CPU Specifications

Table A-2 CPU Order Numbers

Order Number	CPU Model	Power Supply (Nominal)	Digital Inputs	Digital Outputs	Comm Ports	Analog Inputs	Analog Outputs	Removable Connector
6ES7 211-0AA23-0XB0	CPU 221	24 VDC	6 x 24 VDC	4 x 24 VDC	1	No	No	No
6ES7 211-0BA23-0XB0	CPU 221	120 to 240 VAC	6 x 24 VDC	4 x Relay	1	No	No	No
6ES7 212-1AB23-0XB0	CPU 222	24 VDC	8 x 24 VDC	6 x 24 VDC	1	No	No	No
6ES7 212-1BB23-0XB0	CPU 222	120 to 240 VAC	8 x 24 VDC	6 x Relay	1	No	No	No
6ES7 214-1AD23-0XB0	CPU 224	24 VDC	14 x 24 VDC	10 x 24 VDC	1	No	No	Yes
6ES7 214-1BD23-0XB0	CPU 224	120 to 240 VAC	14 x 24 VDC	10 x Relay	1	No	No	Yes
6ES7 214-2AD23-0XB0	CPU 224XP	24 VDC	14 x 24 VDC	10 x 24 VDC	2	2	1	Yes
6ES7 214-2BD23-0XB0	CPU 224XP	120 to 240 VAC	14 x 24 VDC	10 x Relay	2	2	1	Yes
6ES7 216-2AD23-0XB0	CPU 226	24 VDC	24 x 24 VDC	16 x 24 VDC	2	No	No	Yes
6ES7 216-2BD23-0XB0	CPU 226	120 to 240 VAC	24 x 24 VDC	16 x Relay	2	No	No	Yes

Table A-3 CPU General Specifications

Order Number	Module Name and Description	Dimensions (mm) (W x H x D)	Weight	Dissipation	VDC Available	
					+5 VDC	+24 VDC[1]
6ES7 211-0AA23-0XB0	CPU 221 DC/DC/DC 6 Inputs/ 4 Outputs	90 x 80 x 62	270 g	3 W	0 mA	180 mA
6ES7 211-0BA23-0XB0	CPU 221 AC/DC/Relay 6 Inputs/ 4 Relays	90 x 80 x 62	310 g	6 W	0 mA	180 mA
6ES7 212-1AB23-0XB0	CPU 222 DC/DC/DC 8 Inputs/ 6 Outputs	90 x 80 x 62	270 g	5 W	340 mA	180 mA
6ES7 212-1BB23-0XB0	CPU 222 AC/DC/Relay 8 Inputs/ 6 Relays	90 x 80 x 62	310 g	7 W	340 mA	180 mA
6ES7 214-1AD23-0XB0	CPU 224 DC/DC/DC 14 Inputs/ 10 Outputs	120.5 x 80 x 62	360 g	7 W	660 mA	280 mA
6ES7 214-1BD23-0XB0	CPU 224 AC/DC/Relay14 Inputs/ 10 Relays	120.5 x 80 x 62	410 g	10 W	660 mA	280 mA
6ES7 214-2AD23-0XB0	CPU 224XP DC/DC/DC 14 Inputs/10 Outputs	140 x 80 x 62	390 g	8 W	660 mA	280 mA
6ES7 214-2BD23-0XB0	CPU 224XP AC/DC/Relay 14 Inputs/10 Relays	140 x 80 x 62	440 g	11 W	660 mA	280 mA
6ES7 216-2AD23-0XB0	CPU 226 DC/DC/DC 24 Inputs/16 Outputs	196 x 80 x 62	550 g	11 W	1000 mA	400 mA
6ES7 216-2BD23-0XB0	CPU 226 AC/DC/Relay 24 Inputs/16 Relays	196 x 80 x 62	660 g	17 W	1000 mA	400 mA

[1] This is the 24 VDC sensor power that is available after the internal relay coil power and 24 VDC comm port power requirements have been accounted for.

