



Fail-safe CPUs

Overview

The fail-safe SIMATIC S7-1200 Controllers are based on the S7-1200 standard CPUs and offer additional safety-related functions.

They can be used for safety-related tasks according to IEC 61508 up to SIL 3 and ISO 13849-1 up to PL e.

Safety-related programs are created in the TIA Portal. The STEP 7 Safety engineering tool offers commands, operations and blocks for safety-related programs in the LAD and FBD languages. To this end, there is a library with pre-configured blocks for safety-related functions certified by the German Technical Inspectorate (TÜV).

- Standard controller with integrated safety functions:
 - Standardized and convenient diagnostic functions for standard and safety
 - Uniform symbols, data consistency, ...
- Modular system with scalable range of CPUs and expandable I/O quantity structure:
 - One engineering for standard and fail-safe automation
 - Use of the standard I/O modules together with the fail-safe I/O modules in the central system
 - Integrated standard PROFINET functionalities for PROFINET controllers and PROFINET IDevice services
 - Connection of distributed standard I/O via fieldbus such as PROFINET or PROFIBUS
 - F-library certified by the German Technical Inspectorate (TÜV) for all common safety functions
 - Free programming of the safety logic using FBD and LAD
 - Standard-compliant printout of the F program
- One integrated engineering for both standard and safety from S7-1200 to S7-300/400/1500 and WinAC RTX F:
 - STEP 7 Safety Basic for easy engineering of the CPU 1200 FC
 - STEP 7 Safety Advanced for the entire fail-safe SIMATIC S7 portfolio
- Integrated system diagnostics of the CPUs, for standard and safety:
 - Consistent plain text display of system diagnostics information in the TIA Portal, HMI and web server
 - Messages are updated even if the CPU is in STOP state
 - System diagnostics integrated in the CPU firmware. Configuration by user not required
 - The diagnostics is automatically updated on configuration changes.
- 2 fail-safe compact controllers with graded performances in the versions DC/DC/DC and DC/DC/relay

Characteristics	CPU 1212 FC	CPU 1214 FC	CPU 1215 FC
Variants	DC/DC/DC, DC/DC/relay	DC/DC/DC, DC/DC/relay	DC/DC/DC, DC/DC/relay
Work memory, integrated	100 KB	125 KB	150 KB
Load memory, integrated	2 MB	4 MB	4 MB
Memory card	SIMATIC Memory Card (optional)	SIMATIC Memory Card (optional)	SIMATIC Memory Card (optional)
Standard digital inputs/outputs, integrated	8/6	14/10	14/10
Standard analog inputs, integrated	2	2	2
Standard analog outputs, integrated	-	-	2
Process image	1024 bytes for inputs, 1024 bytes for outputs	1024 bytes for inputs, 1024 bytes for outputs	1024 bytes for inputs, 1024 bytes for outputs
Expansion by signal board	Max. 1	Max. 1	Max. 1
Expansion by signal modules	Max. 2	Max. 8	Max. 8
Expansion by communications modules	Max. 3	Max. 3	Max. 3

Application

SIMATIC S7-1200 is the ideal controller for local and distributed automation solutions with safety requirements in the central configuration.

Via the engineering, the fail-safe SIMATIC S7-1200 Controller makes preassembled, tested and TÜV/German Technical Inspectorate-certified blocks available for implementing all common safety functions, such as EMERGENCY STOP or protective door monitoring, with or without interlocking.

- CPU 1212FC:
 - The ideal compact solution for standard and fail-safe applications
- CPU 1214 FC:
 - The compact CPU for standard and fail-safe applications
- CPU 1215 FC:
 - The compact CPU with two PROFINET ports for standard and fail-safe applications

Design

Mechanical features

- Horizontal or vertical mounting on DIN rail or direct mounting in the cabinet using integral drill holes (not horizontal).
- Terminal block for independent wiring for all CPUs and associated components.

