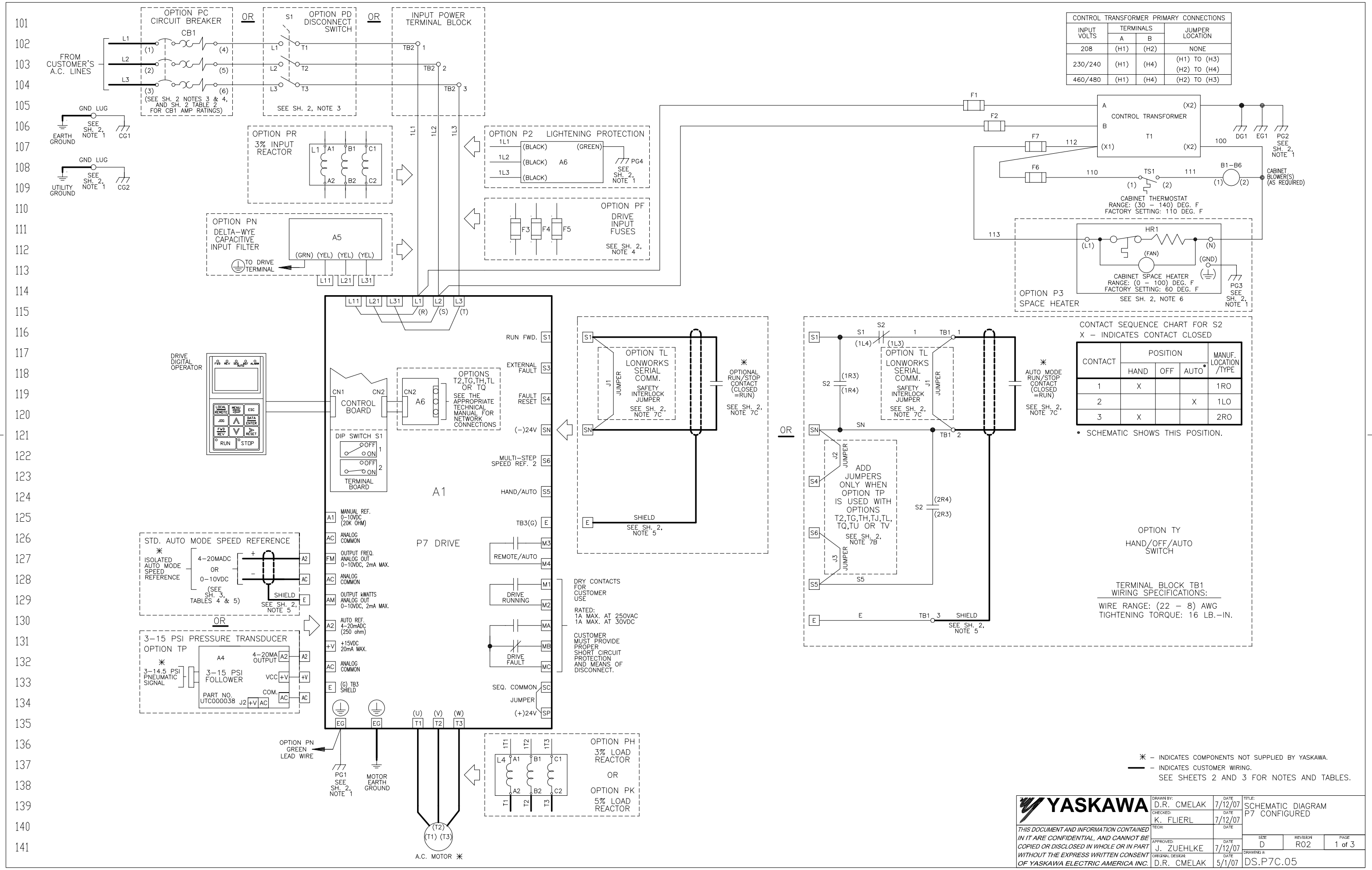

CONTROL TRANSFORMER PRIMARY CONNECTIONS

INPUT VOLTS	TERMINALS A	TERMINALS B	JUMPER LOCATION
208	(H1)	(H2)	NONE
230/240	(H1)	(H4)	(H1) TO (H3) (H2) TO (H4)
460/480	(H1)	(H4)	(H2) TO (H3)

CONTACT SEQUENCE CHART FOR S2
X – INDICATES CONTACT CLOSED

CONTACT	POSITION HAND	POSITION OFF	POSITION AUTO •	MANUF. LOCATION /TYPE
1	X			1RO
2			X	1LO
3	X			2RO

• SCHEMATIC SHOWS THIS POSITION.

