

Chapter 2

Electrical Installation

This chapter describes wiring terminals, main circuit terminal connections, main circuit terminal wiring specifications, control circuit terminals, and control circuit wiring specifications.

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Wiring Main Circuit Terminals

◆ Applicable Wire Sizes and Closed-loop Connectors

Select the appropriate wires and crimp terminals from Table 2.1 and Table 2.2.

Table 2.1 208-240Vac Wire Sizes and Connector Specifications						
Drive Model CIMR-P7U	Terminal Symbol	Terminal Screws	Clamping Torque lb. in. (N•m)	Possible Wire Sizes AWG (mm ²) *1	Recommended Wire Size AWG (mm ²) *2	Wire Type
20P4	R/L1, S/L2, T/L3, ⊖, ⊕1, ⊕2 U/T1, V/T2, W/T3	M4	10.6 to 13.2 (1.2 to 1.5)	14 to 10 (2 to 5.5)	14 (2)	600Vac UL Approved vinyl-sheathed or equivalent
	⊕					
20P7	R/L1, S/L2, T/L3, ⊖, ⊕1, ⊕2 U/T1, V/T2, W/T3	M4	10.6 to 13.2 (1.2 to 1.5)	14 to 10 (2 to 5.5)	14 (2)	
	⊕					
21P5	R/L1, S/L2, T/L3, ⊖, ⊕1, ⊕2 U/T1, V/T2, W/T3	M4	10.6 to 13.2 (1.2 to 1.5)	14 to 10 (2 to 5.5)	14 (2)	
	⊕					
22P2	R/L1, S/L2, T/L3, ⊖, ⊕1, ⊕2 U/T1, V/T2, W/T3	M4	10.6 to 13.2 (1.2 to 1.5)	14 to 10 (2 to 5.5)	14 (2)	
	⊕					
23P7	R/L1, S/L2, T/L3, ⊖, ⊕1, ⊕2 U/T1, V/T2, W/T3	M4	10.6 to 13.2 (1.2 to 1.5)	12 to 10 (3.5 to 5.5)	12 (3.5)	
	⊕					
25P5	R/L1, S/L2, T/L3, ⊖, ⊕1, ⊕2 U/T1, V/T2, W/T3	M4	10.6 to 13.2 (1.2 to 1.5)	12 to 10 (3.5 to 5.5)	10 (5.5)	
	⊕					
27P5	R/L1, S/L2, T/L3, ⊖, ⊕1, ⊕2 U/T1, V/T2, W/T3	M5	21.99 (2.5)	8 to 6 (8 to 14)	8 (8)	
	⊕					
2011	R/L1, S/L2, T/L3, ⊖, ⊕1, ⊕2	M5	21.99 (2.5)	6 to 4 (14 to 22)	4 (22)	
	U/T1, V/T2, W/T3				6 (14)	
	⊕					
2015	R/L1, S/L2, T/L3, ⊖, ⊕1, ⊕2	M6	35.2 to 43.99 (4.0 to 5.0)	4 to 2 (22 to 38)	3 (30)	
	U/T1, V/T2, W/T3				4 (22)	
	B1, B2	M5	21.99 (2.5)	8 to 6 (8 to 14)	Application Dependent	
	⊕	M6	35.2 to 43.99 (4.0 to 5.0)	4 (22)	4 (22)	
2018	R/L1, S/L2, T/L3, ⊖, ⊕1, ⊕2	M8	79.2 to 87.97 (9.0 to 10.0)	3 to 2 (30 to 38)	2 (38)	
	U/T1, V/T2, W/T3				3 (30)	
	B1, B2	M5	21.99 (2.5)	8 to 6 (8 to 14)	Application Dependent	
	⊕	M6	35.2 to 43.99 (4.0 to 5.0)	4 (22)	4 (22)	
2022	R/L1, S/L2, T/L3, ⊖, ⊕1, R1/L11, S1/L21, T1/L31	M8	79.2 to 87.97 (9.0 to 10.0)	N/A	1 (50)	
	U/T1, V/T2, W/T3,				2 (38)	
	⊕3	M6	35.2 to 43.99 (4.0 to 5.0)	N/A	Application Dependent	
	⊕	M8	79.2 to 87.97 (9.0 to 10.0)	N/A	4 (22)	
2030	R/L1, S/L2, T/L3, ⊖, ⊕1 U/T1, V/T2, W/T3, R1/L11, S1/L21, T1/L31	M8	79.2 to 87.97 (9.0 to 10.0)	N/A	1/0 (60)	
	⊕3	M6	35.2 to 43.99 (4.0 to 5.0)	N/A	Application Dependent	
	⊕	M8	79.2 to 87.97 (9.0 to 10.0)	N/A	4 (22)	