Technical specifications						
Article number	6ES7212-1AF40-0XB0	6ES7212-1HF40-0XB0	6ES7214-1AF40-0XB0	6ES7214-1HF40-0XB0	6ES7215-1AF40-0XB0	6ES7215-1HF40-0XB0
	CPU 1212FC DC/DC/DC, 8DI/6DO/2AI	CPU 1212FC, DC/DC/Relay, 8DI/6DO/2AI	CPU 1214 FC, DC/DC/DC, 14DI/10DO/2AI	CPU 1214 FC, DC/DC/Relay, 14DI/10DO/2AI	CPU 1215 FC, DC/DC/DC, 14DI/10DO/2AI/2AO	CPU 1215 FC, DC/DC/RLY,14DI/10DO/2AI/2AO
General information						
Product type designation	CPU 1212FC DC/DC/DC	CPU 1212FC DC/DC/relay	CPU 1214FC DC/DC/DC	CPU 1214FC DC/DC/Relay	CPU 1215FC DC/DC/DC	CPU 1215FC DC/DC/relay
Firmware version	V4.5	V4.5	V4.5	V4.5	V4.5	V4.5
Engineering with						
• Programming package	STEP 7 V17 or higher	STEP 7 V17 or higher	STEP 7 V17 or higher	STEP 7 V17 or higher	STEP 7 V17 or higher	STEP 7 V17 or higher
Supply voltage						
Rated value (DC)						
• 24 V DC	Yes	Yes	Yes	Yes	Yes	Yes
permissible range, lower limit (DC)	20.4 V	20.4 V	20.4 V	20.4 V	20.4 V	20.4 V
permissible range, upper limit (DC)	28.8 V	28.8 V	28.8 V	28.8 V	28.8 V	28.8 V
Reverse polarity protection	Yes		Yes		Yes	Yes
Load voltage L+						
• Rated value (DC)	24 V	24 V	24 V	24 V	24 V	24 V
• permissible range, lower limit (DC)	20.4 V	20.4 V	20.4 V	20.4 V	20.4 V	20.4 V
• permissible range, upper limit (DC)	28.8 V	28.8 V	28.8 V	28.8 V	28.8 V	28.8 V
Input current						
Current consumption (rated value)	400 mA; CPU only	400 mA; CPU only	500 mA; CPU only	500 mA; CPU only	500 mA; CPU only	500 mA; CPU only
Current consumption, max.	1 200 mA; CPU with all expansion modules	1 200 mA; CPU with all expansion modules	1 500 mA; CPU with all expansion modules	1 500 mA; CPU with all expansion modules	1 500 mA; CPU with all expansion modules	1 500 mA; CPU with all expansion modules
Inrush current, max.	12 A; at 28.8 V DC	12 A; at 28.8 V DC	12 A; at 28.8 V DC	12 A; at 28.8 V DC	12 A; at 28.8 V DC	12 A; at 28.8 V DC
I ² t	0.5 A ² ·s	0.8 A ² ·s	0.5 A ² ·s	0.8 A ² ·s	0.5 A ² ·s	0.5 A ² ·s
Output current						
for backplane bus (5 V DC), max.	1 000 mA; Max. 5 V DC for SM and CM	1 000 mA; Max. 5 V DC for SM and CM	1 600 mA; Max. 5 V DC for SM and CM	1 600 mA; Max. 5 V DC for SM and CM	1 600 mA; Max. 5 V DC for SM and CM	1 600 mA; Max. 5 V DC for SM and CM
Encoder supply						
24 V encoder supply						
• 24 V	L+ minus 4 V DC min.	L+ minus 4 V DC min.	L+ minus 4 V DC min.	L+ minus 4 V DC min.	L+ minus 4 V DC min.	L+ minus 4 V DC min.
Power loss						
Power loss, typ.	9 W	9 W	12 W	12 W	12 W	12 W
Memory						
Work memory						
• integrated	100 kbyte	100 kbyte	125 kbyte	125 kbyte	150 kbyte	150 kbyte
• expandable	No	No	No	No	No	No
Load memory						
• integrated	2 Mbyte	2 Mbyte	4 Mbyte	4 Mbyte	4 Mbyte	4 Mbyte
• Plug-in (SIMATIC Memory Card), max.	with SIMATIC memory card	with SIMATIC memory card	with SIMATIC memory card	with SIMATIC memory card	with SIMATIC memory card	with SIMATIC memory card
Backup						
• present	Yes	Yes	Yes	Yes	Yes	Yes
• maintenance-free	Yes	Yes	Yes	Yes	Yes	Yes
• without battery	Yes	Yes	Yes	Yes	Yes	Yes
CPU processing times						
for bit operations, typ.	0.08 µs; / instruction	0.08 µs; / instruction	0.08 µs; / instruction	0.08 µs; / instruction	0.08 µs; / instruction	0.08 µs; / instruction
for word operations, typ.	1.7 µs; / instruction	1.7 µs; / instruction	1.7 µs; / instruction	1.7 µs; / instruction	1.7 µs; / instruction	1.7 µs; / instruction
for floating point arithmetic, typ.	2.3 µs; / instruction	2.3 µs; / instruction	2.3 µs; / instruction	2.3 µs; / instruction	2.3 µs; / instruction	2.3 µs; / instruction
CPU-blocks						
Number of blocks (total)	DBs, FCs, FBs, counters and timers. The maximum number of addressable blocks ranges from 1 to 65535. There is no restriction, the entire working memory can be used	DBs, FCs, FBs, counters and timers. The maximum number of addressable blocks ranges from 1 to 65535. There is no restriction, the entire working memory can be used	DBs, FCs, FBs, counters and timers. The maximum number of addressable blocks ranges from 1 to 65535. There is no restriction, the entire working memory can be used	DBs, FCs, FBs, counters and timers. The maximum number of addressable blocks ranges from 1 to 65535. There is no restriction, the entire working memory can be used	DBs, FCs, FBs, counters and timers. The maximum number of addressable blocks ranges from 1 to 65535. There is no restriction, the entire working memory can be used	DBs, FCs, FBs, counters and timers. The maximum number of addressable blocks ranges from 1 to 65535. There is no restriction, the entire working memory can be used
OB						
• Number, max.	Limited only by RAM for code	Limited only by RAM for code	Limited only by RAM for code	Limited only by RAM for code	Limited only by RAM for code	Limited only by RAM for code
Data areas and their retentivity						
Retentive data area (incl. timers, counters, flags), max.	14 kbyte	14 kbyte	14 kbyte	14 kbyte	14 kbyte	14 kbyte
Flag						
• Size, max.	4 kbyte; Size of bit memory address area	4 kbyte; Size of bit memory address area	8 kbyte; Size of bit memory address area	8 kbyte; Size of bit memory address area	8 kbyte; Size of bit memory address area	8 kbyte; Size of bit memory address area
Local data						
• per priority class, max.	16 kbyte; Priority class 1 (program cycle)	16 kbyte; Priority class 1 (program cycle)	16 kbyte; Priority class 1 (program cycle)	16 kbyte; Priority class 1 (program cycle)	16 kbyte; Priority class 1 (program cycle)	16 kbyte; Priority class 1 (program cycle); 16 KB, priority