NOTES:

1. CONNECTED TO THE CABINET. CUSTOMER TO CONNECT THE CABINET GROUND LUGS TO EARTH GROUND AND UTILITY GROUND.
2. THE CUSTOMER MUST USE TYPE 3R RATED HUBS OR FITTINGS (OR EQUIVALENT) TO MAINTAIN THE ENCLOSURE RATING.
3. WITHOUT THE CIRCUIT BREAKER (OPTION PC) OR DISCONNECT SWITCH (OPTION PD), THE DISCONNECT MEANS MUST BE SUPPLIED BY THE CUSTOMER.
4. IF THE CIRCUIT BREAKER (OPTION PC) OR DRIVE INPUT FUSES (OPTION PF) ARE NOT ADDED, THEN BRANCH CIRCUIT PROTECTION (CIRCUIT BREAKER OR AC INPUT FUSES) MUST BE SUPPLIED BY THE CUSTOMER.
5. INSULATED TWISTED SHIELDED WIRE IS REQUIRED. 2 CONDUCTOR #18GA. (BELDEN NO. 8760, OR EQUIVALENT). SHIELD TO CONNECT TO PROPER TERMINAL AS SHOWN. CONNECT THE SHIELD ONLY AT THIS END. STUB AND ISOLATE THE OTHER END. DO NOT RUN THESE WIRES IN THE SAME CONDUIT AS THE AC POWER AND AC CONTROL WIRES.
6. CUSTOMER TO ADJUST THE THERMOSTAT ON THE SPACE HEATER HR1 FOR THE MINIMUM DESIRED TEMPERATURE INSIDE THE DRIVE CABINET. THIS SET TEMPERATURE IS NORMALLY SELECTED TO BE SLIGHTLY HIGHER THAN THE MINIMUM AMBIENT TEMPERATURE OF THE AIR SURROUNDING THE CABINET, AND IS THE TEMPERATURE AT WHICH THE SPACE HEATER HR1 WILL SHUT OFF.
7. SERIAL COMMUNICATION OPTIONS T2, TG, TH, TJ, TL, TQ, TU OR TV (SEE SH. 3, TABLE 4 OR 5):
   OPTION T2 = ETHERNET/IP, OPTION TG = DEVICENET, OPTION TH = PROFIBUS, OPTION TJ = METASYS N2, OPTION TL = LONWORKS, OPTION TQ = ETHERNET MODBUS TCP/IP, OPTION TU = APOGEE FLN AND OPTION TV = DRIVE EMBEDDED MODBUS PROTOCOL.
   A. THE HAND/OFF/AUTO SWITCH (IF PRESENT) MUST BE IN THE "AUTO" POSITION, IF SERIAL COMMUNICATION IS TO BE USED TO CONTROL THE DRIVE.
   B. TO OBTAIN AN ANALOG SPEED REFERENCE FROM TERMINAL A2, WITH THE HAND/OFF/AUTO SWITCH PRESENT, THE FOLLOWING JUMPERS MUST BE ADDED TO THE DRIVE TERMINALS:
      1) JUMPER J2, FROM S4 TO SN
      2) JUMPER J3, FROM S5 TO S6
   C. WHEN OPTION TL IS ORDERED, A JUMPER IS REQUIRED FROM DRIVE TERMINALS (S1) TO (SN) (WITHOUT THE HAND/OFF/AUTO SWITCH), OR FROM TERMINAL BLOCK TB1 POINTS (1) TO (2) (WITH THE HAND/OFF/AUTO SWITCH), SO THAT LONWORKS SERIAL COMMUNICATIONS CAN BE USED TO CONTROL THE RUN, STOP AND SPEED OF THE AC MOTOR.
   CUSTOMER TO REPLACE THE JUMPER WITH NORMALLY CLOSED SAFETY INTERLOCKS, OR REMOTE RUN/STOP CONTACT, IF APPLICABLE.
8. SEE TABLE 4 WITHOUT THE HAND/OFF/AUTO SELECTOR SWITCH OPTION TY, AND USE THE DEFAULT SETTING WITH OPTION TY.
9. USE THE DEFAULT SETTING WITHOUT THE HAND/OFF/AUTO SELECTOR SWITCH OPTION TY, AND SEE TABLE 5 WITH OPTION TY.

