

General specifications and features

Table 1 General

Technical data	CPU 1212C AC/DC/Relay	CPU 1212C DC/DC/Relay	CPU 1212C DC/DC/DC
Order number	6ES7 212-1BE31-0XB0	6ES7 212-1HE31-0XB0	6ES7 212-1AE31-0XB0
Dimensions W x H x D (mm)	90 x 100 x 75	90 x 100 x 75	90 x 100 x 75
Shipping weight	425 grams	385 grams	370 grams
Power dissipation	11 W	9 W	9 W
Current available (SM and CM bus)	1000 mA max. (5 VDC)	1000 mA max. (5 VDC)	1000 mA max. (5 VDC)
Current available (24 VDC)	300 mA max. (sensor power)	300 mA max. (sensor power)	300 mA max. (sensor power)
Digital input current consumption (24 VDC)	4 mA/input used	4 mA/input used	4 mA/input used

Table 2 CPU features

Technical data		Description
User memory ¹	Work	50 Kbytes
	Load	1 Mbyte internal, expandable up to SD card size
	Retentive	10 Kbytes
On-board digital I/O		8 inputs/6 outputs
On-board analog I/O		2 inputs
Process image size		1024 bytes of inputs (I)/1024 bytes of outputs (Q)
Bit memory (M)		4096 bytes
Temporary (local) memory		<ul style="list-style-type: none"> 16 Kbytes for startup and program cycle (including associated FBs and FCs) 4 Kbytes for standard interrupt events including FBs and FCs 4 Kbytes for error interrupt events including FBs and FCs
Signal modules expansion		2 SMs max.
SB, CB, BB expansion		1 max.
Communication module expansion		3 CMs max.
High-speed counters		5 built in I/O, 6 with signal board, see table, HSC input assignments for CPU 1212C <ul style="list-style-type: none"> Single phase: 3 at 100 kHz and 1 at 30 kHz clock rate, SB: 2 at 30 kHz Quadrature phase: 3 at 80 kHz and 1 at 20 kHz clock rate, SB: 2 at 20 kHz
Pulse outputs ²		4
Pulse catch inputs		8

Technical data	Description
Time delay / cyclic interrupts	4 total with 1 ms resolution
Edge interrupts	8 rising and 8 falling (12 and 12 with optional signal board)
Memory card	SIMATIC Memory Card (optional)
Real time clock accuracy	+/- 60 seconds/month
Real time clock retention time	20 days typ./12 days min. at 40°C (maintenance-free Super Capacitor)

¹ The size of the user program, data, and configuration is limited by the available load memory and work memory in the CPU. There is no specific limit to the number of OB, FC, FB and DB blocks supported or to the size of a particular block; the only limit is due to overall memory size.

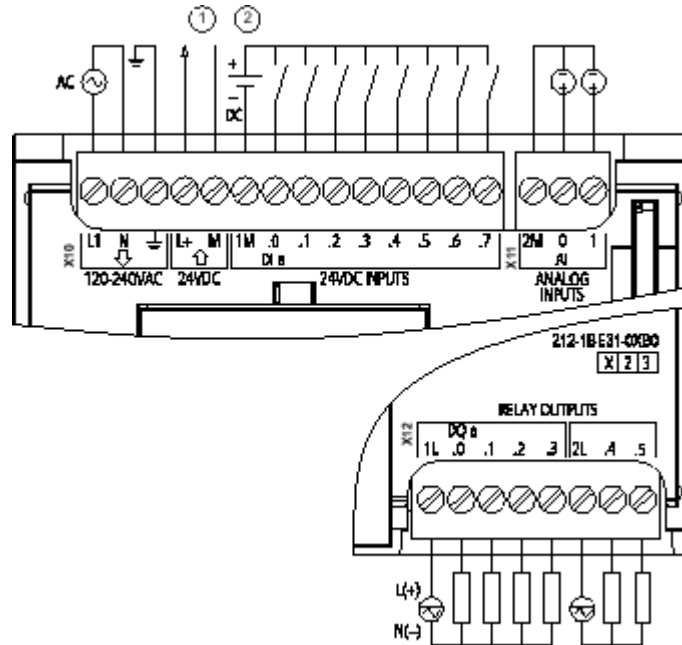
² For CPU models with relay outputs, you must install a digital signal board (SB) to use the pulse outputs.