Table 2.1 208-240Vac Wire Sizes and Connector Specifications (Continued)

Drive Model CIMR-P7U	Terminal Symbol	Terminal Screws	Clamping Torque lb. in. (N•m)	Possible Wire Sizes AWG (mm ²) *1	Recommended Wire Size AWG (mm ²) *2	Wire Type
2037	R/L1, S/L2, T/L3, ⊖, ⊕ ₁ U/T1, V/T2, W/T3, R1/L11, S1/L21, T1/L31	M10	154.8 to 197.9 (17.6 to 22.5)	N/A	4/0 (100)	600Vac UL Approved vinyl-sheathed or equivalent
	⊕ ₃	M8	77.4 to 95.0 (8.8 to 10.8)	N/A	Application Dependent	
	⊖	M10	154.8 to 197.9 (17.6 to 22.5)	N/A	2 (38)	
	r/l1, s/l2	M4	11.4 to 12.3 (1.3 to 1.4)	N/A	16 (1.25)	
2045	R/L1, S/L2, T/L3, ⊖, ⊕ ₁ , R1/L11, S1/L21, T1/L31	M10	154.8 to 197.9 (17.6 to 22.5)	N/A	300 (150)	
	U/T1, V/T2, W/T3				250 (125)	
	⊕ ₃	M8	77.4 to 95.0 (8.8 to 10.8)	N/A	Application Dependent	
	⊖	M10	154.8 to 197.9 (17.6 to 22.5)	N/A	1 (50)	
	r/l1, s/l2	M4	11.4 to 12.3 (1.3 to 1.4)	N/A	16 (1.25)	
2055	R/L1, S/L2, T/L3, ⊖, ⊕ ₁ , U/T1, V/T2, W/T3, R1/L11, S1/L21, T1/L31	M10	154.8 to 197.9 (17.6 to 22.5)	N/A	1/0 X 2P (60 X 2P)	
	⊕ ₃	M8	77.4 to 95.0 (8.8 to 10.8)	N/A	Application Dependent	
	⊖	M10	154.8 to 197.9 (17.6 to 22.5)	N/A	1/0 (60)	
	r/l1, s/l2	M4	11.4 to 12.3 (1.3 to 1.4)	N/A	16 (1.25)	
2075	R/L1, S/L2, T/L3, R1/L11, S1/L21, T1/L31	M10	154.8 to 197.9 (17.6 to 22.5)	N/A	4/0 X 2P (100 X 2P)	
	U/T1, V/T2, W/T3			N/A	3/0 X 2P (80 X 2P)	
	⊖, ⊕ ₁	M12	276.2 to 344.8 (31.4 to 39.2)	N/A	3/0 X 2P (80 X 2P)	
	⊕ ₃	M8	77.4 to 95.0 (8.8 to 10.8)	N/A	Application Dependent	
	⊖	M12	276.2 to 344.8 (31.4 to 39.2)	N/A	3/0 (80)	
	r/l1, s/l2	M4	11.4 to 12.3 (1.3 to 1.4)	N/A	16 (1.25)	
2090	R/L1, S/L2, T/L3, ⊖, ⊕ ₁ , R1/L11, S1/L21, T1/L31	M12	276.2 to 344.8 (31.4 to 39.2)	N/A	250 X 2P (125 X 2P)	
	U/T1, V/T2, W/T3			N/A	4/0 X 2P (100 X 2P)	
	⊕ ₃	M8	77.4 to 95.0 (8.8 to 10.8)	N/A	Application Dependent	
	⊖	M12	276.2 to 344.8 (31.4 to 39.2)	N/A	2/0 X 2P (70 X 2P)	
	r/l1, s/l2	M4	11.4 to 12.3 (1.3 to 1.4)	N/A	16 (1.25)	
2110	R/L1, S/L2, T/L3, ⊖, ⊕ ₁ , R1/L11, S1/L21, T1/L31	M12	276.2 to 344.8 (31.4 to 39.2)	N/A	350 X 2P (200 X 2P)	
	U/T1, V/T2, W/T3			N/A	300 X 2P (150 X 2P)	
	⊕ ₃	M8	77.4 to 95.0 (8.8 to 10.8)	N/A	Application Dependent	
	⊖	M12	276.2 to 344.8 (31.4 to 39.2)	N/A	300 X 2P (150 X 2P)	
	r/l1, s/l2	M4	11.4 to 12.3 (1.3 to 1.4)	N/A	16 (1.25)	