CUSTOMER WIRING REQUIREMENTS

- FOR 0 TO 100 AMPS, USE A MINIMUM OF 60°–75°C COPPER WIRE.
- FOR ABOVE 100 AMPS, USE A MINIMUM OF 75°C COPPER WIRE.

(UNLESS SPECIFIED OTHERWISE)

TABLE 2 — A.C. LINE WIRING

P7 CONFIG. MODEL NO. BASE NUMBER P7CRXXXX			WITH OPTION PC, TO CIRCUIT BREAKER CB1				OR, WITH OPTION PD, TO DISCONNECT SWITCH S1				OR, WITHOUT OPTIONS PC OR PD, TO TERMINAL BLOCK TB2	
208V	240V	480V	MFG. PART NUMBER	CURRENT RATING (AMPS)	WIRE SIZE RANGE (AWG)	TIGHTENING TORQUE (LB.–IN.)	MFG. PART NUMBER	CURRENT RATING (AMPS)	WIRE SIZE RANGE (AWG)	TIGHTENING TORQUE (LB.–IN.)	WIRE SIZE RANGE (AWG)	TIGHTENING TORQUE (LB.–IN.)
	A312		MAL36500	500	(1–3) x (3/0 – 500 kcmil)	(1–3) x 300	MHL36006M	600	(1–3) x (3/0 – 500 kcmil)	(1–3) x 300	2 x (4 – 350 kcmil)	2 x 275
D343	A360	B361	MAL36600	600								
D396												
		B414	MAL36700	700								
		B477	MAL36800	800			MHL36008M	800			2 x (4 – 500 kcmil)	2 x 500
		B515										
		B590	MAL36900	900							2 x (4 – 600 kcmil)	2 x 500

TABLE 3 — A.C. MOTOR WIRING / GROUND WIRING

P7 CONFIG. MODEL NO. BASE NUMBER P7CRXXXX			WITH OPTION PH, TO OUTPUT REACTOR L4			OR, WITH OPTION PK, TO OUTPUT REACTOR L4			OR, WITHOUT OPTIONS PH OR PK, TO STANDARD AC DRIVE	GROUND LUGS	
208V	240V	480V	MFG. PART NUMBER	WIRE SIZE RANGE (AWG)	TIGHTENING TORQUE (LB.–IN.)	MFG. PART NUMBER	WIRE SIZE RANGE (AWG)	TIGHTENING TORQUE (LB.–IN.)		WIRE SIZE RANGE (AWG)	TIGHTENING TORQUE (LB.–IN.)
	A312		RL–3200X	CUSTOMER TO SUPPLY A UL LISTED CLOSED–LOOP CONNECTOR		RL–3200X	CUSTOMER TO SUPPLY A UL LISTED CLOSED–LOOP CONNECTOR		CUSTOMER TO SUPPLY A UL LISTED CLOSED–LOOP CONNECTOR, PER THE AC DRIVE TECHNICAL MANUAL USE 75°C COPPER WIRE ONLY	6 – 250 kcmil	275
D343	A360	B361	RL–4000X			RL–4000X					
D396		B414	RL–5000X			RL–50002					
		B477									
		B515	RL–6000X			RL–60002					
		B590									