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	cycle): 16 KB, priority class 2 to 26: 6 KB	cycle): 16 KB, priority class 2 to 26: 6 KB	cycle): 16 KB, priority class 2 to 26: 6 KB	cycle): 16 KB, priority class 2 to 26: 6 KB	cycle): 16 KB, priority class 2 to 26: 6 KB	class 2 to 26: 6 KB
Address area						
Process image						
• Inputs, adjustable	1 kbyte	1 kbyte	1 kbyte	1 kbyte	1 kbyte	1 kbyte
• Outputs, adjustable	1 kbyte	1 kbyte	1 kbyte	1 kbyte	1 kbyte	1 kbyte
Hardware configuration						
Number of modules per system, max.	3 comm. modules, 1 signal board, 2 signal modules	3 comm. modules, 1 signal board, 2 signal modules	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	3 comm. modules, 1 signal board, 8 signal modules
Time of day						
Clock						
• Hardware clock (real-time)	Yes	Yes	Yes	Yes	Yes	Yes
• Backup time	480 h; Typical	480 h; Typical	480 h; Typical	480 h; Typical	480 h; Typical	480 h; Typical
• Deviation per day, max.	60 s/month at 25 °C	±60 s/month at 25 °C	±60 s/month at 25 °C	±60 s/month at 25 °C	±60 s/month at 25 °C	±60 s/month at 25 °C
Digital inputs						
Number of digital inputs	8; Integrated	8; Integrated	14; Integrated	14; Integrated	14; Integrated	14; Integrated
• of which inputs usable for technological functions	4; HSC (High Speed Counting)	4; HSC (High Speed Counting)	6; HSC (High Speed Counting)	6; HSC (High Speed Counting)	6; HSC (High Speed Counting)	6; HSC (High Speed Counting)
Source/sink input	Yes	Yes	Yes	Yes	Yes	Yes
Number of simultaneously controllable inputs						
all mounting positions						
— up to 40 °C, max.	8	8	14	14	14	14
Input voltage						
• Rated value (DC)	24 V	24 V	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	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	15 V DC at 2.5 mA	15 V DC at 2.5 mA
Input delay (for rated value of input voltage)						
for standard inputs						
— parameterizable	0.2 ms, 0.4 ms, 0.8 ms, 1.6 ms, 3.2 ms, 6.4 ms and 12.8 ms, selectable in groups of four	0.2 ms, 0.4 ms, 0.8 ms, 1.6 ms, 3.2 ms, 6.4 ms and 12.8 ms, selectable in groups of four	0.2 ms, 0.4 ms, 0.8 ms, 1.6 ms, 3.2 ms, 6.4 ms and 12.8 ms, selectable in groups of four	0.2 ms, 0.4 ms, 0.8 ms, 1.6 ms, 3.2 ms, 6.4 ms and 12.8 ms, selectable in groups of four	0.2 ms, 0.4 ms, 0.8 ms, 1.6 ms, 3.2 ms, 6.4 ms and 12.8 ms, selectable in groups of four	Yes; 0.2 ms, 0.4 ms, 0.8 ms, 1.6 ms, 3.2 ms, 6.4 ms and 12.8 ms, selectable in groups of four
— at "0" to "1", min.	0.2 ms	0.2 ms	0.2 ms	0.2 ms	0.2 ms	0.2 ms
— at "0" to "1", max.	12.8 ms	12.8 ms	12.8 ms	12.8 ms	12.8 ms	12.8 ms
for interrupt inputs						
— parameterizable	Yes	Yes	Yes	Yes	Yes	Yes
for technological functions						
— parameterizable	Single phase: 3 @ 100 kHz & 3 @ 30 kHz, differential: 3 @ 80 kHz & 3 @ 30 kHz	Single phase: 3 @ 100 kHz & 3 @ 30 kHz, differential: 3 @ 80 kHz & 3 @ 30 kHz	Single phase: 3 @ 100 kHz & 3 @ 30 kHz, differential: 3 @ 80 kHz & 3 @ 30 kHz	Single phase: 3 @ 100 kHz & 3 @ 30 kHz, differential: 3 @ 80 kHz & 3 @ 30 kHz	Single phase: 3 @ 100 kHz & 3 @ 30 kHz, differential: 3 @ 80 kHz & 3 @ 30 kHz	Single phase: 3 @ 100 kHz & 3 @ 30 kHz, differential: 3 @ 80 kHz & 3 @ 30 kHz
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	500 m; 50 m for technological functions	500 m; 50 m for technological functions	500 m; 50 m for technological functions
• unshielded, max.	300 m; for technological functions: No	300 m; for technological functions: No	300 m; for technological functions: No	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	6; Relays	10	10; Relays	10	10; Relays
• of which high-speed outputs	4; 100 kHz Pulse Train Output		4; 100 kHz Pulse Train Output		4; 100 kHz Pulse Train Output	
Limitation of inductive shutdown voltage to	L+ (-48 V)		L+ (-48 V)		L+ (-48 V)	
Switching capacity of the outputs						
• with resistive load, max.	0.5 A	2 A	0.5 A	2 A	0.5 A	2 A
• on lamp load, max.	5 W	30 W with DC, 200 W with AC	5 W	30 W with DC, 200 W with AC	5 W	30 W with DC, 200 W with AC
Output voltage						
• for signal "0", max.	0.1 V; with 10 kOhm load		0.1 V; with 10 kOhm load		0.1 V; with 10 kOhm load	
• for signal "1", min.	20 V		20 V		20 V	
Output current						
• for signal "1" rated value	0.5 A		0.5 A		0.5 A	
• for signal "0" residual current, max.	0.1 mA		0.1 mA		0.1 mA	
Output delay with resistive load						
• "0" to "1", max.	1 µs	10 ms; max.	1 µs	10 ms; max.	1 µs	10 ms; max.
• "1" to "0", max.	5 µs	10 ms; max.	5 µs	10 ms; max.	5 µs	10 ms; max.
Switching frequency						
• of the pulse outputs, with resistive load, max.	100 kHz		100 kHz		100 kHz	

