

Manual Addendum for TE-B Configured Soft Start Packages

For use with wiring diagram # 93-4014 Rev A (CB/FS), or 93-4015 Rev A (MLO), and TE2 instruction manual.

Introduction: The TE-B is a configured enclosed soft start, available as a Combination (with C/B or Fused disconnect) package, or as an MLO (Main Lug Only) package, intended for use in Industrial, Commercial, Agricultural, or Infrastructure applications.

Line Voltage:

By default, units are set-up for 460VAC line power, but can be adjusted to operate on 230VAC or 208VAC at the reduced HP rating. To adjust the operating voltage simply move wire #1L2B from the 480V (H4) terminal to the 230V (H3) or 208V (H2) terminal.

Power Connections:

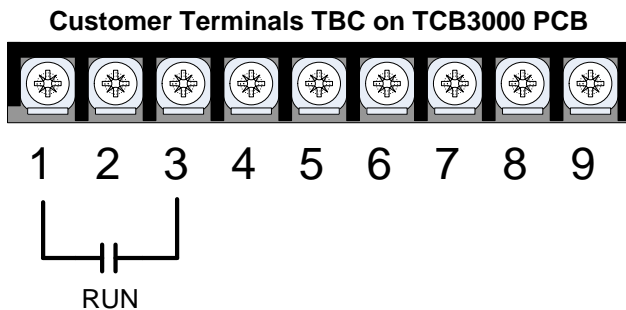
Line Power input is connected directly to the bottom terminals of the Circuit Breaker, or line terminals on MLO (Main Lug Only) units, and the motor is connected to the lugs at the bottom of the TE2 soft start.

Remote Start / Stop Control connections:

The TE-B is set up for 2 or 3 wire remote control using dry contacts rated at 120VAC (0.1Amp).

Remote Two Wire Control:

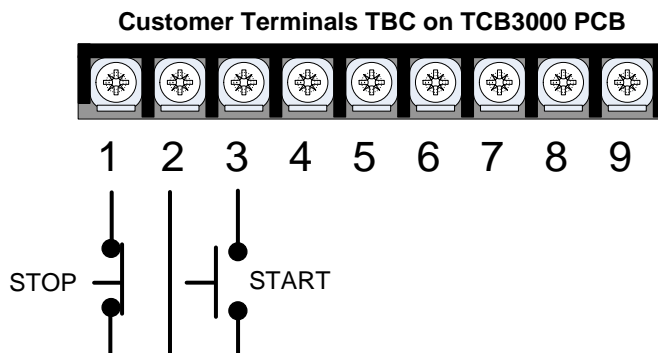
Connect a dry (voltage free) maintained contact closure between terminals 1 and 3 of the customer terminal strip as shown here.



See page 3.
TCB3000 Terminal Control Board

Remote Three Wire Control:

For standard 3-wire control, connect dry (voltage free) contacts for the Stop / Start buttons as shown below of the customer terminal strip. Connect the normally closed "STOP" pushbutton across terminals 1 & 2, and the normally open "START" pushbutton across terminals 2 & 3 of the customer terminal strip. **Note:** the unit can be operated in the "Local" position without any external control.

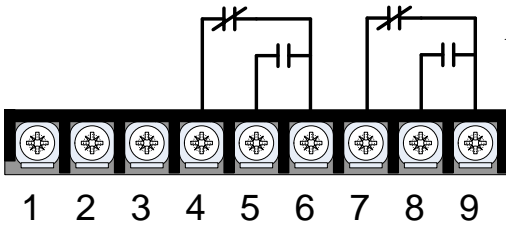


See page 3.
TCB3000 Terminal Control Board

Run Status Output Contacts

The TE-B unit offers 2 Form-C (N.O and N.C.) "RUN" contacts located on the customer terminal strip, terminals 4 (NC), 5 (NO), 6 (Common), and terminals 7 (NC), 8 (NO) 9 (Common). These contacts reflect a successful RUN command in "SOFT" or "X-LINE" mode, and should be used for any required "Run / Running" status outputs.

