SIMATIC S7-1200
Central processing units

CPU 1214C

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

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■ 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

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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

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■ **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

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■ **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%

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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_2S 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	2*g* panel mount, 1*g* DIN rail mount	2*g* panel mount, 1*g* DIN rail mount	2*g* panel mount, 1*g* 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

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