IG.P7.03
Installation Guide for P7 Drives

Purpose:
This document describes wiring terminals, main circuit terminal connections and main circuit terminal wiring specifications for the standard P7 drive.

The contents of this document are included in the P7 User Manual TM.P7.01:

- Chapter 2, pages 2-1 through 2-7
  - Section: Wiring Main Circuit Terminals
  - Table 2.1 208-240Vac Wire Sizes and Connector Specifications
  - Table 2.2 480Vac Wire Sizes and Connector Specifications

Information in this document supercedes that contained in TM.P7.01 with dates 5/1/06, Rev: 06-05, and earlier. The data in this document reflects the most recent information provided by Yaskawa regarding these specific wire size tables.

This document is subject to change without notice. The latest version of this document can be obtained from the Yaskawa website www.yaskawa.com by entering IG.P7.03 into the Yaskawa site search.

Applicability:
This document applies to the following models of P7 drives:

CIMR-P7U20P4
CIMR-P7U20P7
CIMR-P7U21P5
CIMR-P7U22P2
CIMR-P7U23P7
CIMR-P7U25P5
CIMR-P7U27P5
CIMR-P7U2011
CIMR-P7U2015
CIMR-P7U2018
CIMR-P7U2022
CIMR-P7U2030
CIMR-P7U2037
CIMR-P7U2045
CIMR-P7U2055
CIMR-P7U2075
CIMR-P7U2090
CIMR-P7U2110

CIMR-P7U40P4
CIMR-P7U40P7
CIMR-P7U41P5
CIMR-P7U42P2
CIMR-P7U43P7
CIMR-P7U45P5
CIMR-P7U47P5
CIMR-P7U49P0
CIMR-P7U4011
CIMR-P7U4015
CIMR-P7U4018
CIMR-P7U4024
CIMR-P7U4030
CIMR-P7U4037
CIMR-P7U4045
CIMR-P7U4055
CIMR-P7U4075
CIMR-P7U4090
CIMR-P7U4110
CIMR-P7U4160
CIMR-P7U4185
CIMR-P7U4220
CIMR-P7U4300

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.

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, ø/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, ø/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, ø/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, ø/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, ø/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, ø/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, ø200/ℓ2200, ø400/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, ø200/ℓ2200, ø400/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, ø200/ℓ2200, ø400/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)	600Vac UL Approved vinyl-sheathed or equivalent
	U/T1, V/T2, W/T3			N/A	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, ø200/ℓ2200, ø400/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			N/A	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, ø200/ℓ2200, ø400/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			N/A	600 X 2P (325 X 2P)	
	⊕3			N/A	Application Dependent	
	⏚			N/A	3/0 x 2P (80 x 2P)	
	r/ℓ1, ø200/ℓ2200, ø400/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			N/A	400 x 2P (200 x 2P)	
	⊖, ⊕1			N/A	250 X 4P (125 X 4P)	
	⊕3			N/A	Application Dependent	
	⏚			N/A	250 x 2P (125 x 2P)	
	r/ℓ1, ø200/ℓ2200, ø400/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			N/A	4/0 x 4P (100 x 4P)	
	⊖, ⊕1			N/A	400 X 4P (200 X 4P)	
	⊕3			N/A	Application Dependent	
	⏚			N/A	250 x 2P (125 x 2P)	
	r/ℓ1, ø200/ℓ2200, ø400/ℓ2400	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 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:

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