Customer Terminals TBC on TCB3000 PCB



Run Status Output Contacts

See page 3.
TCB3000 Terminal Control Board

TE2 Auxiliary Contacts (TB2 of Soft Starter)

There are 3 programmable Aux contacts available on TB2 of the TE2 soft start (2 form-C and 1 form-A). The function of these contacts are labeled on the wiring diagrams, but can be changed in the TE2 programming. Note however, that the contacts may not function properly when operating in the X-LINE mode. (see description below).

X-LINE Operation:

TE-B packages are supplied with a **SOFT/X-LINE** selector switch, located on the TCB3000 PCB that allows the operator to select Full Voltage operation of the motor via the bypass contactor for emergency operation when the soft start may be inoperable.

When operated in the X-LINE mode full start/stop control is maintained, and the "Run Status Output Contacts" will function correctly.

During X-LINE operation, the motor will be protected by the external Bi-Metal overload relay which must be set according to the motor FLA and the Current transformer ratio of the unit.

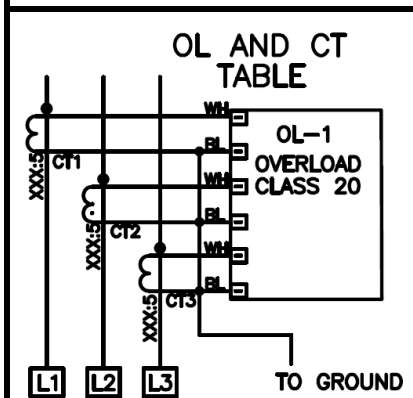
Important:

Motor FLA and Service Factor must be entered prior to a start attempt see next section on how to set Motor FLA and Service Factor parameters.

OVERLOAD RELAY OPERATION

WHEN IN HAND (H) POSITION: USER MUST RESET OL (BY PUSHING GREEN BUTTON)

WHEN IN AUTO (A) POSITION: RELAY WILL AUTOMATICALLY RESET AFTER TRIPPING



OL SET FORMULA

$$OL SET = \frac{MOTOR FLA \times 5}{CT RATING}$$

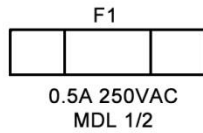
NOTE: YELLOW OVERLOAD DIAL MUST BE SET IN ACCORDANCE WITH THE MOTOR "FULL LOAD AMPS" PER MOTOR NAME PLATE DATA

YELLOW OVERLOAD ADJUSTMENT DIAL

TE-B MODEL NUMBER	CT RATING XXX:5	4	5	6
TE-B-21-YY-4	18-25A	18	22	25
TE-B-27-YY-4	28-40A	28	34	40
TE-B-40-YY-4	34-50A	34	42	50
TE-B-45-YY-4	50:5	40	50	60
TE-B-55-YY-4	75:5	60	75	90
TE-B-68-YY-4	75:5	60	75	90
TE-B-96-YY-4	100:5	80	100	120
TE-B-125-YY-4	120:5	96	120	144
TE-B-156-YY-4	200:5	160	200	240
TE-B-220-YY-4	200:5	160	200	240
TE-B-230-YY-4	250:5	200	250	300
TE-B-248-YY-4	300:5	240	300	360
TE-B-400-YY-4	400:5	320	400	480
TE-B-480-YY-4	500:5	400	500	600
TE-B-600-YY-4	500:5	400	500	600
TE-B-690-YY-4	700:5	560	700	840
TE-B-800-YY-4	700:5	560	700	840
TE-B-960-YY-4	1000:5	800	1000	1200
TE-B-1080-YY-4	1200:5	960	1200	N/A

TCB3000 Terminal Board

CUSTOMER CONNECTIONS



CNTRL POWER ON
E-STOP CLOSE
FUSE OK



Green LED
- Control Power ON
- E-Stop Not Active
- Fuse OK

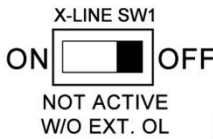
Green LED
Motor Running

MOTOR RUN



Yellow LED
X-Line Mode Enabled
(D.O.L. Start)

