

TOSHIBA

Toshiba 18 - 1250 A Instruction Manual

Low voltage digital solid state startern 18-1250a

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DOCUMENT: NBZ0003

TOSHIBA

INSTRUCTION MANUAL

INSTALLATION - OPERATION - MAINTENANCE

TE SERIES

Low Voltage

Digital Solid State Starter

18 - 1250 A

Issued: 10/09

Manufactured in the USA

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[Controller Toshiba TE Series Instruction Manual](#)

Low voltage digital solid state soft starter 18 - 1250a (91 pages)

[Controller Toshiba TE-18-BP Quick Start Up Manual](#)

Digital solid state soft starter 18-1250a (38 pages)

[Automobile Parts Toshiba 48-1250 A Instruction Manual](#)

Low voltage digital solid state starter 48-1250 a (28 pages)

Summary of Contents for Toshiba 18 - 1250 A

[Page 1](#) DOCUMENT: NBZ0003 INSTRUCTION MANUAL INSTALLATION - OPERATION - MAINTENANCE TE SERIES Low Voltage Digital Solid State Starter 18 - 1250 A Issued: 10/09 Manufactured in the USA...

[Page 3](#) SAFETY IMPORTANT MESSAGES Read this manual and follow its instructions. Signal words such as DANGER, WARNING and CAUTION will be followed by important safety information that must be carefully reviewed. Indicates a situation which will result in death, serious injury, and severe property damage if you do not follow instructions.

[Page 4](#) SAFETY SAFETY CODES Toshiba motor control is designed and built in accordance with the latest applicable provisions of NEMA and the National Electrical Code. Installations must comply with all applicable state and local codes, adhere to all applicable National Electric Code (NFPA 70) standards and instructions provided in this manual.

[Page 6: Table Of Contents](#)

Table of Contents Chapter 1: Introduction Chapter 2 - Installation Chapter 3 - Motor Overload Protection Chapter 4 - Connections Chapter 5 - Programming Chapter 6 - Start-up Chapter 7 - Fault Conditions Appendices TE Series Digital Solid State Soft Starter 18 -...

[Page 8: Chapter 1: Introduction](#)

Chapter 1 - Introduction Acceleration Adjustments Dual Ramp Settings Deceleration Adjustments Jog Settings Kick Start Settings Process Timer (2 modes) Real Time Clock (RTC) Controller 1.1 General Description The TE Series is a digitally programmable solid-state reduced voltage soft starter. Its six SCR design features a voltage/current ramp with an anti-oscillation circuit for smooth load acceleration.

[Page 9](#) 1.1.2 Advanced Motor Protection Features A sophisticated Thermal Model of the motor operation is created in the Thermal Model Electronic microprocessor to accurately track all starting, stopping and running conditions Overload Protection to provide maximum motor protection. Two Stage Starting: Programmable for Class 5 or 10 Overload Curves Run: Programmable for Class 5 through 30 when "At-Speed"...

[Page 10](#) TE Series Type of Load: AC Supply Voltage: Power Ratings: Unit Capacity - Continuous Unit Capacity - Overload Rating (Percent of motor FLA) Power Circuit SCR Firing Angle Detection SCR PIV Ratings (Peak Inverse Voltage) Phase Rotation Transient Protection Cooling Bypass Contactor Units 160A and less: Units 210A and over:...

[Page 11: Sizes And Ratings](#)

The Toshiba TE Series starters are current rated controllers. Max. Amp ratings are for continuous duty and must not be exceeded. Always check the motor nameplate FLA and Service Factor to ensure proper sizing. Each size has an adjustable range of current from 50% to 100% of the Max Amp rating.

[Page 12: Chapter 2 - Installation](#)

TE Series Chapter 2 - Installation Digital Solid State Soft Starters 18 – 1250A Receiving and Unpacking Upon receipt of the product, you should immediately do the following: Carefully unpack the unit from the shipping carton and inspect it for shipping damage (if damaged, notify the freight carrier and file a claim within 15 days of receipt).