Table 3 Performance

Type of instruction	Execution speed
Boolean	0.08 µs/instruction
Move Word	1.7 µs/instruction
Real math	2.3 µs/instruction

CPU 1212C Wiring diagrams

Table 1 CPU 1212C AC/DC/Relay (6ES7 212-1BE31-0XB0)



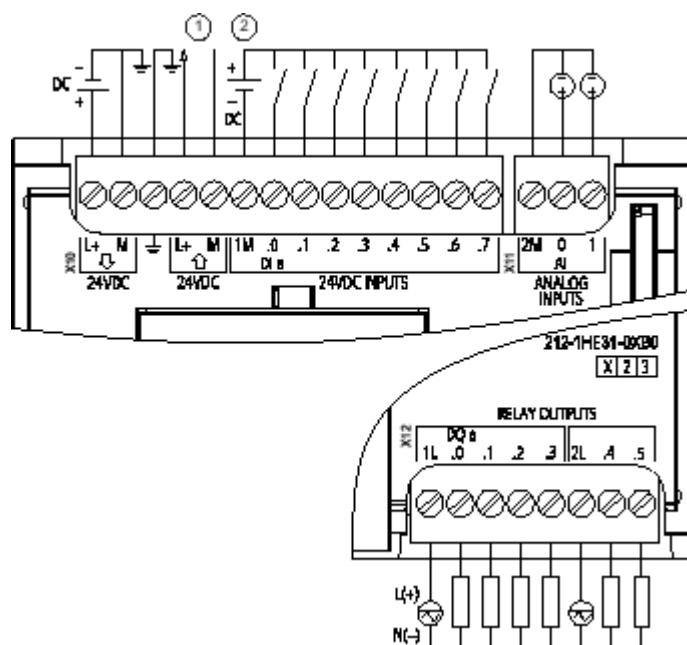
- ① 24 VDC Sensor Power Out
For additional noise immunity, connect "M" to chassis ground even if not using sensor supply.
- ② For sinking inputs, connect "-" to "M" (shown).
For sourcing inputs, connect "+" to "M".

Note: X11 connectors must be gold. See Appendix C, Spare Parts for order number.

Table 2 Connector pin locations for CPU 1212C AC/DC/Relay (6ES7 212-1BE31-0XB0)

Pin	X10	X11 (gold)	X12
1	L1 / 120-240 VAC	2 M	1L
2	N / 120-240 VAC	AI 0	DQ a.0
3	Functional Earth	AI 1	DQ a.1
4	L+ / 24VDC Sensor Out	--	DQ a.2
5	M / 24VDC Sensor Out	--	DQ a.3
6	1M	--	2L
7	DI a.0	--	DQ a.4
8	DI a.1	--	DQ a.5
9	DI a.2	--	--
10	DI a.3	--	--
11	DI a.4	--	--
12	DI a.5	--	--
13	DI a.6	--	--
14	DI a.7	--	--

Table 3 CPU 1212C DC/DC/Relay (6ES7 212-1HE31-0XB0)



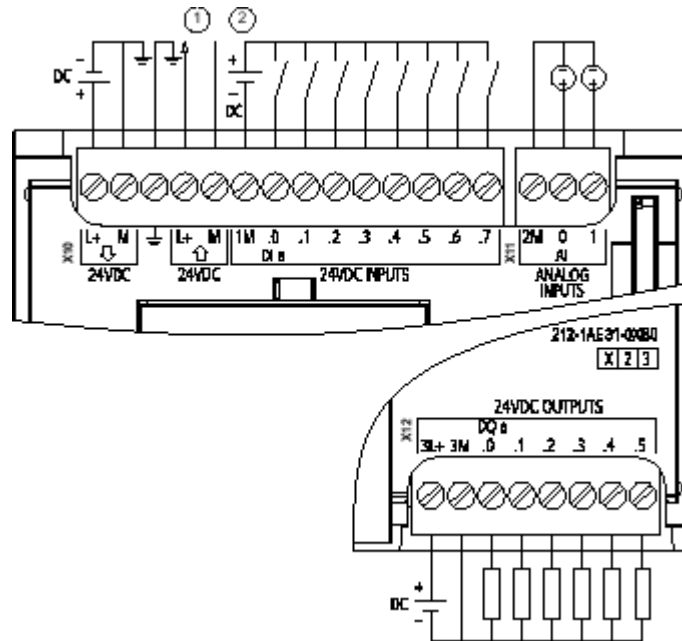
- ① 24 VDC Sensor Power Out
For additional noise immunity, connect "M" to chassis ground even if not using sensor supply.
- ② For sinking inputs, connect "-" to "M" (shown).
For sourcing inputs, connect "+" to "M".