X-LINE MODE ON



AUX 2 OR 3 WIRE
START-STOP
INPUT



TBE
TBD

6 COM
5 NO
4 NC

XLINE RELAY

3 COM
2 NO
1 NC

FAULT RELAY

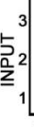
9 COM
8 NO
7 NC

RUN RELAY

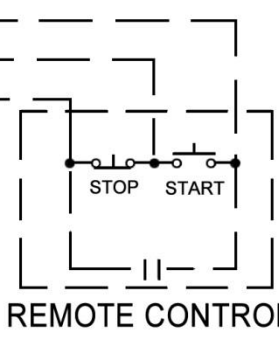
6 COM
5 NO
4 NC

RUN RELAY

REMOTE
2 OR 3 WIRE
START/STOP
INPUT



TBC



Red LED
Fault
(Unit Tripped requires
Reset Command)

FAULT



Red LED
External O/L Tripped
(Reset O/L Manually
by pressing green
button on overload
relay).

EXT OL TRIP



EXT OL INPUT
2
1
TB4

TCB3000

62-1080 RV1

Programming Instructions

This document is intended for use with Models: TE-B Soft Start Packages
Motor FLA and Service Factor must be entered prior to start attempt

Entering Motor FLA & SF



Press Key...	Means...
0000	Default Display
Fn	F001 Function #1 Selected
Read Enter	0000 FLA value (0000 is default)
↑	0009 Set value of ones digit (flashing)
←	0009 Cursor Position Shift (tens digit flashing)
↑ ←	0179 Set value of remaining FLA digits
Read Enter	End Value Accepted (flashes once)
	F001

Use up arrow to scroll to F002 and repeat process to set Service Factor. When programming is complete press Fn key to exit programming mode.

Fn #	Function Description	Range	Default
F001	Motor Nameplate FLA	50-100% of Max Amp Rating.	None
F002	Motor Nameplate Service Factor	1.00 - 1.30 SF	1.0 SF

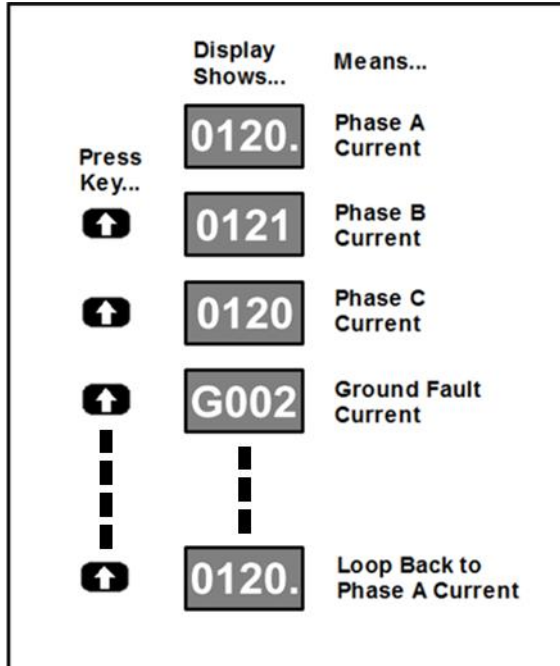
For complete parameter list see pages 6-7 of this document