*1 Wire size range provided for Drives using insulated screw-type terminal blocks. All other models require the use of UL listed connectors. Refer to Table 2.3.
 *2 Recommended wire sizes are based on the normal duty (ND) current ratings and NEC Article 310 Table 310.16, 75 degree Celsius copper or equivalent.
 When sizing wiring based on the heavy duty (HD) current ratings, consult NEC Article 430 and any other applicable codes.

Table 2.2 480Vac Wire Sizes and Connector Specifications

Drive Model CIMR-P7U	Terminal Symbol	Terminal Screws	Clamping Torque lb. in. (N•m)	Possible Wire Sizes AWG (mm ²) *1	Recommended Wire Size AWG (mm ²) *2	Wire Type
40P4	R/L1, S/L2, T/L3, ⊖, ⊕1, ⊕2 U/T1, V/T2, W/T3	M4	10.6 to 13.2 (1.2 to 1.5)	14 to 10 (2 to 5.5)	14 (2)	600Vac UL Approved vinyl-sheathed or equivalent
	⊕					
40P7	R/L1, S/L2, T/L3, ⊖, ⊕1, ⊕2 U/T1, V/T2, W/T3	M4	10.6 to 13.2 (1.2 to 1.5)	14 to 10 (2 to 5.5)	14 (2)	
	⊕					
41P5	R/L1, S/L2, T/L3, ⊖, ⊕1, ⊕2 U/T1, V/T2, W/T3	M4	10.6 to 13.2 (1.2 to 1.5)	14 to 10 (2 to 5.5)	14 (2)	
	⊕					
42P2	R/L1, S/L2, T/L3, ⊖, ⊕1, ⊕2 U/T1, V/T2, W/T3	M4	10.6 to 13.2 (1.2 to 1.5)	14 to 10 (2 to 5.5)	14 (2)	
	⊕					
43P7 44P0	R/L1, S/L2, T/L3, ⊖, ⊕1, ⊕2 U/T1, V/T2, W/T3	M4	10.6 to 13.2 (1.2 to 1.5)	14 to 10 (2 to 5.5)	12 (3.5)	
	⊕				14 (2)	
45P5	R/L1, S/L2, T/L3, ⊖, ⊕1, ⊕2 U/T1, V/T2, W/T3	M4	10.6 to 13.2 (1.2 to 1.5)	12 to 10 (3.5 to 5.5)	12 (3.5)	
	⊕			14 to 10 (2 to 5.5)	14 (2)	
47P5	R/L1, S/L2, T/L3, ⊖, ⊕1, ⊕2 U/T1, V/T2, W/T3	M4	15.6 (1.8)	10 (5.5)	10 (5.5)	
	⊕			12 to 10 (3.5 to 5.5)	12 (3.5)	
49P0/4011	R/L1, S/L2, T/L3, ⊖, ⊕1, ⊕2	M5	21.99 (2.5)	10 to 6 (5.5 to 14)	8 (8)	
	U/T1, V/T2, W/T3				10 (5.5)	
	⊕					
4015	R/L1, S/L2, T/L3, ⊖, ⊕1, ⊕2, B1, B2 U/T1, V/T2, W/T3	M5	21.99 (2.5)	8 to 6 (8 to 14)	8 (8)	
	⊕	M5	21.99 (2.5)	10 to 6 (5.5 to 14)	10 (5.5)	
		M6	35.2 to 43.99 (4.0 to 5.0)			
4018	R/L1, S/L2, T/L3, ⊖, ⊕1, ⊕2	M6	35.2 to 43.99 (4.0 to 5.0)	8 to 2 (8 to 38)	6 (14)	
	U/T1, V/T2, W/T3				8 (8)	
	B1, B2	M5	21.99 (2.5)	8 (8)	8 (8)	
	⊕	M6	35.2 to 43.99 (4.0 to 5.0)	8 to 4 (8 to 22)	8 (8)	
4022	R/L1, S/L2, T/L3, ⊖, ⊕1, ⊕3, R1/L11, S1/L21, T1/L31	M6	35.2 to 43.99 (4.0 to 5.0)	N/A	4 (22)	
	U/T1, V/T2, W/T3				6 (14)	
	⊕	M8	79.2 to 87.97 (9.0 to 10.0)	N/A	6 (14)	