Note: X11 connectors must be gold. See Appendix C, Spare Parts for order number.

Table 4 Connector pin locations for CPU 1212C DC/DC/Relay (6ES7 212-1HE31-0XB0)

Pin	X10	X11 (gold)	X12
1	L+ / 24VDC	2 M	1L
2	M / 24VDC	AI 0	DQ a.0
3	Functional Earth	AI 1	DQ a.1
4	L+ / 24VDC Sensor Out	--	DQ a.2
5	M / 24VDC Sensor Out	--	DQ a.3
6	1M	--	2L
7	DI a.0	--	DQ a.4
8	DI a.1	--	DQ a.5
9	DI a.2	--	--
10	DI a.3	--	--
11	DI a.4	--	--
12	DI a.5	--	--
13	DI a.6	--	--
14	DI a.7	--	--

Table 5 CPU 1212C DC/DC/DC (6ES7-212-1AE31-0XB0)



- ① 24 VDC Sensor Power Out

For additional noise immunity, connect "M" to chassis ground even if not using sensor supply.

- ② For sinking inputs, connect "-" to "M" (shown).

For sourcing inputs, connect "+" to "M".

Note: X11 connectors must be gold. See Appendix C, Spare Parts for order number.

Table 6 Connector pin locations for CPU 1212C DC/DC/DC (6ES7 212-1AE31-0XB0)

Pin	X10	X11 (gold)	X12
1	L+ / 24VDC	2 M	3L+
2	M / 24VDC	AI 0	3M
3	Functional Earth	AI 1	DQ a.0
4	L+ / 24VDC Sensor Out	--	DQ a.1
5	M / 24VDC Sensor Out	--	DQ a.2
6	1M	--	DQ a.3
7	DI a.0	--	DQ a.4
8	DI a.1	--	DQ a.5
9	DI a.2	--	--
10	DI a.3	--	--
11	DI a.4	--	--
12	DI a.5	--	--
13	DI a.6	--	--
14	DI a.7	--	--

Note

Unused analog inputs should be shorted.

Sample time for the built-in analog ports of the CPU

Table 1 Sample time for built-in analog inputs of the CPU

Rejection frequency (Integration time selection)	Sample time
60 Hz (16.6 ms)	4.17 ms
50 Hz (20 ms)	5 ms
10 Hz (100 ms)	25 ms

Step response of the built-in analog inputs of the CPU

Table 1 Step Response (ms), 0V to 10V measured at 95%

Smoothing selection (sample averaging)	Rejection frequency (Integration time)		
	60 Hz	50 Hz	10 Hz
None (1 cycle): No averaging	50 ms	50 ms	100 ms
Weak (4 cycles): 4 samples	60ms	70 ms	200 ms
Medium (16 cycles): 16 samples	200 ms	240 ms	1150 ms
Strong (32 cycles): 32 samples	400 ms	480 ms	2300 ms
Sample time	4.17 ms	5 ms	25 ms

Analog inputs

Table 1 Analog inputs

Technical data	Description
Number of inputs	2
Type	Voltage (single-ended)
Full-scale range	0 to 10 V
Full-scale range (data word)	0 to 27648
Overshoot range	10.001 to 11.759 V
Overshoot range (data word)	27,649 to 32,511
Overflow range	11.760 to 11.852 V
Overflow range (data word)	32,512 to 32,767
Resolution	10 bits
Maximum withstand voltage	35 VDC
Smoothing	None, Weak, Medium, or Strong See the table for <u>step response (ms)</u> for the analog inputs of the CPU.
Noise rejection	10, 50, or 60 Hz
Impedance	$\geq 100\text{ K}\Omega$
Isolation (field side to logic)	None
Accuracy (25°C / -20 to 60°C)	3.0% / 3.5% of full-scale
Cable length (meters)	100 m, shielded twisted pair