Table A-4 CPU Specifications

	CPU 221	CPU 222	CPU 224	CPU 224XP	CPU 226
Memory					
User program size with run mode edit without run mode edit	 4096 bytes 4096 bytes		 8192 bytes 12288 bytes	 12288 bytes 16384 bytes	 16384 bytes 24576 bytes
User data	2048 bytes		8192 bytes	10240 bytes	10240 bytes
Backup (super cap) (optional battery)	50 hours typical (8 hours min. at 40°C) 200 days typical		100 hours typical (70 hours min. at 40°C) 200 days typical	100 hours typical (70 hours min. at 40°C) 200 days typical	
I/O					
Digital I/O	6 inputs/4outputs	8 inputs/6 outputs	14 inputs/10 outputs	14 inputs/10 outputs	24 inputs/16 outputs
Analog I/O	none			2 inputs/1 output	none
Digital I/O image size	256 (128 In/128 Out)				
Analog I/O image size	None	32 (16 In/16 Out)	64 (32 In/32 Out)		
Max. expansion modules allowed	None	2 modules[1]	7 modules[1]		
Max. intelligent modules allowed	None	2 modules[1]	7 modules[1]		
Pulse Catch inputs	6	8	14		24
High-Speed Counters Single phase Two phase	4 counters total 4 at 30 kHz 2 at 20 kHz		6 counters total 6 at 30 kHz 4 at 20 kHz	6 counters total 4 at 30 kHz 2 at 200 kHz 3 at 20 kHz 1 at 100 kHz	6 counters total 6 at 30 kHz 4 at 20 kHz
Pulse outputs	2 at 20 kHz (DC outputs only)			2 at 100 kHz (DC outputs only)	2 at 20 kHz (DC outputs only)
General					
Timers	256 total timers; 4 timers (1 ms); 16 timers (10 ms); 236 timers (100 ms)				
Counters	256 (backed by super capacitor or battery)				
Internal memory bits Stored on power down	256 (backed by super capacitor or battery) 112 (stored to EEPROM)				
Timed interrupts	2 with 1 ms resolution				
Edge interrupts	4 up and/or 4 down				
Analog adjustment	1 with 8 bit resolution		2 with 8 bit resolution		
Boolean execution speed	0.22 μs per instruction				
Real Time Clock	Optional cartridge		Built-in		
Cartridge options	Memory, Battery, and Real Time Clock		Memory and battery		
Communications Built-in					
Ports (Limited Power)	1 RS-485 port			2 RS-485 ports	
PPI, DP/T baud rates	9.6, 19.2, 187.5 kbaud				
Freeport baud rates	1.2 kbaud to 115.2 kbaud				
Max. cable length per segment	With isolated repeater: 1000 m up to 187.5 kbaud, 1200 m up to 38.4 kbaud Without isolated repeater: 50 m				
Max. number of stations	32 per segment, 126 per network				
Max. number of masters	32				
Peer to Peer (PPI Master Mode)	Yes (NETR/NETW)				
MPI connections	4 total, 2 reserved (1 for a PG and 1 for an OP)				

1 You must calculate your power budget to determine how much power (or current) the S7-200 CPU can provide for your configuration. If the CPU power budget is exceeded, you may not be able to connect the maximum number of modules. See Appendix A for CPU and expansion module power requirements, and Appendix B to calculate your power budget.

Table A-5 CPU Power Specifications

	DC		AC	
Input Power				
Input voltage	20.4 to 28.8 VDC		85 to 264 VAC (47 to 63 Hz)	
Input current CPU 221 CPU 222 CPU 224 CPU 224XP CPU 226	CPU only at 24 VDC 80 mA 85 mA 110 mA 120 mA 150 mA	Max. load at 24 VDC 450 mA 500 mA 700 mA 900 mA 1050 mA	CPU only 30/15 mA at 120/240 VAC 40/20 mA at 120/240 VAC 60/30 mA at 120/240 VAC 70/35 mA at 120/240 VAC 80/40 mA at 120/240 VAC	Max. load 120/60 mA at120/240 VAC 140/70 mA at 120/240 VAC 200/100 mA at 120/240VAC 220/100 mA at 120/240 VAC 320/160 mA at 120/240VAC
Inrush current	12 A at 28.8 VDC		20 A at 264 VAC	
Isolation (field to logic)	Not isolated		1500 VAC	
Hold up time (loss of power)	10 ms at 24 VDC		20/80 ms at 120/240 VAC	
Fuse (non-replaceable)	3 A, 250 V Slow Blow		2 A, 250 V Slow Blow	
24 VDC Sensor Power				
Sensor voltage (Limited Power)	L+ minus 5 V		20.4 to 28.8 VDC	
Current limit	1.5 A peak, thermal limit non-destructive (See Table A-3 for rated load.)			
Ripple noise	Derived from input power		Less than 1 V peak-to-peak	
Isolation (sensor to logic)	Not isolated			