For Complete Installation instructions see TE2 Instruction Manual

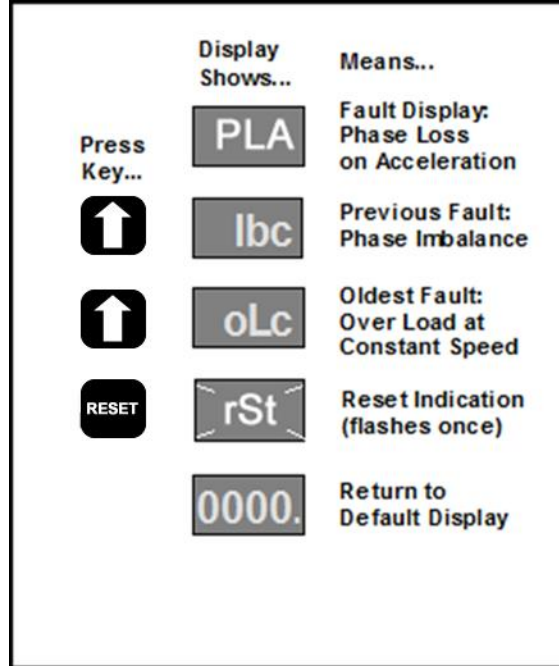
Operation and Troubleshooting

Keypad Operation

Display Mode (Default)



Fault Mode



Fault Code	Description
nFLA	No Full Load Amps set in F001
Inh	Parameter change attempted when in Run Mode or without password
N3Ph	Line Voltage Loss (no 3 phase prior to start)
Loc	Lockout Starter is in overload or duty cycle lockout
Err	Incorrect Password Entered
ocA; occ; ocd	Over Current during Acceleration; Constant speed; Deceleration
PLA; PLc; <u>PLd</u> *	Phase Loss during Acceleration; Constant speed; Deceleration
otA; otc; otd	Over Temperature during Acceleration; Constant speed; Deceleration
oLA; oLc; oLd	Over Load during Acceleration; Constant speed; Deceleration
SSA; SSc; <u>SSd</u> *	Shorted SCR during Acceleration; Constant speed; Deceleration
st	Shunt Trip during Acceleration; Constant speed; Deceleration
IbA; Ibc; Ibd	Current Imbalance during Acceleration; Constant speed; Deceleration
UcA; Ucc; Ucd	Under Current during Acceleration; Constant speed; Deceleration
ScA; Scc; Scd	Short Circuit during Acceleration; Constant speed; Deceleration
GfA; Gfc; Gfd	Ground Fault during Acceleration; Constant speed; Deceleration
bPA; bPc; bPd	Bypass Discrepancy during Acceleration; Constant speed; Deceleration
LcA; Lcc; <u>Lcd</u> *	Normally closed external lockout is open
rtA; rtc; rtd	Rotation Trip during Acceleration; Constant speed; Deceleration
EIA; Eic; Eid	Voltage Imbalance during Acceleration; Constant speed; Deceleration
oEA; oEc; oEd	Overvoltage during Acceleration; Constant speed; Deceleration
UEA; UEc; UEd	Undervoltage during Acceleration; Constant speed; Deceleration
PfA; Pfc; Pfd	Power Factor trip during Acceleration; Constant speed; Deceleration
PrA; Prc; Prd	Power (kW) trip during Acceleration; Constant speed; Deceleration
ncPA; ncPc; ncPd	Control Power Loss during Acceleration; Constant speed; Deceleration

*NOTES:

“PLd” can be caused by a Grounded delta power system. If one input leg measures ZERO volts to ground, reduce the setting of F051 to “0054” for operation on a “Grounded Delta”.

“SSd” can be caused by operating without a motor connected, ensure the motor is firmly connected.

“LcA, Lcc, or Lcd” indicates that the Surge absorber is damaged; see NOTE 1 on wiring diagram.