[Page 13: Service Warning](#)

TE Series WARNING Digital Solid State Soft Starters 18 – 1250A SERVICE WARNING! Do not service equipment with voltage applied! The unit can be the source of fatal electrical shocks! To avoid shock hazard, disconnect main power and control power before working on the unit.

[Page 14: Power Terminations](#)

Bus Tabs located on each unit. Bus tabs are pre-drilled to accept industry standard bolts. Some sizes come with saddle clamp terminals, however lugs are the responsibility of the user. Toshiba recommends using crimp-on lugs, although mechanical lugs are suitable as well. The following diagrams show sizes of the bus tab holes and critical spacing between them for determining the size of lug that can be used.

[Page 15](#) TE Series Digital Solid State Soft Starters 18 – 1250A 2.6 Power Connections (cont.) TE-150 TE-160 Line 1.52" (38.58 mm) 1.54" (39.09 mm) 0.60 (15.23 mm) T/L3 R/L1 0.14" (3.55 mm) S/L2 Line Figure 2.6.3 Critical clearances for bus tab connections NOTE: Consult factory for bus tab critical dimensions for units 210A and above Load...

[Page 16: Remote Keypad Mounting](#)

TE Series Model Number TE-18-BP TE-28-BP TE-39-BP TE-48-BP TE-62-BP TE-78-BP TE-92-BP TE-112-BP TE-150-BP TE-160-BP TE-210-BP or -P TE-276-BP or -P TE-360-BP or -P TE-450-BP or -P TE-550-BP or -P TE-718-BP or -P TE-900-BP or -P TE-1000-BP or -P Table 2.6: TE Series Wire Ranges and Torque Specifications CF = Consult Factory Digital Solid State Soft Starters 18 –...

[Page 17: Dimensions](#)

TE Series Enclosure Panel (open) with integral bypass contactor Digital Solid State Soft Starters 18 – 1250A Dimensions (consult price catalog for enclosed units) Overall Model Number TE -18-BP thru 8.75 7.95 TE -48-BP TE -62-BP thru 14.00 8.00 TE -112-BP TE -150-BP and 19.21 8.00...

[Page 18: Chapter 3 - Motor Overload Protection](#)

Chapter 3 - Motor Overload Protection MOTOR FLA (F001) must be programmed for unit to operate! Examples: H 100 100% Thermal Capacity remaining at rest H 057 57% Thermal Capacity remaining after starting (43% used) Solid State Overload Protection The TE Series Starter provides true U.L. listed I Protection as a built-in function of the main digital processor for maximum motor protection.

[Page 19](#) 3.1.3 Disabling the Overload Protection The Overload Protection feature can be disabled if necessary. When using external devices such as Motor Protection Relays or when the TE Series is wired downstream from an existing starter, this feature can be disabled to prevent conflicts with external overload protection devices. When the TE Series is controlling multiple motors, the built-in Overload protection must be disabled and individual thermal overload relays must be installed on the motor leads going to each motor (see appendix 5 for...

[Page 20: Nema Class Trip Curves](#)

TE Series CAUTION If a Bypass Contactor is added by the user in the field (i.e. 210A units and above), care must be taken to ensure proper power routing to ensure functioning of the Overload protection. Consult factory for assistance. Digital Solid State Soft Starters 18 –...

[Page 21](#) Figure 3.2.4: TE Series Overload Trip Curves 3.2.3 Running Overload Curve During the Run mode, Overload trip curves are selectable from NEMA Class 5, 10, 15, 20, 25, and 30. Program the appropriate curve according to the characteristics of your motor and load. 3.2.4 Overload Trip Curve Chart...