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Relay outputs						
• Number of relay outputs	0	6	0	10	0	10
• Number of operating cycles, max.		mechanically 10 million, at rated load voltage 100 000		mechanically 10 million, at rated load voltage 100 000		mechanically 10 million, at rated load voltage 100 000
Cable length						
• shielded, max.	500 m	500 m	500 m	500 m	500 m	500 m
• unshielded, max.	150 m	150 m	150 m	150 m	150 m	150 m
Analog inputs						
Number of analog inputs	2	2	2	2	2	2
Input ranges						
• Voltage	Yes	Yes	Yes	Yes	Yes	Yes
Input ranges (rated values), voltages						
• 0 to +10 V	Yes	Yes	Yes	Yes	Yes	Yes
— Input resistance (0 to 10 V)	≥100k ohms	≥100k ohms	≥100k ohms	≥100k ohms	≥100k ohms	≥100k ohms
Cable length						
• shielded, max.	100 m; twisted and shielded	100 m; twisted and shielded	100 m; twisted and shielded	100 m; twisted and shielded	100 m; twisted and shielded	100 m; twisted and shielded
Analog outputs						
Number of analog outputs	0	0	0	0	2	2
Output ranges, current						
• 0 to 20 mA					Yes	Yes
Analog value generation for the inputs						
Integration and conversion time/resolution per channel						
• Resolution with overrange (bit including sign), max.	10 bit	10 bit	10 bit	10 bit	10 bit	10 bit
• Integration time, parameterizable	Yes	Yes	Yes	Yes	Yes	Yes
• Conversion time (per channel)	625 µs	625 µs	625 µs	625 µs	625 µs	625 µs
Analog value generation for the outputs						
Integration and conversion time/resolution per channel						
• Resolution with overrange (bit including sign), max.					10 bit	10 bit
Encoder						
Connectable encoders						
• 2-wire sensor	Yes	Yes	Yes	Yes	Yes	Yes
1. Interface						
Interface type	PROFINET	PROFINET	PROFINET	PROFINET	PROFINET	PROFINET
Isolated	Yes	Yes	Yes	Yes	Yes	Yes
automatic detection of transmission rate	Yes	Yes	Yes	Yes	Yes	Yes
Autonegotiation	Yes	Yes	Yes	Yes	Yes	Yes
Autocrossing	Yes	Yes	Yes	Yes	Yes	Yes
Interface types						
• RJ 45 (Ethernet)	Yes		Yes	Yes	Yes	Yes
• Number of ports	1	1	1	1	2	2
• integrated switch	No	No	No	No	Yes	Yes
Protocols						
• PROFINET IO Controller	Yes	Yes	Yes	Yes	Yes	Yes
• PROFINET IO Device	Yes	Yes	Yes	Yes	Yes	Yes
• SIMATIC communication	Yes	Yes	Yes	Yes	Yes	Yes
• Open IE communication	Yes; Optionally also encrypted	Yes; Optionally also encrypted	Yes; Optionally also encrypted	Yes; Optionally also encrypted	Yes; Optionally also encrypted	Yes; Optionally also encrypted
• Web server	Yes	Yes	Yes	Yes	Yes	Yes
• Media redundancy	No	No	No	No	Yes; as MRP client	Yes
PROFINET IO Controller						
• Transmission rate, max.	100 Mbit/s	100 Mbit/s	100 Mbit/s	100 Mbit/s	100 Mbit/s	100 Mbit/s
Services						
— PG/OP communication	Yes; encryption with TLS V1.3 pre-selected	Yes; encryption with TLS V1.3 pre-selected	Yes; encryption with TLS V1.3 pre-selected	Yes; encryption with TLS V1.3 pre-selected	Yes; encryption with TLS V1.3 pre-selected	Yes; encryption with TLS V1.3 pre-selected
— Isochronous mode	No	No	No	No	No	No
— IRT	No	No	No	No	No	No
— PROFIenergy	No	No	No	No	No	No
— Prioritized startup	Yes	Yes	Yes	Yes	Yes	Yes
— Number of IO devices with prioritized startup,	16	16	16	16	16	16