TABLE 1 FACTORY SET P7 CONFIGURED DRIVE PARAMETERS

PARAMETER	DATA	UNIT	DESCRIPTION/REMARKS
b1–01	SEE TABLE 4 OR 5	N/A	FREQUENCY REFERENCE SELECTION
b1–02	SEE NOTE 8	N/A	RUN COMMAND SELECTION
b1–08	1	N/A	RUN COMMAND SELECTION DURING PROGRAMMING – ENABLED
d1–01	10.0	HZ.	FREQUENCY REFERENCE 1 – SEE TABLE 4 OR TABLE 5
d1–02	6.0	HZ.	FREQUENCY REFERENCE 2 – SEE TABLE 5
d1–04	40.0	HZ.	FREQUENCY REFERENCE 4 – SEE TABLE 5
E1–01	240(480)	VOLTS	STANDARD INPUT VOLTAGE SETTING
	208		INPUT VOLTAGE SETTING FOR BASE NUMBER "D___"
E1–05	230(460)	VOLTS	STANDARD MAXIMUM OUTPUT VOLTAGE SETTING
	208		MAXIMUM OUTPUT VOLTAGE SETTING FOR BASE NUMBER "D___"
H1–02	SEE NOTE 9	N/A	TERMINAL S4 SELECTION
H1–03	SEE NOTE 9	N/A	TERMINAL S5 SELECTION
H3–08	SEE TABLE 4 OR 5	N/A	TERMINAL A2 SIGNAL SELECTION
H3–09	SEE NOTE 9	N/A	TERMINAL A2 FUNCTION SELECTION
H3–13	SEE TABLE 4 OR 5	N/A	TERMINALS A1 AND A2 MASTER FREQUENCY REFERENCE SELECTION
H5–02	SEE TABLE 4 OR 5	N/A	SERIAL COMMUNICATIONS SPEED SELECTION BAUD RATE
H5–07	SEE TABLE 4 OR 5	N/A	REQUEST TO SEND (RTS) CONTROL SELECTION
H5–08	SEE TABLE 4 OR 5	N/A	SERIAL COMMUNICATIONS PROTOCOL SELECTION
H5–09	10.0	SEC.	SERIAL COMMUNICATIONS ERROR DETECTION TIME
L4–05	0	N/A	FREQUENCY REFERENCE LOSS DETECTION DISABLED
L5–01	10	N/A	NUMBER OF AUTO RESTART ATTEMPTS
L5–03	10.0	SEC.	MAXIMUM RESTART TIME AFTER FAULT
o2–03	1	N/A	USER INITIALIZATION FACTORY SET PARAMETER DEFAULT VALUES (FOUND IN A1–03="1110")
o3–02	1	N/A	DIGITAL OPERATOR KEYPAD READ ALLOWED ENABLED

SEE SHEET 3 FOR TABLES 4 AND 5.

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DRIVE OPERATION MODE SELECTION WITHOUT THE HAND/OFF/AUTO SELECTOR SWITCH OPTION TY

