MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Selected official pages for procurement and maintenance review

PRODUCT BRAND

Siemens

PRODUCT MODEL

6ES7215-1HG40-0XB0

CPU 1215C DC/Relay Controller. Relevant section pages: 2, 1227, 1228, 1232, 1233, 1234, 1235, 1236, 1237. Adjacent model text on shared pages is outside this product reference.

OFFICIAL SOURCE

S7-1200 Programmable Controller System Manual; V4.5 05/2021

Source: Siemens V4.5 05/2021. Original manufacturer pages follow this cover.

V4.5 (05/2021) 1HG40 DC/DC/relay technical excerpt, not complete installation or wiring guidance. The 1BG40 material on source p.1237 is outside scope.

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Amikon Limited prepared this independent reference package. Selected manufacturer pages follow with their original content and pagination visible.

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This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

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⚠ WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

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indicates that property damage can result if proper precautions are not taken.

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Table A-65 Connector pin locations for CPU 1214C DC/DC/DC (6ES7214-1AG40-0XB0)

Pin	X10	X11 (gold)	X12
1	L+ / 24 V DC	2 M	3L+
2	M / 24 V DC	AI 0	3M
3	Functional Earth	AI 1	DQ a.0
4	L+ / 24 V DC Sensor Out	--	DQ a.1
5	M / 24 V DC 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	--	DQ a.6
10	DI a.3	--	DQ a.7
11	DI a.4	--	DQ b.0
12	DI a.5	--	DQ b.1
13	DI a.6	--	--
14	DI a.7	--	-
15	DI b.0	--	--
16	DI b.1	--	--
17	DI b.2	--	--
18	DI b.3	--	--
19	DI b.4	--	--
20	DI b.5	--	--

Note

Unused analog inputs should be shorted.

A.7 CPU 1215C

A.7.1 General specifications and features

Table A-66 General

Technical data	CPU 1215C AC/DC/Relay	CPU 1215C DC/DC/Relay	CPU 1215C DC/DC/DC
Article number	6ES7215-1BG40-0XB0	6ES7215-1HG40-0XB0	6ES7215-1AG40-0XB0
Dimensions W x H x D (mm)	130 x 100 x 75		
Shipping weight	585 grams	550 grams	520 grams
Power dissipation	14 W	12 W	
Electrical current available (SM and CM bus)	1600 mA max. (5 V DC)		

Technical data	**CPU 1215C AC/DC/Relay**	**CPU 1215C DC/DC/Relay**	**CPU 1215C DC/DC/DC**
Electrical current available (24 V DC)	400 mA max. (sensor power)		
Digital input current consumption (24 V DC)	4 mA/input used		

Table A-67 CPU features

Technical data		**Description**
User memory (Refer to "General technical specifications (Page 1183)", "Internal CPU memory retention".)	Work	125 Kbytes
	Load	4 Mbytes, internal, expandable up to SD card size
	Retentive	14 Kbytes
Onboard digital I/O		14 inputs/10 outputs
Onboard analog I/O		2 inputs/2 outputs
Process image size		1024 bytes of inputs (I)/1024 bytes of outputs (Q)
Bit memory (M)		8192 bytes
Temporary (local) memory		• 16 Kbytes for startup and program cycle (including associated FBs and FCs) • 6 Kbytes for each of the other interrupt priority levels (including FBs and FCs)
Signal modules expansion		8 SMs max.
SB, CB, BB expansion		1 max.
Communication module expansion		3 CMs max.
High-speed counters		Up to 6 configured to use any built-in or SB inputs. Refer to "Hardware input pin assignment" (Page 535) for CPU 1215C: HSC default address assignments. • 100/[1]80 kHz (Ia.0 to Ia.5) • 30/[1]20 kHz (Ia.6 to Ib.5)
Pulse outputs[2]		Up to 4 configured to use any built-in or SB outputs • 100 kHz (Qa.0 to Qa.3) • 20 kHz (Qa.4 to Qb.1)
Pulse catch inputs		14
Time delay interrupts		4 total with 1 ms resolution
Cyclic interrupts		4 total with 1 ms resolution
Edge interrupts		12 rising and 12 falling (16 and 16 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 slower speed is applicable when the HSC is configured for quadrature mode of operation.

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

Technical data		Description
IRT, supported		No
MRP, supported		Yes
PROFIenergy		Yes
Shared device		Yes
Number of IO controllers with shared device, max.		2
SIMATIC communication		
S7 communication, as server		Yes
S7 communication, as client		Yes
User data per job, max.		See online help (S7 communication, user data size)
Open IE communication		
TCP/IP:		Yes
	Data length, max.	8 KB
	Several passive connections per port, supported	Yes
ISO-on-TCP (RFC1006):		Yes
	Data length, max.	8 KB
UDP:		Yes
	Data length, max.	1472 bytes
DHCP		No
SNMP		Yes
DCP		Yes
LLDP		Yes

[1] Ethernet port isolation is designed to limit hazard during short term network faults to hazardous voltages. It does not conform to safety requirements for routine AC line voltage isolation.