[Page 22: Chapter 4 - Connections](#)

TE Series Chapter 4 – Connections Disconnect Circuit Breaker TE Starter Solid State. Over Load Integral Bypass Contactor* Figure 4.1: TE Power Connections *Larger units (210A and above) can be ordered with fan cooling instead of Bypass Contactors, but are intended for use in NEMA

1 ventilated enclosures only.

[Page 23: Control Connections](#)

TE Series TB1: 12 terminals, #1-12 RAMP2 3 ... 11 12 13 14 ...19 20 24VDC from internal supply = Factory installed jumpers Digital Solid State Soft Starters 18 – 1250A 4.1.4 Testing The TE Series can be tested with a load smaller than the motor it was originally selected to control, however additional steps must be taken to avoid tripping on Phase Current Loss.

[Page 24](#) TE Series Figure 4.2: Control Terminal Blocks 120VAC A1 A2 Figure 4.2.1 Control Power Supply Connection TB-2 Digital Solid State Soft Starters 18 – 1250A 4.2.1 AC Control Power Supply Connection Separate AC Control Power supply is required to power the electronics Supply of the TE Series starter.

[Page 25](#) TE Series RAMP2 Figure 4.2.2 Connect 3 wire 3 Wire Control Connection control here TB-1 as shown RAMP2 Figure 4.2.3 2 Wire Control Connection TB-1 Connect 2 wire control / PLC output here RAMP2 Remove factory jumper and connect external interlock device here Figure 4.2.

[Page 26](#) TE Series RAMP2 RAMP 1 RAMP 2 Figure 4.2.5.a: Dual Ramp Connections TB-1 RAMP2 Figure 4.2.5.b: Jog Connections TB-1 RAMP2 RAMP 2 Figure 4.2.5.c: Dual Ramp / Jog Connections TB-1 Digital Solid State Soft Starters 18 – 1250A 4.2.5 Enabling the Dual Ramp and Jog Features TB1 includes provisions for enabling the Dual Ramp and Jog functions...

[Page 27](#) TE Series RAMP2 PTC Resistor in Motor Figure 4.2.6: PTC Resistor Connection TB-1 ** Remove factory jumper from Terminals 9 and 10 RAMP2 Optional External OL Relays Emergency Stop PB OLR 1 OLR 2 Figure 4.2.6.a: External Overload Relay(s) and/or E-Stop PB Connection TB-1 ** Remove factory jumper from Terminals 9 and 10...

[Page 28](#) Form A, (SPST), N.O. contact. It is not necessary to use the programmable output auxiliary relays in the Start / Stop circuit. An internal seal-in relay is provided elsewhere (see 4.2.2.a above). Toshiba recommends fusing all contacts with external fuses.

[Page 29](#) 4.2.9 Bypass Contactor Control On TE...-BP version (and NEMA 12 enclosed) starters, an internal dedicated connection is used at the factory for automatically controlling the Bypass Contactor. Field wiring for Bypass Contactor operation is not required. 4.2.9.a Independent Bypass Contactor Control The TE...-BP Series starters use standard industrial contactors that can be controlled independent of the starter electronics if necessary.

[Page 30: Chapter 5 - Programming](#)

TE Series Chapter 5 - Programming MOTOR FLA (F001) must be programmed for unit to operate! Figure 5.2: Digital Interface Digital Solid State Soft Starters 18 – 1250A Introduction It is best to operate the motor at its full load starting conditions to achieve the proper time, torque and ramp settings.

[Page 31: Display Modes](#)

Example: Figure 5.3.1 Reading the Status Display [0120.] Indicates Phase A is drawing 120 amps. Press the UP arrow [0121] Indicates Phase B is drawing 121 amps. NOTE: Decimal points are not present in the readouts for Phases B and C. Press the UP arrow [0120] Indicates Phase C is drawing 120 amps.

[Page 32: Program Mode](#)

TE Series Example: Figure 5.4.1 Viewing a Function's Set Value: Motor FLA Setting [0000.] Indicates that Phase A is drawing no current (unit is in Off mode). Press the Fn key [F001] Indicates that this is Function 001 (Motor FLA). Press Read / Enter key to view the F001's value [0306]...