Table 2.2 480Vac Wire Sizes and Connector Specifications (Continued)

Drive Model CIMR-P7U	Terminal Symbol	Terminal Screws	Clamping Torque lb. in. (N*m)	Possible Wire Sizes AWG (mm ²) *1	Recommended Wire Size AWG (mm ²) *2	Wire Type
4024/4030	R/L1, S/L2, T/L3, ⊖, ⊕1, ⊕3, R1/L11, S1/L21, T1/L31	M6	35.2 to 43.99 (4.0 to 5.0)	N/A	3 (30)	600Vac UL Approved vinyl-sheathed or equivalent
	U/T1, V/T2, W/T3				4 (22)	
	⊕	M8	79.2 to 87.97 (9.0 to 10.0)	N/A	4 (22)	
4037	R/L1, S/L2, T/L3, ⊖, ⊕1, R1/L11, S1/L21, T1/L31	M8	79.2 to 87.97 (9.0 to 10.0)	N/A	2 (38)	
	U/T1, V/T2, W/T3				3 (30)	
	⊕3	M6	35.2 to 43.99 (4.0 to 5.0)	N/A	Application Dependent	
	⊕	M8	79.2 to 87.97 (9.0 to 10.0)	N/A	4 (22)	
4045	R/L1, S/L2, T/L3, ⊖, ⊕1, R1/L11, S1/L21, T1/L31	M8	79.2 to 87.97 (9.0 to 10.0)	N/A	1/0 (60)	
	U/T1, V/T2, W/T3				1 (50)	
	⊕3	M6	35.2 to 43.99 (4.0 to 5.0)	N/A	Application Dependent	
	⊕	M8	79.2 to 87.97 (9.0 to 10.0)	N/A	4 (22)	
4055	R/L1, S/L2, T/L3, ⊖, ⊕1, U/T1, V/T2, W/T3, R1/L11, S1/L21, T1/L31	M8	79.2 to 87.97 (9.0 to 10.0)	N/A	2/0 (70)	
	⊕3	M6	35.2 to 43.99 (4.0 to 5.0)	N/A	Application Dependent	
	⊕	M8	79.2 to 87.97 (9.0 to 10.0)	N/A	4 (22)	
4075	R/L1, S/L2, T/L3, ⊖, ⊕1, R1/L11, S1/L21, T1/L31	M10	154.8 to 197.5 (17.6 to 22.5)	N/A	4/0 (100)	
	U/T1, V/T2, W/T3			N/A	3/0 (80)	
	⊕3	M8	77.4 to 95.0 (8.8 to 10.8)	N/A	Application Dependent	
	⊕	M10	154.8 to 197.5 (17.6 to 22.5)	N/A	2 (38)	
	r/l1, ⌀200/ℓ200, ⌀400/ℓ2400	M4	11.4 to 12.3 (1.3 to 1.4)	N/A	16 (1.25)	
4090	R/L1, S/L2, T/L3, ⊖, ⊕1, R1/L11, S1/L21, T1/L31	M10	154.8 to 197.5 (17.6 to 22.5)	N/A	250 (125)	
	U/T1, V/T2, W/T3			N/A	4/0 (100)	
	⊕3	M8	77.4 to 95.0 (8.8 to 10.8)	N/A	Application Dependent	
	⊕	M10	154.8 to 197.5 (17.6 to 22.5)	N/A	1 (50)	
	r/l1, ⌀200/ℓ200, ⌀400/ℓ2400	M4	11.4 to 12.3 (1.3 to 1.4)	N/A	16 (1.25)	
4110	R/L1, S/L2, T/L3, ⊖, ⊕1, R1/L11, S1/L21, T1/L33	M10	154.8 to 197.5 (17.6 to 22.5)	N/A	2/0 × 2P (70 × 2P)	
	U/T1, V/T2, W/T3			N/A	1/0 × 2P (60 × 2P)	
	⊕3	M8	77.4 to 95.0 (8.8 to 10.8)	N/A	Application Dependent	
	⊕	M12	276.2 to 344.8 (31.4 to 39.2)	N/A	2/0 (70)	
	r/l1, ⌀200/ℓ200, ⌀400/ℓ2400	M4	11.4 to 12.3 (1.3 to 1.4)	N/A	16 (1.25)	