Table A-71 Power supply

Technical data		CPU 1215C AC/DC/Relay	CPU 1215C DC/DC/Relay	CPU 1215C DC/DC/DC
Voltage range		85 to 264 V AC	20.4 V DC to 28.8 V DC	
Line frequency		47 to 63 Hz	--	
Input current (max. load)	CPU only	100 mA at 120 V AC 50 mA at 240 V AC	500 mA at 24 V DC	
	CPU with all expansion accessories	300 mA at 120 V AC 150 mA at 240 V AC	1500 mA at 24 V DC	
Inrush current (max.)		20 A at 264 V AC	12 A at 28.8 V DC	
I^2t		0.8 A^2 s	0.5 A^2 s	
Isolation (input power to logic)		1500 V AC	Not isolated	
Ground leakage, AC line to functional earth		0.5 mA max.	-	
Hold up time (loss of power)		20 ms at 120 V AC 80 ms at 240 V AC	10 ms at 24 V DC	
Internal fuse, not user replaceable		3 A, 250 V, slow blow		

Table A-72 Sensor power

Technical data	CPU 1215C AC/DC/Relay	CPU 1215C DC/DC/Relay	CPU 1215C DC/DC/DC
Voltage range	20.4 to 28.8 V DC	L+ minus 4 V DC min.	
Output current rating (max.)	400 mA (short-circuit protected)		
Maximum ripple noise (<10 MHz)	< 1 V peak to peak	Same as input line	
Isolation (CPU logic to sensor power)	Not isolated		

A.7.3 Digital inputs and outputs

Table A-73 Digital inputs

Technical data	CPU 1215C AC/DC/Relay	CPU 1215C DC/DC/Relay	CPU 1215C DC/DC/DC
Number of inputs	14		
Type	Sink/Source (IEC Type 1 sink)		
Rated voltage	24 V DC at 4 mA, nominal		
Continuous permissible voltage	30 V DC, max.		
Surge voltage	35 V DC for 0.5 sec.		
Logic 1 signal (min.)	15 V DC at 2.5 mA		
Logic 0 signal (max.)	5 V DC at 1 mA		
Isolation (field side to logic)	707 V DC (type test)		
Isolation groups	1		
Filter times	us settings: 0.1, 0.2, 0.4, 0.8, 1.6, 3.2, 6.4, 10.0, 12.8, 20.0 ms settings: 0.05, 0.1, 0.2, 0.4, 0.8, 1.6, 3.2, 6.4, 10.0, 12.8, 20.0		
HSC clock input rates (max.) (Logic 1 Level = 15 to 26 V DC)	100/80 kHz (Ia.0 to Ia.5) 30/20 kHz (Ia.6 to Ib.5)		
Number of inputs on simultaneously	• 7 (no adjacent points) at 60 °C horizontal or 50 °C vertical • 14 at 55 °C horizontal or 45 °C vertical		
Cable length (meters)	500 m shielded, 300 m unshielded, 50 m shielded for HSC inputs		

Table A-74 Digital outputs

Technical data	CPU 1215C AC/DC/Relay and CPU 1215C DC/DC/Relay	CPU 1215C DC/DC/DC
Number of outputs	10	
Type	Relay, mechanical	Solid state - MOSFET (sourcing)
Voltage range	5 to 30 V DC or 5 to 250 V AC	20.4 to 28.8 V DC
Logic 1 signal at max. current	--	20 V DC min.
Logic 0 signal with 10 KΩ load	--	0.1 V DC 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.

Technical data	CPU 1215C AC/DC/Relay and CPU 1215C DC/DC/Relay	CPU 1215C DC/DC/DC
Leakage current per point	--	10 µA max.
Surge current	7 A with contacts closed	8 A for 100 ms max.
Overload protection	No	
Isolation (field side to logic)	1500 V AC (coil to contact) None (coil to logic)	707 V DC (type test)
Isolation groups	2	1
Isolation (group-to-group)	1500 V AC[1]	--
Inductive clamp voltage	--	L+ minus 48 V DC, 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 Qb.1)	10 ms max.	5 µs max., off to on 20 µs max., on to off
Maximum relay switching frequency	1 Hz	--
Pulse Train Output rate	Not recommended [2]	100 kHz (Qa.0 to Qa.3)[3], 2 Hz min. 20 kHz (Qa.4 to Qb.1)[3]
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)	
Control of a digital input	Yes	
Parallel outputs for redundant load control	Yes (with same common)	
Parallel outputs for increased load	No	
Number of outputs on simultaneously	• 5 (no adjacent points) at 60 °C horizontal or 50 °C vertical • 10 at 55 °C horizontal or 45 °C vertical	
Cable length (meters)	500 m shielded, 150 m unshielded	

1 Relay group-to-group isolation separates line voltage from SELV/PELV and separates different phases up to 250 V AC line to ground.

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

3 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.