Table A-6 CPU Digital Input Specifications

General	24 VDC Input (CPU 221, CPU 222, CPU 224, CPU 226)		24 VDC Input (CPU 224XP)	
Type	Sink/Source (IEC Type 1 Sink)		Sink/Source (IEC Type 1 Sink, except I0.3 to I0.5)	
Rated voltage	24 VDC at 4 mA typical		24 VDC at 4 mA typical	
Max. continuous permissible voltage	30 VDC			
Surge voltage	35 VDC for 0.5 s			
Logic 1 (min.)	15 VDC at 2.5 mA		15 VDC at 2.5 mA (I0.0 to I0.2 and I0.6 to I1.5) 4 VDC at 8 mA (I0.3 to I0.5)	
Logic 0 (max.)	5 VDC at 1 mA		5 VDC at 1 mA (I0.0 to I0.2 and I0.6 to I1.5) 1 VDC at 1 mA (I0.3 to I0.5)	
Input delay	Selectable (0.2 to 12.8 ms)			
Connection of 2 wire proximity sensor (Bero) Permissible leakage current (max.)	 1 mA			
Isolation (field to logic) Optical (galvanic) Isolation groups	Yes 500 VAC for 1 minute See wiring diagram			
High Speed Counter (HSC) input rate HSC Inputs All HSC All HSC HC4, HC5 on CPU 224XP only	 Logic 1 Level 15 to 30 VDC 15 to 26 VDC > 4 VDC	Single phase 20 kHz 30 kHz 200 kHz	Two phase 10 kHz 20 kHz 100 kHz	
Inputs on simultaneously	All		All CPU 224XP AC/DC/RELAY only: All at 55° C with DC inputs at 26 VDC max. All at 50° C with DC inputs at 30 VDC max.	
Cable length (max.) Shielded Unshielded	 500 m normal inputs, 50 m HSC inputs[1] 300 m normal inputs			

1 Shielded twisted pair is recommended for HSC inputs.

Table A-7 CPU Digital Output Specifications

General	24 VDC Output (CPU 221, CPU 222, CPU 224, CPU 226)	24 VDC Output (CPU 224XP)	Relay Output
Type	Solid State-MOSFET[1] (Sourcing)		Dry contact
Rated voltage	24 VDC	24 VDC	24 VDC or 250 VAC
Voltage range	20.4 to 28.8 VDC	5 to 28.8 VDC (Q0.0 to Q0.4) 20.4 to 28.8 VDC (Q0.5 to Q1.1)	5 to 30 VDC or 5 to 250 VAC
Surge current (max.)	8 A for 100 ms		5 A for 4 s @ 10% duty cycle
Logic 1 (min.)	20 VDC at maximum current	L+ minus 0.4 V at max. current	–
Logic 0 (max.)	0.1 VDC with 10 K Ω Load		–
Rated current per point (max.)	0.75 A		2.0 A
Rated current per common (max.)	6 A	3.75 A	10 A
Leakage current (max.)	10 μ A		–
Lamp load (max.)	5 W		30 W DC; 200 W AC[3, 4]
Inductive clamp voltage	L+ minus 48 VDC, 1 W dissipation		–
On State resistance (contact)	0.3 Ω typical (0.6 Ω max.)		0.2 Ω (maximum when new)
Isolation Optical (galvanic, field to logic) Logic to contact Resistance (logic to contact) Isolation groups	 500 VAC for 1 minute – – See wiring diagram		 – 1500 VAC for 1 minute 100 M Ω See wiring diagram
Delay (max.) Off to on (μs) On to off (μs) Switching	 2μs (Q0.0, Q0.1), 15μs (all other) 10μs (Q0.0, Q0.1), 130μs (all other) –	 0.5μs (Q0.0, Q0.1), 15μs (all other) 1.5μs (Q0.0, Q0.1), 130μs (all other) –	 – – 10 ms
Pulse frequency (max.)	20 kHz[2] (Q0.0 and Q0.1)	100 kHz[2] (Q0.0 and Q0.1)	1 Hz
Lifetime mechanical cycles	–	–	10,000,000 (no load)
Lifetime contacts	–	–	100,000 (rated load)
Outputs on simultaneously	All at 55° C (horizontal), All at 45° C (vertical)		
Connecting two outputs in parallel	Yes, only outputs in same group		No
Cable length (max.) Shielded Unshielded	 500 m 150 m		