Full Parameter List

Parameter	Description	Adjustment Range	Factory Setting		
F001	Motor FLA	50-100% of Max Amp Rating (less Service Factor)	0		
F002	Motor Service Factor	1.00-1.30	1.00		
F003	Overload Class During Start	NEMA/UL Class 5-30	10		
F004	Overload Class During Run	NEMA/UL Class 5-30	10		
F005	Overload Reset	0=Manual, 1=Auto, 2=Disabled	0:Manual		
F10	Ramp Type (If Ramp 2 is not being used, unit will ignore all settings referenced to Ramp 2)	Ramp #1	Ramp #2		
		Setting = 1	Voltage	Voltage	1
		Setting = 2	Current	Current	
		Setting = 3	Voltage	Current	
		Setting = 4	Current	Voltage	
F011	Initial Voltage of Ramp 1	0-100% Line Voltage	60%		
F012	Initial Current of Ramp 1	0-600% Motor Current	200%		
F013	Accel Ramp Time of Ramp 1	1-120 seconds	10 sec		
F014	Max Current Limit of Ramp 1	200 - 600% Motor Current	350%		
F015	Initial Voltage of Ramp 2 (if Ramp 2 is used)	0-100% Line Voltage	60%		
F016	Initial Current of Ramp 2 (if Ramp 2 is used)	0-600% Motor Current	200%		
F017	Accel Ramp Time of Ramp 2 (if Ramp 2 is used)	1-120 seconds	10Sec.		
F018	Max Current Limit of Ramp 2 (if Ramp 2 is used)	200 - 600% Motor Current	350%		
F019	Voltage Jog	5-100% Line Voltage	50%		
F020	Time of Voltage Jog	1-20 seconds	10 sec		
F021	Current Jog	100-500% Motor Current	150%		
F022	Kick Start Voltage	0=Disabled or 10-100% Line Voltage	0		
F023	Kick Time	0.1-2 seconds	0.8 sec		
F024	Deceleration Ramp (Pump Control)	0=Disabled (Coast to Stop) 1=Enabled (except after OL trip) 2=Enabled (Deceleration even during O/L trip)	0		
F025	Begin Decel Level (BDL)	0 - 100 % of Output Voltage	60%		
F026	Decel Shut Off Voltage	0 to (BDL minus 1)% Voltage	30%		
F027	Decel Ramp Time	1-60 seconds	10Sec.		
F028	Auto Restart Delay Time	0=Disabled or 1-999sec after Power Loss	0		
F029	Voltage Input	200 - 690 Volt	480		
F030	Voltage Imbalance Trip %	0, 1 - 30% [0=Disabled]	0		
F031	Voltage Imbalance Trip Delay	1 - 20 seconds	10		
F032	Over Voltage Trip %	0, 1 - 10% [0=Disabled]	0		
F033	Over Voltage Trip Delay	1 - 20 seconds	10		
F034	Under Voltage Trip on Start %	0, 1 - 20% [0=Disabled]	0		
F035	UV Trip on Start Delay	1 - 180 seconds	10		
F036	Under Voltage Trip on Run %	0, 1 - 20% [0=Disabled]	0		
F037	UV Trip Delay during Run	1 - 20 seconds	2		
F038	Shorted SCR and Trip Delay	0, 1-10 seconds [0=Disabled]	1Sec		
F039	Shunt Trip Delay	0, 1-10 seconds [0=Disabled]	1Sec		
F040	Current Imbalance Trip %	0=Disabled or 5-30% imbalance	0		
F041	Current Imbalance Trip Delay	1-20 seconds	2 sec		
F042	Over Current Trip %	0=Disabled or 100-300% of Motor FLA	0		
F043	Over Current Trip Delay	1-20 seconds	1 sec		
F044	Under Current %	0=Disabled or 10-90% of Motor FLA	0		
F045	Under Current Trip Delay	1-60 seconds	2 sec		
F046	Ground Fault Current Trip Value	0=Disabled or 5-90% of CT ratio from Fn74	0		
F047	Ground Fault Current Trip Delay	1-60 seconds	2 sec		
F048	Coast Down Lockout Time	0=Disabled or 1-60 minutes	0		
F049	Maximum Starts per Hour	0=Disabled or 1-10 Starts	0		
F050	Minimum Time Between Starts	0=Disabled or 1-60 minutes	0		
F051	nCP Trip (No Control Power)	0, 1 [0=Disabled, 1=Enabled]	1		