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max.						
— Number of connectable IO Devices, max.	16	16	16	16	16	16
— Number of connectable IO Devices for RT, max.	16	16	16	16	16	16
— of which in line, max.	16	16	16	16	16	16
—	Yes	Yes	Yes	Yes	Yes	Yes
Activation/deactivation of IO Devices						
— Number of IO Devices that can be simultaneously activated/deactivated, max.	8	8	8	8	8	8
— Updating time	The minimum value of the update time also depends on the communication component set for PROFINET IO, on the number of IO devices and the quantity of configured user data.	The minimum value of the update time also depends on the communication component set for PROFINET IO, on the number of IO devices and the quantity of configured user data.	The minimum value of the update time also depends on the communication component set for PROFINET IO, on the number of IO devices and the quantity of configured user data.	The minimum value of the update time also depends on the communication component set for PROFINET IO, on the number of IO devices and the quantity of configured user data.	The minimum value of the update time also depends on the communication component set for PROFINET IO, on the number of IO devices and the quantity of configured user data.	The minimum value of the update time also depends on the communication component set for PROFINET IO, on the number of IO devices and the quantity of configured user data.
PROFINET IO Device Services						
— PG/OP communication	Yes; encryption with TLS V1.3 pre-selected	Yes; encryption with TLS V1.3 pre-selected	Yes; encryption with TLS V1.3 pre-selected	Yes; encryption with TLS V1.3 pre-selected	Yes; encryption with TLS V1.3 pre-selected	Yes; encryption with TLS V1.3 pre-selected
— Isochronous mode	No	No	No	No	No	No
— IRT	No	No	No	No	No	No
— PROFINergy	Yes	Yes	Yes	Yes	Yes	Yes
— Shared device	Yes	Yes	Yes	Yes	Yes	Yes
— Number of IO Controllers with shared device, max.	2	2	2	2	2	2
Protocols						
Supports protocol for PROFINET IO	Yes	Yes	Yes	Yes	Yes	Yes
PROFIsafe	Yes	Yes	Yes	Yes	Yes	Yes
PROFIBUS	Yes; CM 1243-5 (master) or CM 1242-5 (slave) required	Yes; CM 1243-5 (master) or CM 1242-5 (slave) required	Yes; CM 1243-5 (master) or CM 1242-5 (slave) required	Yes; CM 1243-5 (master) or CM 1242-5 (slave) required	Yes; CM 1243-5 (master) or CM 1242-5 (slave) required	Yes; CM 1243-5 (master) or CM 1242-5 (slave) required
OPC UA	Yes; OPC UA Server	Yes; OPC UA Server	Yes; OPC UA Server	Yes; OPC UA Server	Yes; OPC UA Server	Yes; OPC UA Server
AS-Interface	Yes; CM 1243-2 required	Yes; CM 1243-2 required	Yes; CM 1243-2 required	Yes; CM 1243-2 required	Yes; CM 1243-2 required	Yes; CM 1243-2 required
Protocols (Ethernet)						
• TCP/IP	Yes	Yes	Yes	Yes	Yes	Yes
• DHCP	No	No	No	No	No	No
• SNMP	Yes	Yes	Yes	Yes	Yes	Yes
• DCP	Yes	Yes	Yes	Yes	Yes	Yes
• LLDP	Yes	Yes	Yes	Yes	Yes	Yes
Redundancy mode						
Media redundancy						
— MRP	No	No			Yes; as MRP redundancy manager and/or MRP client	Yes; as MRP redundancy manager and/or MRP client
— MRPD	No	No			No	No
SIMATIC communication						
• S7 routing					Yes	Yes
Open IE communication						
• TCP/IP	Yes	Yes	Yes	Yes	Yes	Yes
— Data length, max.	8 kbyte	8 kbyte	8 kbyte	8 kbyte	8 kbyte	8 kbyte
• ISO-on-TCP (RFC1006)	Yes	Yes	Yes	Yes	Yes	Yes
— Data length, max.	8 kbyte	8 kbyte	8 kbyte	8 kbyte	8 kbyte	8 kbyte
• UDP	Yes	Yes	Yes	Yes	Yes	Yes
— Data length, max.	1 472 byte	1 472 byte	1 472 byte	1 472 byte	1 472 byte	1 472 byte
Web server						
• supported	Yes	Yes	Yes	Yes	Yes	Yes
• User-defined websites	Yes	Yes	Yes	Yes	Yes	Yes
OPC UA						
• Runtime license required	Yes; "Basic" license required	Yes; "Basic" license required	Yes; "Basic" license required	Yes; "Basic" license required	Yes; "Basic" license required	Yes; "Basic" license required