Digital inputs and outputs

Table 1 Digital inputs

Technical data	CPU 1212C AC/DC/Relay, DC/DC/Relay, and DC/DC/DC
Number of inputs	8
Type	Sink/Source (IEC Type 1 sink)
Rated voltage	24 VDC at 4 mA, nominal
Continuous permissible voltage	30 VDC, max.
Surge voltage	35 VDC for 0.5 sec.
Logic 1 signal (min.)	15 VDC at 2.5 mA
Logic 0 signal (max.)	5 VDC at 1 mA
Isolation (field side to logic)	500 VAC for 1 minute
Isolation groups	1
Filter times	0.2, 0.4, 0.8, 1.6, 3.2, 6.4, and 12.8 ms (selectable in groups of 4)
HSC clock input rates (max.) (Logic 1 Level = 15 to 26 VDC)	Single phase: 100 KHz (Ia.0 to Ia.5) and 30 KHz (Ia.6 to Ia.7) Quadrature phase: 80 KHz (Ia.0 to Ia.5) and 20 KHz (Ia.6 to Ia.7)
Number of inputs on simultaneously	8 at 60°C horizontal, 50°C vertical
Cable length (meters)	500 m shielded, 300 m unshielded, 50 m shielded for HSC inputs

Table 2 Digital outputs

Technical data	CPU 1212C AC/DC/Relay and DC/DC/Relay	CPU 1212C DC/DC/DC
Number of outputs	6	6
Type	Relay, dry contact	Solid state - MOSFET (sourcing)
Voltage range	5 to 30 VDC or 5 to 250 VAC	20.4 to 28.8 VDC
Logic 1 signal at max. current	--	20 VDC min.
Logic 0 signal with 10 K Ω load	--	0.1 VDC max.
Current (max.)	2.0 A	0.5 A
Lamp load	30 W DC / 200 W AC	5 W
ON state resistance	0.2 Ω max. when new	0.6 Ω max.
Leakage current per point	--	10 μ A max.
Surge current	7 A with contacts closed	8 A for 100 ms max.
Overload protection	No	No
Isolation (field side to logic)	1500 VAC for 1 minute (coil to contact) None (coil to logic)	500 VAC for 1 minute

Technical data	CPU 1212C AC/DC/Relay and DC/DC/Relay	CPU 1212C DC/DC/DC
Isolation resistance	100 MΩ min. when new	--
Isolation between open contacts	750 VAC for 1 minute	--
Isolation groups	2	1
Inductive clamp voltage	--	L+ minus 48 VDC, 1 W dissipation
Switching delay (Qa.0 to Qa.3)	10 ms max.	1.0 μs max., off to on 3.0 μs max., on to off
Switching delay (Qa.4 to Qa.5)	10 ms max.	50 μs max., off to on 200 μs max., on to off
Maximum relay switching frequency	1 Hz	--
Pulse Train Output rate (Qa.0 and Qa.2)	Not recommended ¹	100 KHz max., 2 Hz min. ²
Lifetime mechanical (no load)	10,000,000 open/close cycles	--
Lifetime contacts at rated load	100,000 open/close cycles	--
Behavior on RUN to STOP	Last value or substitute value (default value 0)	Last value or substitute value (default value 0)
Number of outputs on simultaneously	6 up to 60°C horizontal, 50°C vertical	
Cable length (meters)	500 m shielded, 150 m unshielded	500 m shielded, 150 m unshielded

¹ For CPU models with relay outputs, you must install a digital signal board (SB) to use the pulse outputs.

² Depending on your pulse receiver and cable, an additional load resistor (at least 10% of rated current) may improve pulse signal quality and noise immunity.