1 When a mechanical contact turns on output power to the S7-200 CPU, or any digital expansion module, it sends a “1” signal to the digital outputs for approximately 50 microseconds. You must plan for this, especially if you are using devices which respond to short duration pulses.

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

3 Relay lifetime with a lamp load will be reduced by 75% unless steps are taken to reduce the turn-on surge below the surge current rating of the output.

4 Lamp load wattage rating is for rated voltage. Reduce the wattage rating proportionally for voltage being switched (for example 120 VAC – 100 W).

Table A-8 CPU 224XP Analog Input Specifications

General	Analog Input (CPU 224XP)
Number of inputs	2 points
Analog input type	Single-ended
Voltage range	±10 V
Data word format, full scale range	–32,000 to +32,000
DC Input impedance	>100 KΩ
Maximum input voltage	30 VDC
Resolution	11 bits plus 1 sign bit
LSB value	4.88 mV
Isolation	None
Accuracy Worst case 0° to 55° C Typical 25° C	 ±2.5% of full scale ±1.0% of full scale
Repeatability	±0.05% of full scale
Analog to digital conversion time	125 msec
Conversion type	Sigma Delta
Step response	250 ms max.
Noise rejection	–20 dB @ 50 Hz typical

Table A-9 CPU 224XP Analog Output Specifications

General	Analog Output (CPU 224XP)
Number of outputs	1 point
Signal range Voltage Current	 0 to 10 V (Limited Power) 0 to 20 mA (Limited Power)
Data word format, full range	0 to +32767
Date word format, full scale	0 to +32000
Resolution, full range	12 bits
LSB value Voltage Current	 2.44 mV 4.88 μA
Isolation	none
Accuracy Worst case, 0° to 55° C Voltage output Current output Typical 25° C Voltage output Current output	 ± 2% of full-scale ± 3% of full-scale ± 1% of full-scale ± 1% of full-scale
Settling time Voltage output Current output	 < 50 μS < 100 μS
Maximum output drive Voltage output Current output	 ≥ 5000 Ω minimum ≤ 500 Ω maximum