[Page 33](#) TE Series Example 1: Figure 5.4.3 Viewing a Function's Set Value [0000.] Indicates Phase A is drawing no current (unit is in Off mode). Press the [Fn] key [F001] Indicates this is Function 001 (Motor FLA). Press [READ/ENTER] key to view the F001 value [0048] Indicates the programmed motor FLA is 48 Amps.

[Page 34](#) TE Series Example 2: Figure 5.4.3.a Changing a Function's Value by Increments [0000.] Indicates that Phase A is drawing no current (unit is in Off mode). Press the [Fn] key

[F001] Indicates that this is Function 001 (Motor FLA). The farthest left digit (1) is flashing, indicating this is the digit that you will alter (cursor position) Press the UP Arrow key twice to increase this digit value to 3...

[Page 35: 5.4.5 Fault Mode](#)

TE Series Example: Figure 5.4.5 Viewing a Fault and History [PLA.] Indicates that there was a Phase Loss during Acceleration. The Decimal point on the right signifies that this is the current fault. Press the UP Arrow key [iBc] Displays the previous fault, a Phase Imbalance during Constant Speed (running) Press the UP Arrow key...

[Page 36](#) TE Series Digital Solid State Soft Starters 18 – 1250A 5.4.5.c Automatic Reset The TE Series starter provides for automatic reset on certain non- critical faults and Over Load. For non-critical fault resets, see section 5.6.9 for program details of F052 and F053. For automatic Over Load reset, see section 3.1 and 5.6.1 for programming details.

[Page 37: The Te Function List](#)

TE Series Fn # Group Function Description Motor Nameplate FLA F001 FLA must be programmed for starter to function. Motor Nameplate F002 Service Factor F003 Overload Class During Start F004 Overload Class During Run F005 Overload Reset F006 Reserved for factory use F009 Table 5.5.1: Motor and Overload Function Group Fn #...

[Page 38](#) TE Series Fn # Group Function Description F019 Voltage Jog F020 Time of Voltage Jog F021 Current Jog Table 5.5.3: Jog Mode Function Group Fn # Group Function Description F022 Kick Start Voltage F023 Kick Start Time Table 5.5.4: Kick Start Mode Function Group Fn # Group Function Description...

[Page 39](#) TE Series Fn # Group Function Description F030 Run Timer Selection Run Timer Time F031 for use in F030 above Time Clock Controller (TCC) Start Event Mode. Chose "One Shot" F032 or 1 to 7 "Start Events" from F033 – F039 Run time for this mode comes from F030 above.

[Page 40](#) TE Series Fn # Group Function Description Coast Down (Back Spin) F048 Lockout Timer F049 Maximum Starts per Hour Minimum Time Between F050 Starts F051 Internal Protection Settings Auto Reset F052 on Selected Faults F053 Auto Reset Attempts Restart Delay Time Value F054 Readout (for F028) Coast Down Timer Value...

[Page 41](#) TE Series Fn # Group Function Description F065 Communications F066 Baud Rate F067 Modbus Address F068 Remote Starter Control F069 Reserved for factory use Table 5.5.11: Serial Communications Function Group Fn # Group Function Description Parameter Lock F070 Customer Password F071 System Clear / Reset F072...

[Page 42](#) TE Series Fn # Group Function Description F085 Fault History #1, Latest Fault Time Stamp, Fault #1 F086 Based on F078-80 Date Stamp, Fault #1 F087 Based on F076-77 Fault History #2, Previous F088 Fault F089 Time Stamp, Fault #2 F090 Date Stamp, Fault #2 F091...

[Page 43: Function Descriptions](#)

TE Series MOTOR FLA (F001) must be programmed for unit to operate! Digital Solid State Soft Starters 18 – 1250A Function Descriptions Your TE Series starter is set at the factory with typical default settings that perform well in most applications. Following are detailed descriptions of each Function and the factory default settings.

