller programming

- Powerful editors for programming the S7-1200 in LAD and FBP
 - comprehensive catalog of instructions
 - configurable favorites area for frequently used instructions
 - table-based editor for configuration of block interfaces
 - intellisense for support during selection of tags
 - simple reuse of instructions or networks within a project
- Motion and technology functionalities
 - system support for integrated technology functions such as "Speed-controlled axis" and "Positioning axis"
 - PID controller with self-optimization (autotuning)

Visualization

- Powerful editors for configuration of Basic Panel functionalities
 - operating screens with touch/key operation and trend/vector graphics
 - bit and analog alarms
 - recipe management
- Multi-language (up to 5 languages online)
- Graphics library with off-the-shelf picture objects
- Intelligent drag&drop for efficient configuration of standard functionalities

Integration

- Integrated symbolic programming
- Direct use of control variables in the HMI to avoid multiple inputs
- Common cross-reference list for configuration objects (tags, blocks, etc.) for system-based project analysis or troubleshooting
- Automatic generation of connections when using the control variables in the HMI
- Global and local libraries for simple repeated use of preconfigured elements
- Intelligent drag&drop for importing and interconnecting data from different editors

Online diagnostics

- Clear representation of module diagnostics information
- Monitoring tables with "Force" and "Control" facilities
- Automatic display of all nodes accessible in the network
- Detailed comparison between online and offline projects

Technical specifications

	STEP 7 Basic
Licensing form	Single license
Software class	A
Current version	V10.5
Target system	SIMATIC S7-1200
Operating system	Windows XP Professional SP3 (32 bit) Windows Vista Ultimate SP1 (32 bit) Windows Vista Business SP1 (32 bit) Windows Vista Home Premium SP1 (32 bit)
Main memory size in programming device/PC, min.	1 GB
Disk memory requirement in programming device/PC	2 GB
Remark	Includes the IEC programming languages LAD and FBP

Ordering data

Order No.

STEP 7 Basic V10.5

Target system:
SIMATIC S7-1200, SIMATIC HMI Basic Panels

Requirement:
Windows XP SP3, Vista Ultimate SP1, Vista Business SP1, Home Premium SP1

Type of delivery:
German, English

STEP 7 Basic V10.5 on DVD	D	6ES7 822-0AA00-0YA0
Software Update Service (requires current software version)	D	6ES7 822-0AA00-0YL0
Trial License STEP 7 Basic V10.5; on DVD, 14-day trial	D	6ES7 822-0AA00-0YA7

D: Subject to export regulations: AL: N and ECCN: 5D992