Wiring Diagrams

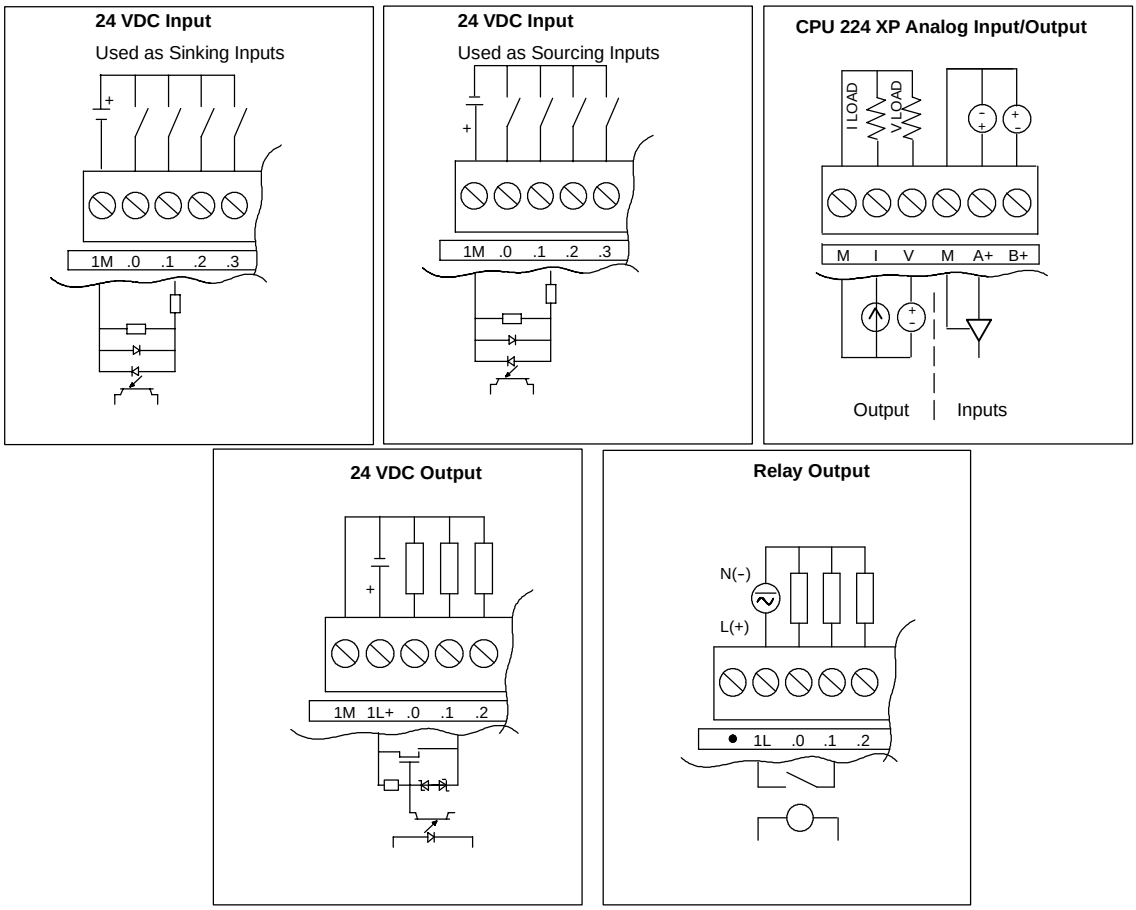


Figure A-2 CPU Inputs and Outputs

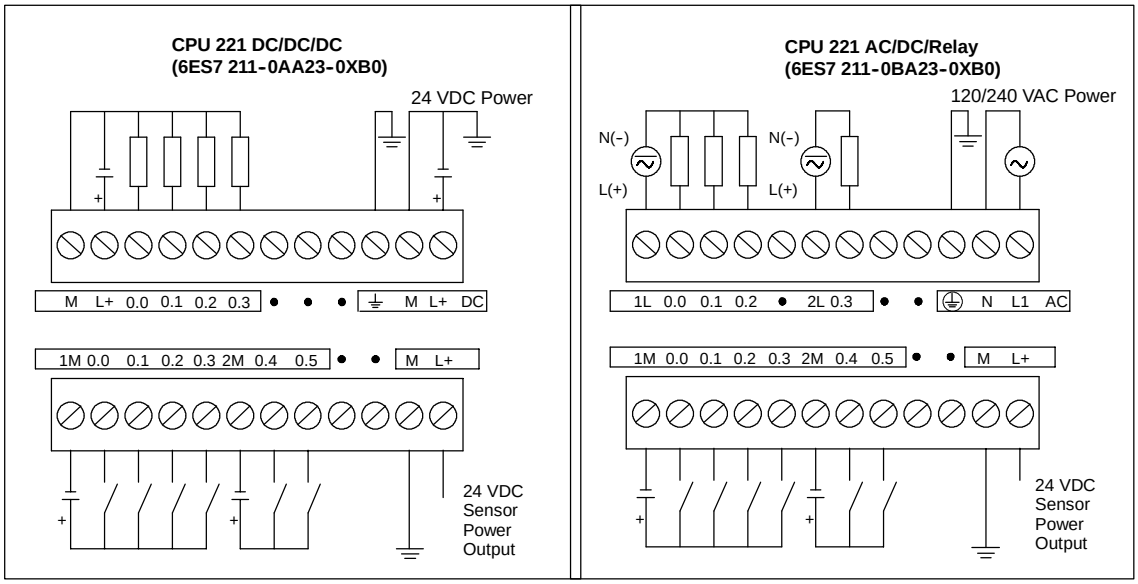


Figure A-3 CPU 221 Wiring Diagrams

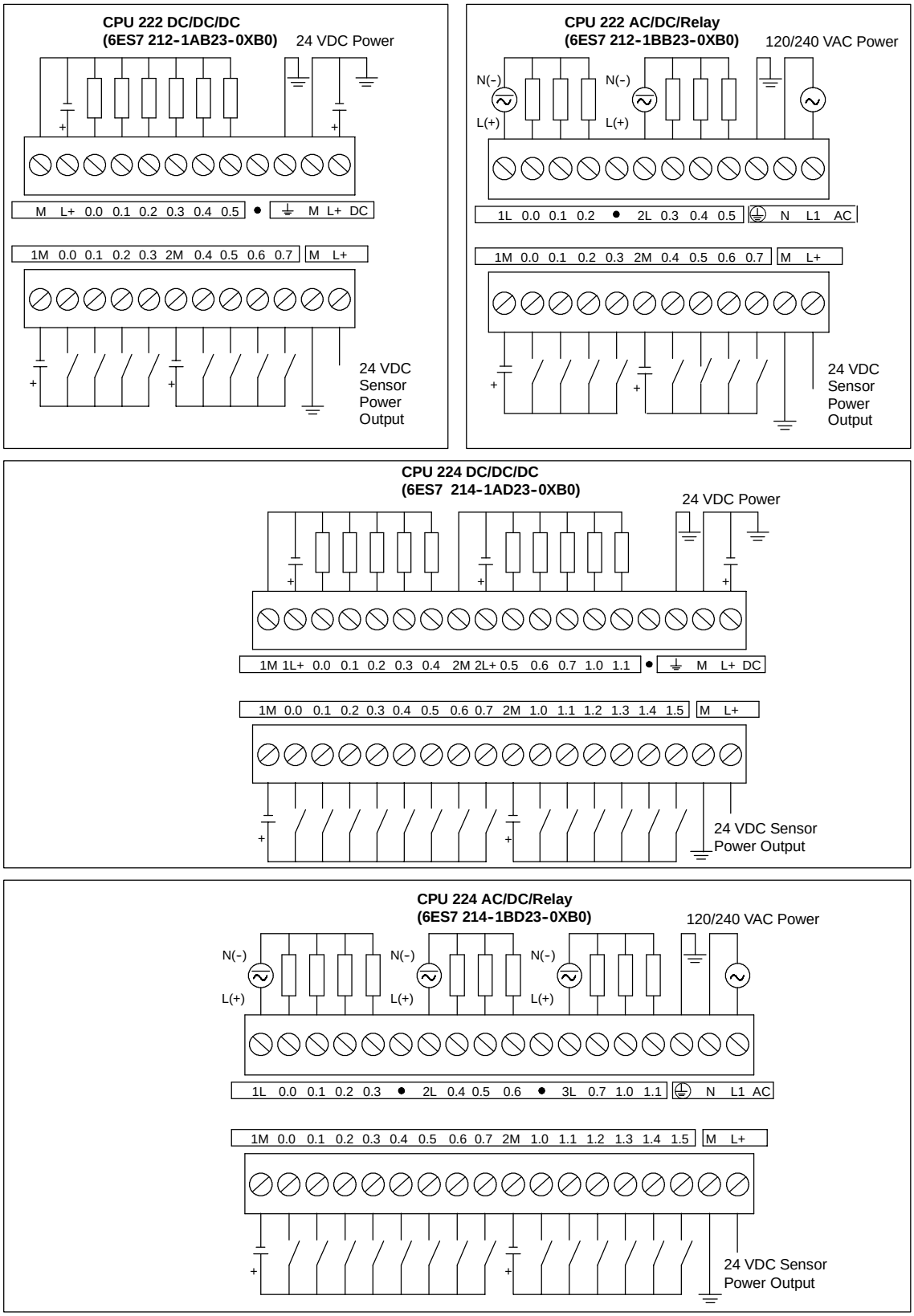