[Page 44](#) TE Series WARNING Setting F005 = 1 (Automatic) may present significant operational risk. When F005 = 2 (Disabled Overload), a separate external thermal overload protection device must be in the circuit. Digital Solid State Soft Starters 18 – 1250A F004 = Overload Class During Run Factory Setting = 10 (Class 10) Range = 5 - 30 NEMA / UL Class Set value according to the instructions provided by your motor /...

[Page 45: Starting Mode](#)

TE Series Digital Solid State Soft Starters 18 – 1250A 5.6.2 Starting Mode The TE Series is capable of several different starting modes, but is set from the factory for the most common applications. A second ramp profile is available for use should you need it. Unless wired to do so, the TE Series defaults to Ramp 1.

[Page 46](#) TE Series Digital Solid State Soft Starters 18 – 1250A F011 = Initial Voltage of Ramp

1 Factory Setting = 60% Range = 0 - 100% Sets the initial voltage of ramp 1 when F010 = 1 or 3. The initial torque level should be set to provide just enough torque to make the motor shaft begin to rotate while preventing torque shock damage to mechanical components.

[Page 47](#) TE Series Digital Solid State Soft Starters 18 - 1250A 5.6.2.a Ramp 2 (user-optional ramp) This ramp is selected by closing the input for Ramp 2, TB1 - terminals 5 & 6 (see section 4.2.5). If this input is left open, the TE Series will respond only to Ramp 1 settings as listed above.

[Page 48](#) TE Series NOTE: Jog functions may become disabled by Comm port function F068 setting 3. See section 5.6.11 for details. CAUTION Although the Thermal Register tracks all motor current use, continuous usage of the Jog feature risks thermal motor damage or nuisance tripping. Jog Voltage Voltage Ramp Setting...

[Page 49: 3/4 Jog Mode / Kick Start Mode](#)

Kick Start Normal Ramp Voltage Setting Kick Time Start Command Time Figure 5.6.4: Kick Start Normal Kick Start Voltage Ramp Voltage Setting Ramp Initial Voltage Setting Kick Time Time Figure 5.6.4.a: Dwell Start Using Kick Start used to check rotation, alignment, or slowly move a load into position.

[Page 50: Pump-Flex Decel Mode](#)

TE Series WARNING Setting F025 = 2 presents significant risk of over-heating the motor beyond its design limits which could result in motor damage and fire hazard. Do this only in circumstances where the potential for mechanical damage outweighs the risk of motor damage. Stop Command (Bypass Contactor Opens) F025: Begin Decel Level...

[Page 51: Restart Delay](#)

CAUTION Decel is THE OPPOSITE of braking. Enabling the Decel feature will make the motor take LONGER to stop than if it were simply turned off. 5.6.6 Restart Delay The TE Series can be programmed to delay restarting upon restoration of line power after an outage.

[Page 52: Process Timer Control Mode](#)

TE Series Digital Solid State Soft Starters 18 - 1250A 5.6.7 Process Timer Control Mode (F030 through F039): The following special functions allow the TE Series starter to operate automatically from a Process Control Timer using an internal Real Time Clock.

[Page 53](#) TE Series Digital Solid State Soft Starters 18 - 1250A F032 = Real Time Clock Controller Factory Setting = 0 (One Shot) Range = 0 - 8 settings This function is used to select the operating mode of the 24hr / 7 Day Time Clock Controller (TCC).

[Page 54: Current And Ground Fault Protection](#)

TE Series Over Current Trip F042: O. C. Trip Setting F043: O.C. Trip Delay Running Current Time Figure 5.6.8.a: Over Current Trip F044: U.C. Trip Setting Under Current Trip Normal Running Current F045: U.C. Trip Delay Time Figure 5.6.8.b: Under Current Trip Digital Solid State Soft Starters 18 - ...