Parameter	Description	Adjustment Range	Factory Setting
F052	Auto Reset Selected Trips	Auto Reset Disabled	0
		Reset after Over Temperature Trip only	1
		Reset after Over Current (Shear Pin) Trip only	2
		Reset after Under Current Trip only	3
		Reset after Phase Loss Trip only	4 (Default)
		Reset after Current Unbalance Trip only	5
		Reset after Ground Fault Trip only	6
		Reset after Short Circuit Trip only	7
		Reset after OT Trip or Over/Under Current Trip	8
		Reset after Phase Loss, Current Unbal, or GF Trip	9
		Reset after all Except Short Circuit Trip	10
		Reset after all Except GF or Short Circuit Trip	11
	Reset after any Trip	12	
F053	Auto Restart Attempts	0=Disabled, 1-10 = # of Attempts	0
F054	Auto Restart Delay Readout	Readout only	
F055	Coast Down Lockout Time Readout	Readout only	
F056	Starts Per Hour Timer Readout	Readout only	
F057	Starts Per Hour Readout	Readout only	
F058	Time Value Between Starts Readout	Readout only	
F059	Thermal Capacity to Start Readout	Readout only	
F060	Aux Relay 1 setting	Run/Stop	1
F061	Aux Relay 2 setting	At Speed/Stop	2
F062	Aux Relay 3 setting	Any Trip	22
F063	Aux. Relay Delay Timer	0=Disabled or 1-999 seconds	0
F065	Communications	0=Disabled 1=Enabled(11bit) 2=Enabled(10 bit)	0:Disabled
F066	Baud Rate	4.8, 9.6, 19.2 KB	9.6
F067	Modbus Address	1-247	1
F068	Remote Starter Control from Communications	0=Disabled 1=Enabled w/Start PB 2=Enabled w/o Start PB 3=Enabled via Remote Jog Input	0
F070	Parameter Lock/ Level 1 Password	0=Disabled or 001-999	0
F071	System Clear / Factory Reset	0=Disabled, 1=Clear Lockouts 2=Reset to Factory Default	0
F073	Frame Rating	10-2000A	by model
F074	CT Value	10-2000	by model
F075	Year	2000-2047	2000
F076	Month	1-12	1
F077	Day	1-31	1
F078	Hour	0-23	0
F079	Minute	0-59	0
F080	Seconds	0-59	0
F081	Software rev # (info purposes only)	rev #	Rev #
F085	Fault History #1 (most recent fault code)	0=No Fault History, or Fault # 1-27 (full manual for fault code descriptions)	0
F086	Time Stamp Fault #1	00.00-23.59 (hh.mm)	00.00
F087	Date Stamp Fault #1	01.01-12.31 (MM-DD)	01.01
F088	Fault History #2 (previous fault code)	0=No Fault History, or Fault # 1-27 (full manual for fault code descriptions)	0
F089	Time Stamp Fault #2	00.00-23.59 (hh.mm)	00.00
F090	Date Stamp Fault #2	01.01-12.31 (MM-DD)	01.01
F091	Fault History #3 (oldest fault code)	0=No Fault History, or Fault # 1-27 (full manual for fault code descriptions)	0
F092	Time Stamp Fault #3	00.00-23.59 (hh.mm)	00.00
F093	Date Stamp Fault #3	01.01-12.31 (MM-DD)	01.01
F094	Run Time Hours	000.9-999.9 hours	0000