A.7.4 Analog inputs and outputs

Table A-75 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

Technical data	Description
Overshoot range (data word)	27649 to 32511
Overflow range	11.760 to 11.852 V
Overflow range (data word)	32512 to 32767
Resolution	10 bits
Maximum withstand voltage	35 V DC
Smoothing	None, Weak, Medium, or Strong See the table for Step response (ms) for the analog inputs of the CPU (Page 1235).
Noise rejection	10, 50, or 60 Hz
Impedance	≥100 KΩ
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

A.7.4.1 Step response of built-in analog inputs of the CPU

Table A-76 Step Response (ms), 0 V to 10 V 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**

A.7.4.2 Sample time for the built-in analog ports of the CPU

Table A-77 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

A.7.4.3 Measurement ranges of the analog inputs for voltage (CPUs)

Table A-78 Analog input representation for voltage (CPUs)

System		Voltage Measuring Range	
Decimal	**Hexadecimal**	**0 to 10 V**	
32767	7FFF	11.852 V	Overflow
32512	7F00		
32511	7EFF	11.759 V	Overshoot range
27649	6C01		
27648	6C00	10 V	Rated range
20736	5100	7.5 V	
34	22	12 mV	
0	0	0 V	
Negative values		Negative values are not supported	

A.7.4.4 Analog output specifications

Table A-79 Analog outputs

Technical data	Description
Number of outputs	2
Type	Current
Full-scale range	0 to 20 mA
Full-scale range (data word)	0 to 27648
Overshoot range	20.01 to 23.52 mA
Overshoot range (data word)	27649 to 32511
Overflow range	see footnote [1]
Overflow range data word	32512 to 32767
Resolution	10 bits
Output drive impedance	≤500 Ω max.
Isolation (field side to logic)	None
Accuracy (25 °C / -20 to 60 °C)	3.0% / 3.5% of full-scale
Settling time	2 ms
Cable length (meters)	100 m, shielded twisted pair

[1] In an overflow condition, analog outputs will behave according to the device configuration properties settings. In the "Reaction to CPU STOP" parameter, select either: "Use substitute value" or "Keep last value".

Table A-80 Analog output representation for current (CPU 1215C and CPU 1217C)

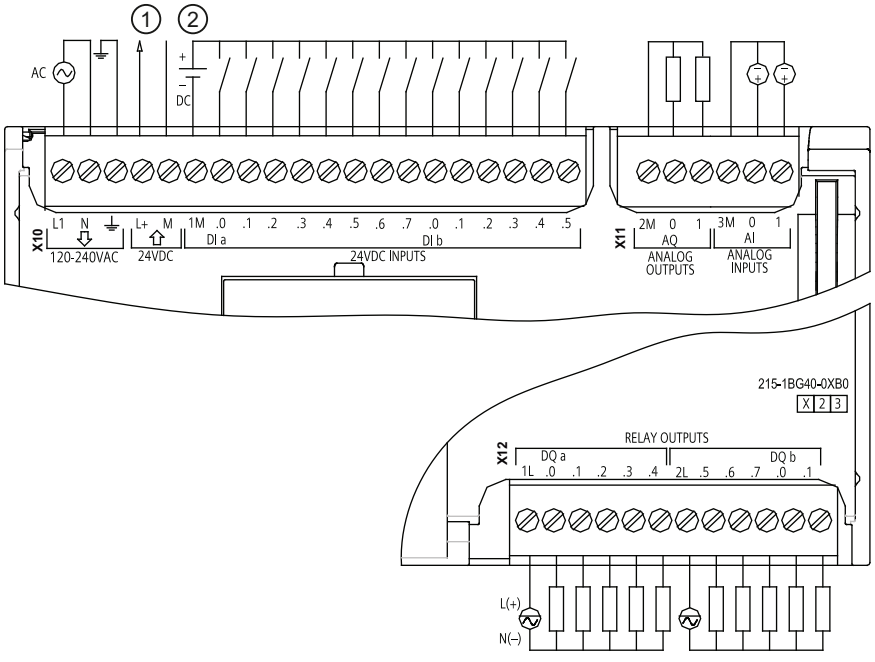
System		Current output range	
Decimal	**Hexadecimal**	**0 mA to 20 mA**	
32767	7FFF	See note 1	Overflow
32512	7F00	See note 1	

System		Current output range	
Decimal	**Hexadecimal**	**0 mA to 20 mA**	
32511	7EFF	23.52 mA	Overshoot range
27649	6C01		
27648	6C00	20 mA	Rated range
20736	5100	15 mA	
34	22	0.0247 mA	
0	0	0 mA	
Negative values		Negative values are not supported	

[1] In an overflow condition, analog outputs will behave according to the device configuration properties settings. In the "Reaction to CPU STOP" parameter, select either: "Use substitute value" or "Keep last value".

A.7.5 CPU 1215C wiring diagrams

Table A-81 CPU 1215C AC/DC/Relay (6ES7215-1BG40-0XB0)



1	24 V DC 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 1: X11 connectors must be gold. See Appendix C, Spare Parts for article number.	
Note 2: Either the L1 or N (L2) terminal can be connected to a voltage source up to 240 V AC. The N terminal can be considered L2 and is not required to be grounded. No polarization is required for L1 and N (L2) terminals.	
Note 3: See Device Configuration (Page 127) for information about the Ethernet port of the CPU.	