[Page 55](#) TE Series WARNING THIS IS NOT INTENDED TO BE USED AS "PERSONNEL PROTECTION" GROUND FAULT! This feature is only intended to provide a level of equipment protection against damaging ground currents. Ground faults are potentially dangerous conditions and must be corrected immediately for safety of operating personnel.

[Page 56: Lockouts, Reset & Internal Protection](#)

TE Series WARNING When F048 through F050 are used with 2-wire control, the starter may restart automatically when time has expired. Adequate warnings similar to those in Section 3.1.3.b should be observed. Figure 5.6.9: Coast Down Lockout Timer Digital Solid State Soft Starters 18 - 1250A 5.6.9 Lockouts, Reset and Internal Protection Features F048 - ...

[Page 57](#) TE Series Digital Solid State Soft Starters 18 - 1250A F050 = Minimum Time Between Starts Lockout Factory Setting = 0 (Disabled) Range = 1 - 60 minutes, or 0 (Disabled) When F050 is set to 1 through 60, the motor cannot be restarted within the time specified after the first start.

[Page 58](#) TE Series Digital Solid State Soft Starters 18 – 1250A Phase Rotation Protection: The TE Series is set up to monitor an expected Phase Rotation and trip if it changes. Control of this is divided into two categories: On-Off and Expected Sequence.

[Page 59](#) TE Series Digital Solid State Soft Starters 18 – 1250A Shunt Trip: Shunt Trip is a feature that will cause an immediate Trip if the TE Series detects current flowing through any phase (or all) when it is supposed to be off.

[Page 60](#) TE Series Fault Display Code PLa or PLc* PTC* PLd or n3Ph * = Operating Mode designation. See Fault Code List for description. Table 5.6.9.a: Function 51 table of Hardware Protection Features Digital Solid State Soft Starters 18 – 1250A 5.6.9.a (continued) Function 51: Internal Protection Features Protection Function...

[Page 61](#) TE Series Digital Solid State Soft Starters 18 – 1250A 5.6.9.b Auto-Reset Programming (F052 – F054) The TE Series can be programmed to automatically attempt to reset after selected faults, provided a Start Command is present (see Section 4.2) and the fault condition has been corrected. The Fault Events to attempt restarting (F052) and number of reset attempts (F053) are programmable as follows.

[Page 62](#) TE Series Digital Solid State Soft Starters 18 – 1250A 5.6.9.c Timer Value Readouts for Protection Features F054 – F059 provide display of timer or register values for information only. The user cannot alter them. Upon power loss and restoration, these values are updated for time elapsed. F054 = Restart Delay Time Readout Factory Setting = Not Applicable Range = 1 - 999 Seconds...

[Page 63: Output Relays](#)

TE Series Digital Solid State Soft Starters 18 – 1250A 5.6.10 Output Relays There are three programmable relays (rated 240VAC, 5A, 1200 VA) in the TE Series. They can be programmed for change of state indication for any one of the 25 conditions identified in the following chart. F060 = Aux Relay 1: Form C (SPDT) Factory Setting = 1 (Run / Stop) Range = 1 - 26 (See list)

[Page 64: Communications](#)

TE Series Special Note when using Serial Comm: When F068 = 3, the function of the Jog / Remote Input on TB-1 terminals 7 and 8 will change. Closing the Input will cause the Comm. port control to function as per setting 1.

[Page 65: System Settings](#)

TE Series WARNING Clearing the Thermal Register to allow restarting without proper cool-down time after an Overload Trip will risk motor damage and fire. Use only where emergency restart is necessary with knowledge of these potential hazards. Digital Solid State Soft Starters 18 – 1250A F069= Reserved 5.6.12 System Settings...

[Page 66](#) TE Series Digital Solid State Soft Starters 18 – 1250A F073 = Unit Frame Rating: Read Only. Reserved for Factory Use F074 = CT Ratio: Read Only. Primary value of the TE Series internal Current Transformers (CTs) for use in determining the GF trip settings (F046).