Figure A-4 CPU 222 and CPU 224 Wiring Diagrams

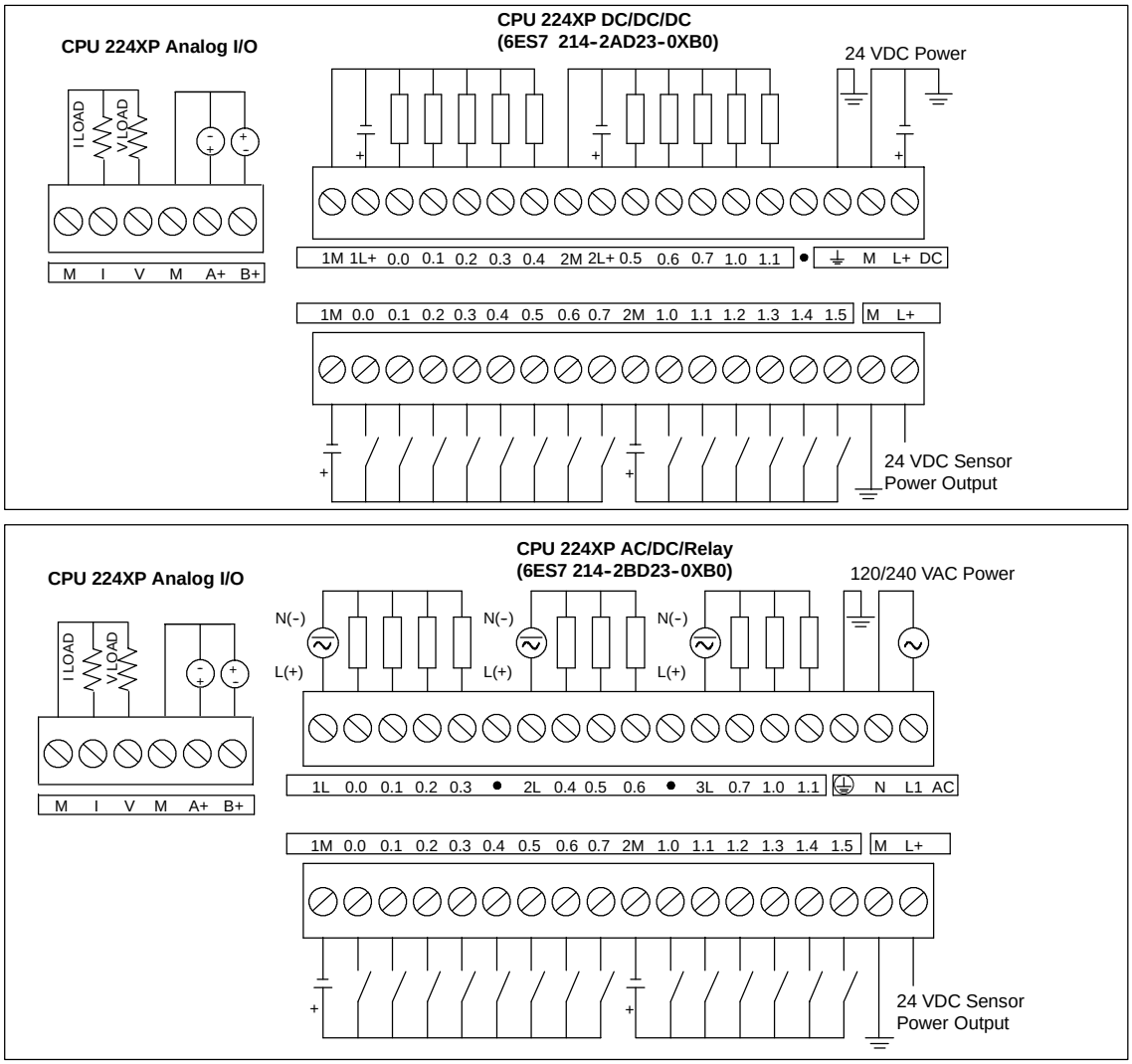


Figure A-5 CPU 224XP Wiring Diagrams

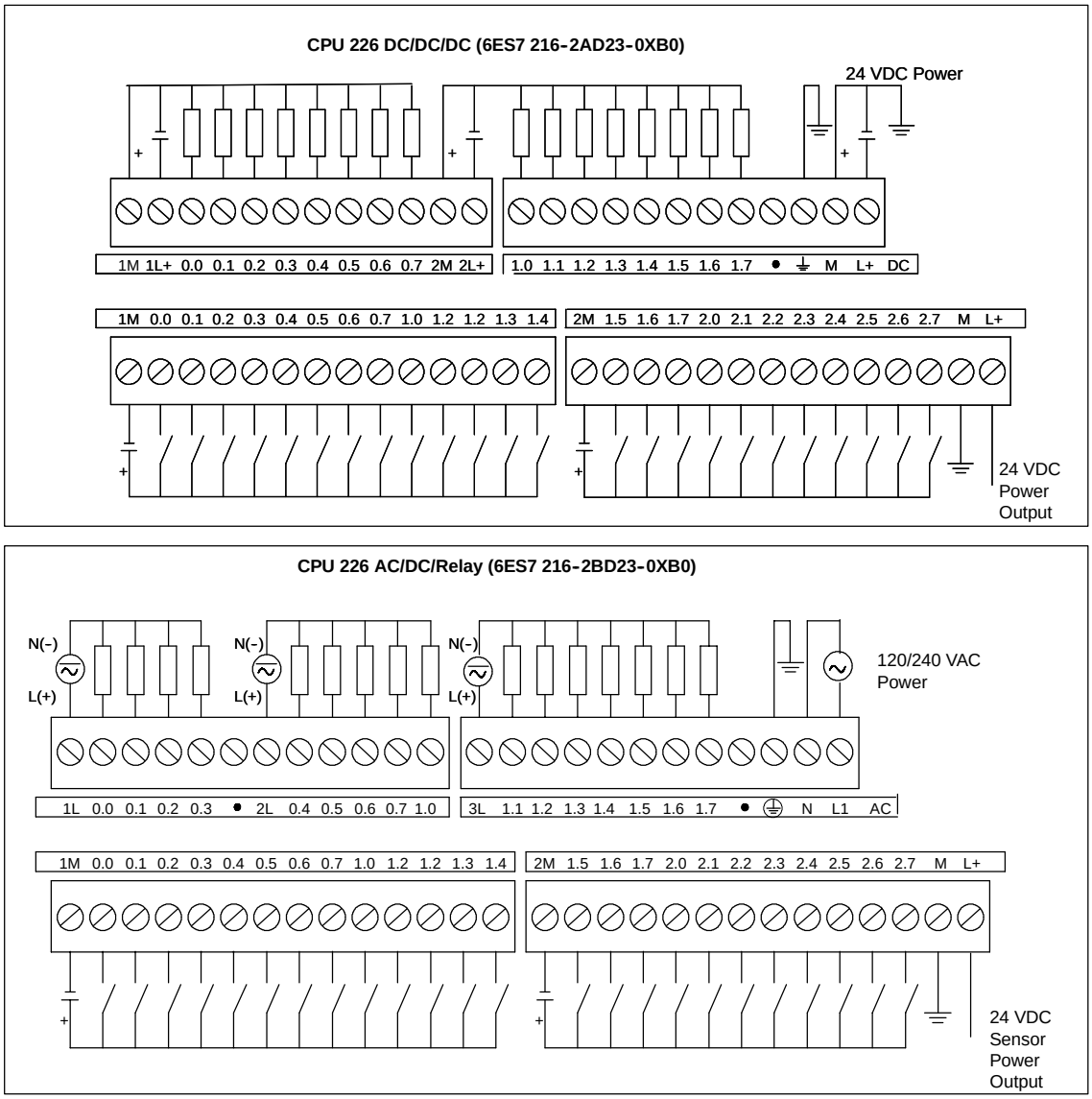
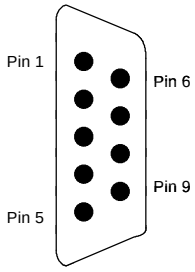


Figure A-6 CPU 226 Wiring Diagrams

Table A-10 Pin Assignments for the S7-200 Communications Port (Limited Power)

Connector	Pin Number	PROFIBUS Signal	Port 0/Port 1
	1	Shield	Chassis ground
	2	24 V Return	Logic common
	3	RS-485 Signal B	RS-485 Signal B
	4	Request-to-Send	RTS (TTL)
	5	5 V Return	Logic common
	6	+5 V	+5 V, 100 Ω series resistor
	7	+24 V	+24 V
	8	RS-485 Signal A	RS-485 Signal A
	9	Not applicable	10-bit protocol select (input)
	Connector shell	Shield	Chassis ground