TABLE 4

OPTION PRESENT	FACTORY SET P7C CONFIGURED DRIVE PARAMETERS							DRIVE CONTROL BOARD SWITCH S1 SETTING		DRIVE MODE SPEED COMMAND						DRIVE RUN/STOP CONTROL
	b1-01	b1-02	H3-08	H3-13	H5-02	H5-07	H5-08	1	2	DRIVE KEYPAD d1-01	DRIVE TERMINAL A2 SIGNAL 4-20 MADC	0-10 VDC	3-15 PSI	SERIAL COMM.	SEE SH. 2, NOTE	
NONE +	0	0	2 ▪	0 ▪	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪	YES						DRIVE KEYPAD
NONE	1 ▪	0	2 ▪	1	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪		YES					
NONE	1 ▪	0	0	1	3 ▪	1 ▪	0 ▪	OFF ▪	OFF			YES				
NONE	0	1 ▪	2 ▪	0 ▪	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪	YES						RUN/STOP CONTACT AT DRIVE TERMINALS S1 AND SN
NONE	1 ▪	1 ▪	2 ▪	1	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪		YES					
NONE	1 ▪	1 ▪	0	1	3 ▪	1 ▪	0 ▪	OFF ▪	OFF			YES				
TP +	1 ▪	0	2 ▪	1	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪				YES			DRIVE KEYPAD
TP	1 ▪	1 ▪	2 ▪	1	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪				YES			RUN/STOP CONTACT
T2,TG,TH OR TQ +	3	3	2 ▪	0 ▪	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪					YES		SERIAL COMMUNICATIONS
T2,TG,TH OR TQ	0	3	2 ▪	0 ▪	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪	YES						
T2,TG,TH OR TQ	1 ▪	3	2 ▪	1	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪		YES					
T2,TG,TH OR TQ	1 ▪	3	0	1	3 ▪	1 ▪	0 ▪	OFF ▪	OFF			YES				
T2,TG,TH OR TQ	3	0	2 ▪	0 ▪	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪					YES		DRIVE KEYPAD
T2,TG,TH OR TQ	3	1 ▪	2 ▪	0 ▪	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪					YES		RUN/STOP CONTACT
(T2,TG,TH OR TQ) AND TP	1 ▪	3	2 ▪	1	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪				YES			SERIAL COMM.
TJ +	2	2	2 ▪	0 ▪	3 ▪	1 ▪	1	OFF ▪	ON ▪					YES		SERIAL COMMUNICATIONS
TJ	0	2	2 ▪	0 ▪	3 ▪	1 ▪	1	OFF ▪	ON ▪	YES						
TJ	1 ▪	2	2 ▪	1	3 ▪	1 ▪	1	OFF ▪	ON ▪		YES					
TJ	1 ▪	2	0	1	3 ▪	1 ▪	1	OFF ▪	OFF			YES				
TJ	2	0	2 ▪	0 ▪	3 ▪	1 ▪	1	OFF ▪	ON ▪					YES		DRIVE KEYPAD
TJ	2	1 ▪	2 ▪	0 ▪	3 ▪	1 ▪	1	OFF ▪	ON ▪					YES		RUN/STOP CONTACT
TJ AND TP	1 ▪	2	2 ▪	1	3 ▪	1 ▪	1	OFF ▪	ON ▪				YES			SERIAL COMM.
TU +	2	2	2 ▪	0 ▪	2	1 ▪	2	OFF ▪	ON ▪					YES		SERIAL COMMUNICATIONS
TU	0	2	2 ▪	0 ▪	2	1 ▪	2	OFF ▪	ON ▪	YES						
TU	1 ▪	2	2 ▪	1	2	1 ▪	2	OFF ▪	ON ▪		YES					
TU	1 ▪	2	0	1	2	1 ▪	2	OFF ▪	OFF			YES				
TU	2	0	2 ▪	0 ▪	2	1 ▪	2	OFF ▪	ON ▪					YES		DRIVE KEYPAD
TU	2	1 ▪	2 ▪	0 ▪	2	1 ▪	2	OFF ▪	ON ▪					YES		RUN/STOP CONTACT
TU AND TP	1 ▪	2	2 ▪	1	2	1 ▪	2	OFF ▪	ON ▪				YES			SERIAL COMM.
TV +	2	2	2 ▪	0 ▪	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪					YES		SERIAL COMMUNICATIONS
TV	0	2	2 ▪	0 ▪	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪	YES						
TV	1 ▪	2	2 ▪	1	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪		YES					
TV	1 ▪	2	0	1	3 ▪	1 ▪	0 ▪	OFF ▪	OFF			YES				
TV	2	0	2 ▪	0 ▪	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪					YES		DRIVE KEYPAD
TV	2	1 ▪	2 ▪	0 ▪	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪					YES		RUN/STOP CONTACT
TV AND TP	1 ▪	2	2 ▪	1	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪				YES			SERIAL COMM.
TL +	2	2	2 ▪	0 ▪	3 ▪	0	0 ▪	ON	ON ▪					YES		SERIAL COMMUNICATIONS
TL	0	2	2 ▪	0 ▪	3 ▪	0	0 ▪	ON	ON ▪	YES						
TL	1 ▪	2	2 ▪	1	3 ▪	0	0 ▪	ON	ON ▪		YES					
TL	1 ▪	2	0	1	3 ▪	0	0 ▪	ON	OFF			YES				
TL	2	0	2 ▪	0 ▪	3 ▪	0	0 ▪	ON	ON ▪					YES		DRIVE KEYPAD
TL	2	1 ▪	2 ▪	0 ▪	3 ▪	0	0 ▪	ON	ON ▪					YES	7C	RUN/STOP CONTACT
TL AND TP	1 ▪	2	2 ▪	1	3 ▪	0	0 ▪	ON	ON ▪				YES			SERIAL COMM.

+ = STANDARD P7C CONFIGURED SET UP

▪ = FACTORY 2-WIRE INITIALIZATION/DEFAULT SETTING

SEE SHEET 2 FOR NOTES, AND TABLES 1, 2 AND 3.