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• OPC UA Server	Yes; data access (read, write, subscribe), method call, runtime license required	Yes; data access (read, write, subscribe), method call, runtime license required	Yes; data access (read, write, subscribe), method call, runtime license required	Yes; data access (read, write, subscribe), method call, runtime license required	Yes; data access (read, write, subscribe), method call, runtime license required	Yes; data access (read, write, subscribe), method call, runtime license required	
— Application authentication	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256	
— User authentication	"anonymous" or by user name & password	"anonymous" or by user name & password	"anonymous" or by user name & password	"anonymous" or by user name & password	"anonymous" or by user name & password	"anonymous" or by user name & password	
— Number of sessions, max.	10	10	10	10	10	10	
— Number of subscriptions per session, max.	5	5	5	5	5	5	
— Sampling interval, min.	100 ms	100 ms	100 ms	100 ms	100 ms	100 ms	
— Publishing interval, min.	200 ms	200 ms	200 ms	200 ms	200 ms	200 ms	
— Number of server methods, max.	20	20	20	20	20	20	
— number of monitored items, recommended max.	1 000	1 000	1 000	1 000	1 000	1 000	
— Number of server interfaces, max.	2	2	2	2	2	2	
— Number of nodes for user-defined server interfaces, max.	2 000	2 000	2 000	2 000	2 000	2 000	
Further protocols							
• MODBUS	Yes	Yes	Yes	Yes	Yes	Yes	
communication functions / header							
S7 communication							
• supported	Yes	Yes	Yes	Yes	Yes	Yes	
• as server	Yes	Yes	Yes	Yes	Yes	Yes	
• as client	Yes	Yes	Yes	Yes	Yes	Yes	
• User data per job, max.	See online help (S7 communication, user data size)	See online help (S7 communication, user data size)	See online help (S7 communication, user data size)	See online help (S7 communication, user data size)	See online help (S7 communication, user data size)	See online help (S7 communication, user data size)	
Number of connections							
• overall	PG Connections: 4 reserved / 4 max; HMI Connections: 12 reserved / 18 max; S7 Connections: 8 reserved / 14 max; Open User Connections: 8 reserved / 14 max; Web Connections: 2 reserved / 30 max; OPC UA Connections: 0 reserved / 10 max; Total Connections: 34 reserved / 64 max	PG Connections: 4 reserved / 4 max; HMI Connections: 12 reserved / 18 max; S7 Connections: 8 reserved / 14 max; Open User Connections: 8 reserved / 14 max; Web Connections: 2 reserved / 30 max; OPC UA Connections: 0 reserved / 10 max; Total Connections: 34 reserved / 64 max	PG Connections: 4 reserved / 4 max; HMI Connections: 12 reserved / 18 max; S7 Connections: 8 reserved / 14 max; Open User Connections: 8 reserved / 14 max; Web Connections: 2 reserved / 30 max; OPC UA Connections: 0 reserved / 10 max; Total Connections: 34 reserved / 64 max	PG Connections: 4 reserved / 4 max; HMI Connections: 12 reserved / 18 max; S7 Connections: 8 reserved / 14 max; Open User Connections: 8 reserved / 14 max; Web Connections: 2 reserved / 30 max; OPC UA Connections: 0 reserved / 10 max; Total Connections: 34 reserved / 64 max	PG Connections: 4 reserved / 4 max; HMI Connections: 12 reserved / 18 max; S7 Connections: 8 reserved / 14 max; Open User Connections: 8 reserved / 14 max; Web Connections: 2 reserved / 30 max; OPC UA Connections: 0 reserved / 10 max; Total Connections: 34 reserved / 64 max	PG Connections: 4 reserved / 4 max; HMI Connections: 12 reserved / 18 max; S7 Connections: 8 reserved / 14 max; Open User Connections: 8 reserved / 14 max; Web Connections: 2 reserved / 30 max; OPC UA Connections: 0 reserved / 10 max; Total Connections: 34 reserved / 64 max	PG Connections: 4 reserved / 4 max; HMI Connections: 12 reserved / 18 max; S7 Connections: 8 reserved / 14 max; Open User Connections: 8 reserved / 14 max; Web Connections: 2 reserved / 30 max; OPC UA Connections: 0 reserved / 10 max; Total Connections: 34 reserved / 64 max
Test commissioning functions							
Status/control							
• Status/control variable	Yes	Yes	Yes	Yes	Yes	Yes	
• Variables	inputs/outputs, bit memories, DBs, peripheral I/Os (without fail-safe), times, counters	inputs/outputs, bit memories, DBs, peripheral I/Os (without fail-safe), times, counters	inputs/outputs, bit memories, DBs, peripheral I/Os (without fail-safe), times, counters	inputs/outputs, bit memories, DBs, peripheral I/Os (without fail-safe), times, counters	inputs/outputs, bit memories, DBs, peripheral I/Os (without fail-safe), times, counters	inputs/outputs, bit memories, DBs, peripheral I/Os (without fail-safe), times, counters	
Forcing							
• Forcing	Yes; peripheral inputs/outputs (without fail-safe)	Yes; peripheral inputs/outputs (without fail-safe)	Yes; peripheral inputs/outputs (without fail-safe)	Yes; peripheral inputs/outputs (without fail-safe)	Yes; peripheral inputs/outputs (without fail-safe)	Yes; peripheral inputs/outputs (without fail-safe)	
Diagnostic buffer							
• present	Yes	Yes	Yes	Yes	Yes	Yes	
Traces							
• Number of configurable Traces	2	2	2	2	2	2	
• Memory size per trace, max.	512 kbyte	512 kbyte	512 kbyte	512 kbyte	512 kbyte	512 kbyte	