Table 2.2 480Vac Wire Sizes and Connector Specifications (Continued)

Drive Model CIMR-P7U	Terminal Symbol	Terminal Screws	Clamping Torque lb. in. (N•m)	Possible Wire Sizes AWG (mm ²) *1	Recommended Wire Size AWG (mm ²) *2	Wire Type
4132	R/L1, S/L2, T/L3, ⊖, ⊕1, R1/L11, S1/L21, T1/L33	M10	154.8 to 197.5 (17.6 to 22.5)	N/A	3/0 × 2P (80 × 2P)	
	U/T1, V/T2, W/T3				2/0 × 2P (70 × 2P)	
	⊕3	M8	77.4 to 95.0 (8.8 to 10.8)	N/A	Application Dependent	
	⊖	M12	276.2 to 344.8 (31.4 to 39.2)	N/A	4/0 (100)	
	r/l1, 4200/l2200, 4400/l2400	M4	11.4 to 12.3 (1.3 to 1.4)	N/A	16 (1.25)	
4160	R/L1, S/L2, T/L3, ⊖, ⊕1, R1/L11, S1/L21, T1/L33	M12	276.2 to 344.8 (31.4 to 39.2)	N/A	4/0 × 2P (100 × 2P)	
	U/T1, V/T2, W/T3				3/0 × 2P (80 × 2P)	
	⊕3	M8	77.4 to 95.0 (8.8 to 10.8)	N/A	Application Dependent	
	⊖	M12	276.2 to 344.8 (31.4 to 39.2)	N/A	1/0 × 2P (60 × 2P)	
	r/l1, 4200/l2200, 4400/l2400	M4	11.4 to 12.3 (1.3 to 1.4)	N/A	16 (1.25)	
4185	R/L1, S/L2, T/L3, U/T1, V/T2, W/T3, R1/L11, S1/L21, T1/L33	M16	693.9 to 867.4 (78.4 to 98.0)	N/A	300 x 2P (150 x 2P)	
	⊖, ⊕1				600 X 2P (325 X 2P)	
	⊕3				Application Dependent	
	⊖				3/0 x 2P (80 x 2P)	
	r/l1, 4200/l2200, 4400/l2400	M4	11.4 to 12.3 (1.3 to 1.4)	N/A	16 (1.25)	
4220	R/L1, S/L2, T/L3, R1/L11, S1/L21, T1/L33	M16	693.9 to 867.4 (78.4 to 98.0)	N/A	500 x 2P (325 x 2P)	
	U/T1, V/T2, W/T3				400 x 2P (200 x 2P)	
	⊖, ⊕1				250 X 4P (125 X 4P)	
	⊕3				Application Dependent	
	⊖				250 x 2P (125 x 2P)	
	r/l1, 4200/l2200, 4400/l2400	M4	11.4 to 12.3 (1.3 to 1.4)	N/A	16 (1.25)	
4300	R/L1, S/L2, T/L3, R1/L11, S1/L21, T1/L33	M16	693.9 to 867.4 (78.4 to 98.0)	N/A	250 x 4P (125 x 4P)	
	U/T1, V/T2, W/T3				4/0 x 4P (100 x 4P)	
	⊖, ⊕1				400 X 4P (200 X 4P)	
	⊕3				Application Dependent	
	⊖				250 x 2P (125 x 2P)	
	r/l1, 4200/l2200, 4400/l2400	M4	11.4 to 12.3 (1.3 to 1.4)	N/A	16 (1.25)	

600Vac
UL Approved
vinyl-sheathed
or equivalent

*1 Wire size range provided for Drives using insulated screw-type terminal blocks. All other models require the use of UL listed connectors. Refer to Table 2.3.
*2 Recommended wire sizes are based on the AC drive normal duty (ND) current ratings and NEC Article 310 Table 310.16, 75 Degree Celsius copper or equivalent.

IMPORTANT

Determine the wire size for the main circuit so that line voltage drop is within 2% of the rated voltage. Line voltage drop is calculated as follows:

$$\text{Line voltage drop (V)} = \sqrt{3} \times \text{wire resistance } (\Omega/\text{km}) \times \text{wire length (m)} \times \text{current (A)} \times 10^{-3}$$