Parameter	Description	Adjustment Range	Factory Setting																											
F095	Run Time in 1,000s of hours	0000-9999K hours	0000																											
F096	Run Counts	0000-9999	000																											
F097	Run Counts in 10,000s of counts	0000-9999 (0001 would equal 10,000 counts)	000																											
F098	Phase Rotation Trip	0, 1 or 2 0=Disabled, 1=ABC, 2=ACB]	0																											
F099	Phase Rotation Trip Delay	1 - 3 seconds	1 Sec																											
F100	Phase Loss Trip Delay during Stop	0 - 20 seconds [0 = Disabled]	1 Sec																											
F101	Phase Loss Trip Delay during Running	0 - 20 seconds [0 = Disabled]	1 Sec																											
F102	Motor kW Trip	0 - 2 0 = Disabled 1 = Over kW Trip 2 = Under kW Trip	0																											
F103	Motor kW Trip Point	20 - 100% of full load KW	50(%)																											
F104	Motor kW Trip Delay Time	1 - 999 seconds	1																											
F105	Power Factor Trip Range	0, 1 - 3 [0=Disabled, 1=l原因, 2=lead, 3= lead/lag]	0																											
F106	Power Factor Trip Point	.01 - 1	.50																											
F107	Power Factor Trip Delay Time	1 - 20 seconds	2 Sec																											
F108	Analog Output	0 - 12 [0: OFF; 1 - 12] (See Table of Default Display)	OFF																											
F109	Analog Output 4mA	0 - 9999	0																											
F110	Analog Output 20mA	0 - 9999	9999																											
F111	Default Display	1-12 (See Table of Default Display)	10																											
F112	System Settings	Reserved for factory use	-																											
F113	Alternate functions for Ramp2/Jog inputs	<table border="0"> <thead> <tr> <th>Setting</th> <th>Dual Ramp Input</th> <th>Jog Input</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Dual Ramp</td> <td>Jog</td> </tr> <tr> <td>1</td> <td>Dual Ramp</td> <td>Remote / Local</td> </tr> <tr> <td>2</td> <td>Dual Ramp</td> <td>Ext. Lockout N/O button</td> </tr> <tr> <td>3</td> <td>Dual Ramp</td> <td>Ext. Lockout N/C button</td> </tr> <tr> <td>4</td> <td>RESET</td> <td>Jog</td> </tr> <tr> <td>5</td> <td>RESET</td> <td>Remote / Local</td> </tr> <tr> <td>6</td> <td>RESET</td> <td>Ext. Lockout N/O button</td> </tr> <tr> <td>7</td> <td>RESET</td> <td>Ext. Lockout N/C button</td> </tr> </tbody> </table>	Setting	Dual Ramp Input	Jog Input	0	Dual Ramp	Jog	1	Dual Ramp	Remote / Local	2	Dual Ramp	Ext. Lockout N/O button	3	Dual Ramp	Ext. Lockout N/C button	4	RESET	Jog	5	RESET	Remote / Local	6	RESET	Ext. Lockout N/O button	7	RESET	Ext. Lockout N/C button	7
Setting	Dual Ramp Input	Jog Input																												
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7	RESET	Ext. Lockout N/C button																												

TE-B Door Mounted Operators



Illuminated E-Stop Pushbutton:

- Removes control power from all circuits and TE2 soft start.
- Push to activate, twist and pull to release.
- Button Lights when E-stop is pressed.

Start/Stop Pushbutton and Run Light Assembly:

- Provides Start/Stop control in "Local" mode.
- Provides "Motor Running" indication in all operating modes.

Local/Off/Remote Selector:

- Local" selects door mounted Start/Stop control.
- Remote" selects Start/Stop control from customer supplied signals at terminals 1-3 on TBC.
- Off" Turns motor off.

Power ON Light:

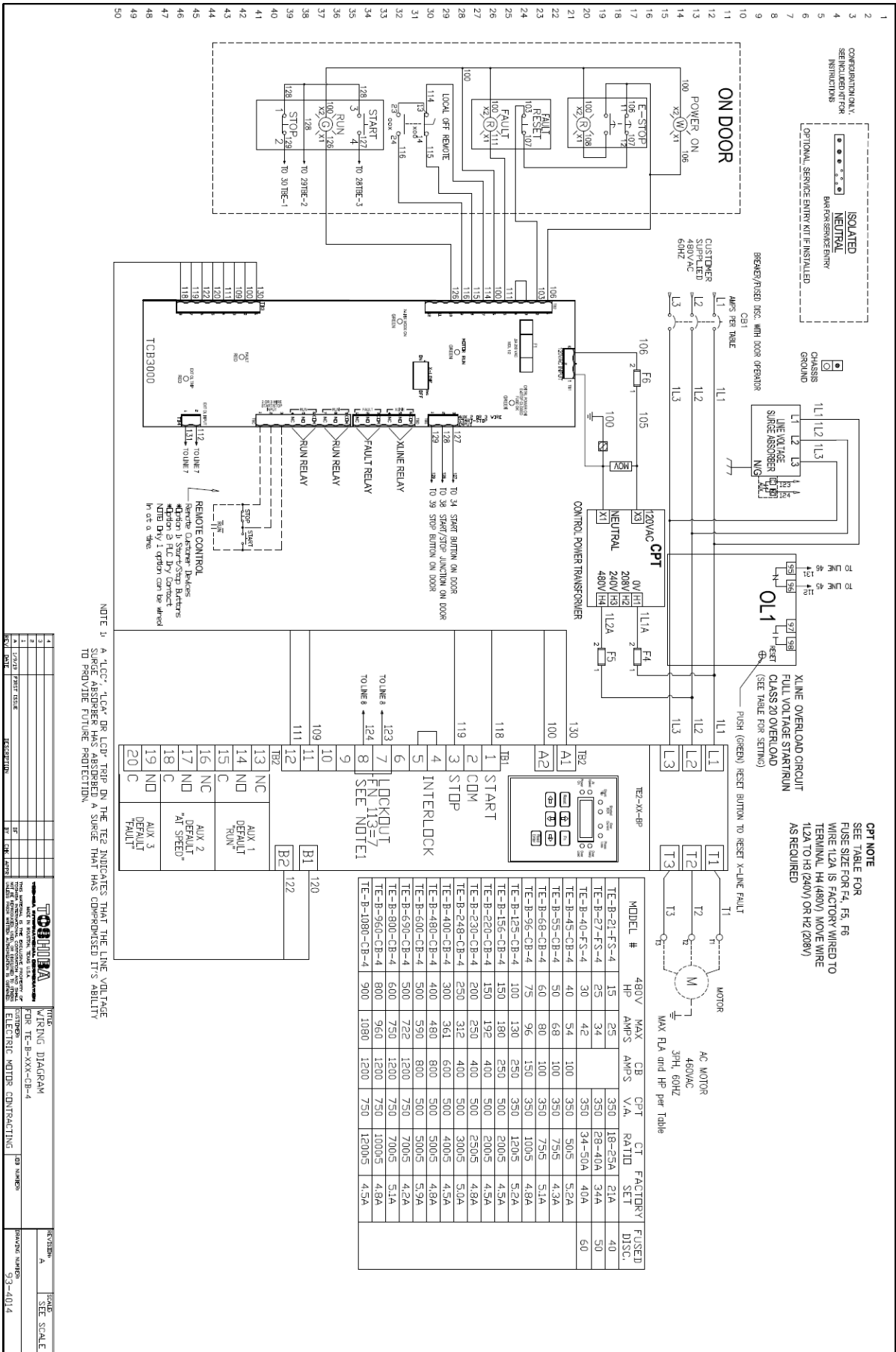
- Indicates presence of 120VAC control power, derived from main (L1 & L2) line voltages.

Fault Light/Reset Pushbutton:

- When lit, indicates that the unit has tripped, and requires "Reset".
- In "Soft" (normal) mode, the "trip" will be displayed on the TE2 keypad (inside), and will reset upon activation of the reset pushbutton.
- In "X-line" mode, the light indicates that the X-line overload inside the panel is tripped, and must be reset manually by pressing the (green) reset key on the overload itself. Then the unit can be reset, using the pushbutton on the door.

Note: If the green reset key on the X-line overload is turned to the "A" (auto) position, the O/L relay will reset itself after the required cooldown, after that the unit can be reset by pushing the reset pushbutton without opening the enclosure door.

Wiring Diagram # 93-4014



Wiring Diagram # 93-4015