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	CPU 1212FC, DC/DC/DC, 8DI/6DO/2AI	CPU 1212FC, DC/DC/Relay, 8DI/6DO/2AI	CPU 1214 FC, DC/DC/DC, 14DI/10DO/2AI	CPU 1214 FC, DC/DC/Relay, 14DI/10DO/2AI	CPU 1215 FC, DC/DC/DC, 14DI/10DO/2AI/2AO	CPU 1215 FC, DC/DC/RLY,14DI/10DO/2AI/2AO
Interrupts/diagnostics/status information						
Diagnostics indication LED						
• RUN/STOP LED	Yes	Yes	Yes	Yes	Yes	Yes
• ERROR LED	Yes	Yes	Yes	Yes	Yes	Yes
• MAINT LED	Yes	Yes	Yes	Yes	Yes	Yes
Integrated Functions						
Frequency measurement controlled positioning	Yes	Yes	Yes	Yes	Yes	Yes
Number of position-controlled positioning axes, max.	8	8	8	8	8	8
Number of positioning axes via pulse-direction interface	Up to 4 with SB 1222	Up to 4 with SB 1222	4; With integrated outputs	Up to 4 with SB 1222	4; With integrated outputs	Up to 4 with SB 1222
PID controller	Yes	Yes	Yes	Yes	Yes	Yes
Number of alarm inputs	4	4	4	4	4	4
Number of pulse outputs	4		4		4	
Limit frequency (pulse)	100 kHz		100 kHz		100 kHz	
Potential separation						
Potential separation digital inputs						
• Potential separation digital inputs	No	500V AC for 1 minute	No	500V AC for 1 minute	No	500V AC for 1 minute
• between the channels, in groups of	1	1	1	1	1	1
Potential separation digital outputs						
• Potential separation digital outputs	Yes	Relays	Yes	Relays	Yes	Relays
• between the channels	No	No	No	No	No	No
• between the channels, in groups of	1	2	1	2	1	2
EMC						
Interference immunity against discharge of static electricity						
• Interference immunity against discharge of static electricity acc. to IEC 61000-4-2	Yes	Yes	Yes	Yes	Yes	Yes
— Test voltage at air discharge	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV
— Test voltage at contact discharge	6 kV	6 kV	6 kV	6 kV	6 kV	6 kV
Interference immunity to cable-borne interference						
• Interference immunity on supply lines acc. to IEC 61000-4-4	Yes	Yes	Yes	Yes	Yes	Yes
• Interference immunity on signal cables acc. to IEC 61000-4-4	Yes	Yes	Yes	Yes	Yes	Yes
Interference immunity against voltage surge						
• Interference immunity on supply lines acc. to IEC 61000-4-5	Yes	Yes	Yes	Yes	Yes	Yes
Interference immunity against conducted variable disturbance induced by high-frequency fields						
• Interference immunity against high-frequency radiation acc. to IEC 61000-4-6	Yes	Yes	Yes	Yes	Yes	Yes
Emission of radio interference acc. to EN 55 011						
• Limit class A, for use in industrial areas	Yes; Group 1	Yes; Group 1	Yes; Group 1	Yes; Group 1	Yes; Group 1	Yes; Group 1
• Limit class B, for use in residential areas	Yes; When appropriate measures are used to ensure compliance with the limits for Class B according to EN 55011	Yes; When appropriate measures are used to ensure compliance with the limits for Class B according to EN 55011	Yes; When appropriate measures are used to ensure compliance with the limits for Class B according to EN 55011	Yes; When appropriate measures are used to ensure compliance with the limits for Class B according to EN 55011	Yes; When appropriate measures are used to ensure compliance with the limits for Class B according to EN 55011	Yes; When appropriate measures are used to ensure compliance with the limits for Class B according to EN 55011
Degree and class of protection						
IP degree of protection	IP20	IP20	IP20	IP20	IP20	IP20
Standards, approvals, certificates						