Timers, counters and code blocks supported by CPU 1212C

Table 1 Blocks, timers and counters supported by CPU 1212C

Element		Description
Blocks	Type	OB, FB, FC, DB
	Size	50 Kbytes
	Quantity	Up to 1024 blocks total (OBs + FBs + FCs + DBs)
	Address range for FBs, FCs, and DBs	1 to 65535 (such as FB 1 to FB 65535)
	Nesting depth	16 from the program cycle or start up OB; 4 from the time delay interrupt, time-of-day interrupt, cyclic interrupt, hardware interrupt, time error interrupt, or diagnostic error interrupt OB
	Monitoring	Status of 2 code blocks can be monitored simultaneously
OBs	Program cycle	Multiple: OB 1, OB 200 to OB 65535
	Startup	Multiple: OB 100, OB 200 to OB 65535
	Time-delay interrupts and cyclic interrupts	4 ¹ (1 per event): OB 200 to OB 65535
	Hardware interrupts (edges and HSC)	50 (1 per event): OB 200 to OB 65535
	Time error interrupts	1: OB 80
	Diagnostic error interrupts	1: OB 82
Timers	Type	IEC
	Quantity	Limited only by memory size
	Storage	Structure in DB, 16 bytes per timer
Counters	Type	IEC
	Quantity	Limited only by memory size
	Storage	Structure in DB, size dependent upon count type <ul style="list-style-type: none"> • SInt, USInt: 3 bytes • Int, UInt: 6 bytes • DInt, UDInt: 12 bytes

¹ Time-delay and cyclic interrupts use the same resources in the CPU. You can have only a total of 4 of these interrupts (time-delay plus cyclic interrupts). You cannot have 4 time-delay interrupts and 4 cyclic interrupts.

Table 2 Communication

Technical data	Description
Number of ports	1

Technical data	Description
Type	Ethernet
HMI device ¹	3
Programming device (PG)	1
Connections	<ul style="list-style-type: none"> 8 for Open User Communication (active or passive): TSEND_C, TRCV_C, TCON, TDISCON, TSEND, and TRCV 3 for server GET/PUT (CPU-to-CPU) S7 communication 8 for client GET/PUT (CPU-to-CPU) S7 communication
Data rates	10/100 Mb/s
Isolation (external signal to PLC logic)	Transformer isolated, 1500 VAC, for short term event safety only
Cable type	CAT5e shielded

¹ The CPU provides dedicated HMI connections to support up to 3 HMI devices. (You can have up to 2 SIMATIC Comfort panels.) The total number of HMI is affected by the types of HMI panels in your configuration. For example, you could have up to three SIMATIC Basic panels connected to your CPU, or you could have up to two SIMATIC Comfort panels with one additional Basic panel.

Table 3 Power supply

Technical data		CPU 1212C AC/DC/Relay	CPU 1212C DC/DC/Relay	CPU 1212C DC/DC/DC
Voltage range		85 to 264 VAC	20.4 VDC to 28.8 VDC 22.0 VDC to 28.8 VDC for ambient temperature -20° to 0° C	
Line frequency		47 to 63 Hz	--	--
Input current (max. load)	CPU only	80 mA at 120 VAC 40 mA at 240 VAC	400 mA at 24 VDC	400 mA at 24 VDC
	CPU with all expansion accessories	240 mA at 120 VAC 120 mA at 240 VAC	1200 mA at 24 VDC	1200 mA at 24 VDC
Inrush current (max.)		20 A at 264 VAC	12 A at 28.8 VDC	12 A at 28.8 VDC
Isolation (input power to logic)		1500 VAC	Not isolated	Not isolated
Ground leakage, AC line to functional earth		0.5 mA max.	--	--
Hold up time (loss of power)		20 ms at 120 VAC 80 ms at 240 VAC	10 ms at 24 VDC	10 ms at 24 VDC
Internal fuse, not user replaceable		3 A, 250 V, slow blow	3 A, 250 V, slow blow	3 A, 250 V, slow blow

Table 4 Sensor power

Technical data	CPU 1212C AC/DC/Relay	CPU 1212C DC/DC/Relay	CPU 1212C DC/DC/DC
Voltage range	20.4 to 28.8 VDC	L+ minus 4 VDC min. L+ minus 5 VDC min. for ambient temperature -20° C to 0° C	
Output current rating (max.)	300 mA (short circuit protected)	300 mA (short circuit protected)	300 mA (short circuit protected)
Maximum ripple noise (<10 MHz)	< 1 V peak to peak	Same as input line	Same as input line
Isolation (CPU logic to sensor power)	Not isolated	Not isolated	Not isolated