DRIVE OPERATION MODE SELECTION WITH THE HAND/OFF/AUTO SELECTOR SWITCH OPTION TY

TABLE 5

OPTION PRESENT	FACTORY SET P7C CONFIGURED DRIVE PARAMETERS									DRIVE CONTROL BOARD SWITCH S1 SETTING		DRIVE MODE SPEED COMMAND: HAND MODE			AUTO MODE					DRIVE RUN/STOP CONTROL	
	b1-01	H1-02 (S4)	H1-03 (S5)	H3-08	H3-09	H3-13	H5-02	H5-07	H5-08	1	2	DRIVE KEYPAD d1-01	DRIVE KEYPAD d1-02	DRIVE KEYPAD d1-04	DRIVE TERMINAL A2 SIGNAL 4-20 MADC	0-10 VDC	3-15 PSI	SERIAL COMM.	SEE SH. 2, NOTE	HAND MODE	AUTO MODE
TY +	1 ▪	14 ▪	3 ▪	2 ▪	0	1	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪		YES		YES					HAND/OFF/AUTO SWITCH IN THE "HAND" POSITION	AUTO MODE RUN/STOP CONTACT AT TB1(1) AND TB1(2)
TY	1 ▪	14 ▪	3 ▪	0	0	1	3 ▪	1 ▪	0 ▪	OFF ▪	OFF		YES			YES					
TY AND TP	1 ▪	14 ▪	3 ▪	2 ▪	0	1	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪		YES				YES				
(T2,TG,TH OR TQ) AND TY +	0	14 ▪	2	2 ▪	2 ▪	0 ▪	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪	YES						YES	7A		
(T2,TG,TH OR TQ) AND TY	0	3	2	2 ▪	2 ▪	0 ▪	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪			YES	YES				7A,7B		
(T2,TG,TH OR TQ) AND TY	0	3	2	0	2 ▪	0 ▪	3 ▪	1 ▪	0 ▪	OFF ▪	OFF			YES		YES			7A,7B		
(T2,TG,TH OR TQ), TY AND TP	0	3	2	2 ▪	2 ▪	0 ▪	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪			YES			YES		7A,7B		
TJ AND TY +	0	14 ▪	6C	2 ▪	2 ▪	0 ▪	3 ▪	1 ▪	1	OFF ▪	ON ▪	YES						YES	7A		AUTO MODE RUN/STOP CONTACT AT TB1(1) AND TB1(2)
TJ AND TY	0	3	6C	2 ▪	2 ▪	0 ▪	3 ▪	1 ▪	1	OFF ▪	ON ▪			YES	YES				7A,7B		
TJ AND TY	0	3	6C	0	2 ▪	0 ▪	3 ▪	1 ▪	1	OFF ▪	OFF			YES		YES			7A,7B		
TJ,TY AND TP	0	3	6C	2 ▪	2 ▪	0 ▪	3 ▪	1 ▪	1	OFF ▪	ON ▪			YES			YES		7A,7B		
TU AND TY +	0	14 ▪	6C	2 ▪	2 ▪	0 ▪	2	1 ▪	2	OFF ▪	ON ▪	YES						YES	7A		SERIAL COMM.
TU AND TY	0	3	6C	2 ▪	2 ▪	0 ▪	2	1 ▪	2	OFF ▪	ON ▪			YES	YES				7A,7B		
TU AND TY	0	3	6C	0	2 ▪	0 ▪	2	1 ▪	2	OFF ▪	OFF			YES		YES			7A,7B		
TU,TY AND TP	0	3	6C	2 ▪	2 ▪	0 ▪	2	1 ▪	2	OFF ▪	ON ▪			YES			YES		7A,7B		
TV AND TY +	0	14 ▪	6C	2 ▪	2 ▪	0 ▪	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪	YES						YES	7A		
TV AND TY	0	3	6C	2 ▪	2 ▪	0 ▪	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪			YES	YES				7A,7B		
TV AND TY	0	3	6C	0	2 ▪	0 ▪	3 ▪	1 ▪	0 ▪	OFF ▪	OFF			YES		YES			7A,7B		
TV,TY AND TP	0	3	6C	2 ▪	2 ▪	0 ▪	3 ▪	1 ▪	0 ▪	OFF ▪	ON ▪			YES			YES		7A,7B		
TL AND TY +	0	14 ▪	6C	2 ▪	2 ▪	0 ▪	3 ▪	0	0 ▪	ON	ON ▪	YES						YES	7A		
TL AND TY	0	3	6C	2 ▪	2 ▪	0 ▪	3 ▪	0	0 ▪	ON	ON ▪			YES	YES				7A,7B		
TL AND TY	0	3	6C	0	2 ▪	0 ▪	3 ▪	0	0 ▪	ON	OFF			YES		YES			7A,7B		
TL,TY AND TP	0	3	6C	2 ▪	2 ▪	0 ▪	3 ▪	0	0 ▪	ON	ON ▪			YES			YES		7A,7B		

+ = STANDARD P7C CONFIGURED SET UP

▪ = FACTORY 2-WIRE INITIALIZATION/DEFAULT SETTING

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