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	CPU 1212FC, DC/DC/DC, 8DI/6DO/2AI	CPU 1212FC, DC/DC/Relay, 8DI/6DO/2AI	CPU 1214 FC, DC/DC/DC, 14DI/10DO/2AI	CPU 1214 FC, DC/DC/Relay, 14DI/10DO/2AI	CPU 1215 FC, DC/DC/DC, 14DI/10DO/2AI/2AO	CPU 1215 FC, DC/DC/RLY, 14DI/10DO/2AI/2AO
CE mark	Yes	Yes	Yes	Yes	Yes	Yes
UL approval	Yes	Yes	Yes	Yes	Yes	Yes
cULus	Yes	Yes	Yes	Yes	Yes	Yes
FM approval	Yes	Yes	Yes	Yes	Yes	Yes
RCM (formerly C-TICK)	Yes	Yes	Yes	Yes	Yes	Yes
KC approval	Yes	Yes	Yes	Yes	Yes	Yes
Marine approval	Yes	Yes	Yes	Yes	Yes	Yes
Highest safety class achievable in safety mode						
• Performance level according to ISO 13849-1	PLe	PLe	PLe	PLe	PLe	PLe
• SIL acc. to IEC 61508	SIL 3	SIL 3	SIL 3	SIL 3	SIL 3	SIL 3
Ambient conditions						
Free fall						
• Fall height, max.	0.3 m; five times, in product package	0.3 m; five times, in product package	0.3 m; five times, in product package	0.3 m; five times, in product package	0.3 m; five times, in product package	0.3 m; five times, in product package
Ambient temperature during operation						
• min.	0 °C	0 °C	0 °C	0 °C	0 °C	0 °C
• max.	55 °C; Number of simultaneously activated inputs or outputs 4 or 3 (no adjacent points) at 60 °C horizontal or 50 °C vertical, 8 or 6 at 55 °C horizontal or 45 °C vertical	55 °C; Number of simultaneously activated inputs or outputs 4 or 3 (no adjacent points) at 60 °C horizontal or 50 °C vertical, 8 or 6 at 55 °C horizontal or 45 °C vertical	55 °C; Number of simultaneously activated inputs or outputs 4 or 3 (no adjacent points) at 60 °C horizontal or 50 °C vertical, 8 or 6 at 55 °C horizontal or 45 °C vertical	55 °C; Number of simultaneously activated inputs or outputs 4 or 3 (no adjacent points) at 60 °C horizontal or 50 °C vertical, 8 or 6 at 55 °C horizontal or 45 °C vertical	55 °C; Number of simultaneously activated inputs or outputs 4 or 3 (no adjacent points) at 60 °C horizontal or 50 °C vertical, 8 or 6 at 55 °C horizontal or 45 °C vertical	55 °C; Number of simultaneously activated inputs or outputs 4 or 3 (no adjacent points) at 60 °C horizontal or 50 °C vertical, 8 or 6 at 55 °C horizontal or 45 °C vertical
• horizontal installation, min.	0 °C	0 °C	0 °C	0 °C	0 °C	0 °C
• horizontal installation, max.	55 °C	55 °C	55 °C	55 °C	55 °C	55 °C
• vertical installation, min.	0 °C	0 °C	0 °C	0 °C	0 °C	0 °C
• vertical installation, max.	45 °C	45 °C	45 °C	45 °C	45 °C	45 °C
Ambient temperature during storage/transportation						
• min.	-40 °C	-40 °C	-40 °C	-40 °C	-40 °C	-40 °C
• max.	70 °C	70 °C	70 °C	70 °C	70 °C	70 °C
Air pressure acc. to IEC 60068-2-13						
• Operation, min.	795 hPa	795 hPa	795 hPa	795 hPa	795 hPa	795 hPa
• Operation, max.	1 080 hPa	1 080 hPa	1 080 hPa	1 080 hPa	1 080 hPa	1 080 hPa
• Storage/transport, min.	660 hPa	660 hPa	660 hPa	660 hPa	660 hPa	660 hPa
• Storage/transport, max.	1 080 hPa	1 080 hPa	1 080 hPa	1 080 hPa	1 080 hPa	1 080 hPa
Altitude during operation relating to sea level						
• Installation altitude, min.	-1 000 m	-1 000 m	-1 000 m	-1 000 m	-1 000 m	-1 000 m
• Installation altitude, max.	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
Relative humidity						
• Operation, max.	95 %; no condensation	95 %; no condensation	95 %; no condensation	95 %; no condensation	95 %; no condensation	95 %; no condensation
Vibrations						
• Vibration resistance during operation acc. to IEC 60068-2-6	2 g (m/s ²) wall mounting, 1 g (m/s ²) DIN rail	2 g (m/s ²) wall mounting, 1 g (m/s ²) DIN rail	2 g (m/s ²) wall mounting, 1 g (m/s ²) DIN rail	2 g (m/s ²) wall mounting, 1 g (m/s ²) DIN rail	2 g (m/s ²) wall mounting, 1 g (m/s ²) DIN rail	2 g (m/s ²) wall mounting, 1 g (m/s ²) DIN rail
• Operation, tested according to IEC 60068-2-6	Yes	Yes	Yes	Yes	Yes	Yes
Shock testing						
• tested 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	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
Pollutant concentrations						
• SO2 at RH < 60% without condensation	SO2: < 0.5 ppm; H2S: < 0.1 ppm; RH < 60% condensation-free	SO2: < 0.5 ppm; H2S: < 0.1 ppm; RH < 60% condensation-free	SO2: < 0.5 ppm; H2S: < 0.1 ppm; RH < 60% condensation-free	SO2: < 0.5 ppm; H2S: < 0.1 ppm; RH < 60% condensation-free	SO2: < 0.5 ppm; H2S: < 0.1 ppm; RH < 60% condensation-free	SO2: < 0.5 ppm; H2S: < 0.1 ppm; RH < 60% condensation-free
configuration / header configuration / programming / header						
Programming language						
— LAD	Yes; incl. failsafe	Yes; incl. failsafe	Yes; incl. failsafe	Yes; incl. failsafe	Yes; incl. failsafe	Yes; incl. failsafe
— FBD	Yes; incl. failsafe	Yes; incl. failsafe	Yes; incl. failsafe	Yes; incl. failsafe	Yes; incl. failsafe	Yes; incl. failsafe
— SCL	Yes	Yes	Yes	Yes	Yes	Yes
Know-how protection						

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	CPU 1212FC, DC/DC/DC, 8DI/6DO/2AI	CPU 1212FC, DC/DC/Relay, 8DI/6DO/2AI	CPU 1214 FC, DC/DC/DC, 14DI/10DO/2AI	CPU 1214 FC, DC/DC/Relay, 14DI/10DO/2AI	CPU 1215 FC, DC/DC/DC, 14DI/10DO/2AI/2AO	CPU 1215 FC, DC/DC/RLY, 14DI/10DO/2AI/2AO
• User program protection/password protection	Yes	Yes	Yes	Yes	Yes	Yes
• Copy protection	Yes	Yes	Yes	Yes	Yes	Yes
• Block protection	Yes	Yes	Yes	Yes	Yes	Yes
Access protection						
• protection of confidential configuration data	Yes		Yes	Yes	Yes	Yes
• Protection level: Write protection	Yes	Yes	Yes	Yes	Yes	Yes
• Protection level: Read/write protection	Yes	Yes	Yes	Yes	Yes	Yes
• Protection level: Complete protection	Yes	Yes	Yes	Yes	Yes	Yes
programming / cycle time monitoring / header						
• adjustable	Yes	Yes	Yes	Yes	Yes	Yes
Dimensions						
Width	90 mm	90 mm	110 mm	110 mm	130 mm	130 mm
Height	100 mm	100 mm	100 mm	100 mm	100 mm	100 mm
Depth	75 mm	75 mm	75 mm	75 mm	75 mm	75 mm
Weights						
Weight, approx.	370 g	385 g	415 g	435 g	500 g	585 g