[Page 67: Fault History And Statistical Data](#)

TE Series Fault code: (See Chapter 7) Time Stamp (HH.mm) Date Stamp (MM.DD) Table 5.6.13.a: Fault History Configuration Digital Solid State Soft Starters 18 – 1250A 5.6.13 Fault History and Statistical Data F085 – F097 contain the Fault History and Statistical data about the Run Mode.

[Page 68](#) TE Series Digital Solid State Soft Starters 18 – 1250A 5.6.13.b Statistical Data F094 - F097 display information from the Run Time / Elapsed Time meter and Run-Cycle counter. Run Time includes Accel, Run, Decel, and Jog operations. Run Cycles are counted only when the starter reaches At-Speed mode.

[Page 69: Chapter 6 - Start-Up](#)

TE Series Chapter 6 - Start-up Digital Solid State Soft Starters 18 – 1250A Basic Startup Your new TE Series Soft Starter is factory preset for a wide variety of applications and often can be used with minimal adjustment. 6.1.1 Three Step Process 1.

[Page 70: Start-Up Check List](#)

TE Series Digital Solid State Soft Starters 18 – 1250A Start-up Check List Supply voltage matches the rated supply voltage of the unit. Horsepower and current ratings of the motor and unit match or the unit is higher rating. Initial ramp time and torque adjustments have been checked. Power lines are attached to the unit input terminals L1, L2 and L3.

[Page 71: Testing With A Smaller Motor](#)

TE Series Chapter 7 - Fault Conditions Digital Solid State Soft Starters 18 – 1250A Testing with a smaller motor To test the TE Series starter with a motor which will draw less than 20% of the unit Max Amp rating, you must disable the Phase Current Loss (Running) protection as per instructions in section 5.6.9.a.

[Page 72](#) TE Series Fault Condition Description No Full Load Amps entered into F001 Over Current during Acceleration Over Current during Constant speed Over Current during Deceleration Phase Loss during Acceleration Phase Loss during Constant speed Phase Loss during Deceleration Line Voltage Loss (no 3 phase prior to start) Over Temperature during Acceleration Over Temperature during Constant speed Over Temperature during Deceleration...

[Page 73: Appendix 1 - Ramp Profile Details](#)

TE Series Appendix 1 - Ramp Profile Details Voltage F011 F013 Current F012 F013 Voltage F011 F013 Current F012 F013 Table APP 1.1: Ramp Selection Choices and Settings Full Speed Initial Torque Ramp Time Time Figure APP 1.1: Voltage Ramp w/o Current Limit Full Speed Initial Torque...

[Page 74](#) TE Series Current Limit Initial Torque Ramp Time Speed Time Figure APP 1.3: Current / Torque Ramp Current Limit Initial Torque Speed Time Figure APP 1.4: Current Step Starting Digital Solid State Soft Starters 18 – 1250A 3. Closed Loop Current (Torque) Ramping is good for smooth linear acceleration of output torque.

[Page 75](#) TE Series Digital Solid State Soft Starters 18 – 1250A Accel Ramp Time. This Function sets the maximum allowable time for ramping from the Initial Torque setting to either of the following: 1) Current limit setting when the motor is still accelerating, or 2) Full output voltage if the Current Limit is set to maximum.

[Page 76: Appendix 2: Pump-Flex ® Decel Mode Application Considerations](#)

Decel Mode Application Considerations ® Pump-Flex Deceleration (Soft Stop) is a unique feature of Toshiba Solid State Soft Starters. It provides a slow decrease in the output voltage, accomplishing a gentle decrease in motor torque during the stopping mode. This is the OPPOSITE OF BRAKING in that it will take longer to come to a stop than if the starter were just turned off.

[Page 77](#) TE Series (Bypass Contactor Opens) Full Speed Time Figure APP2.2: Pump-Flex Decel Graph Digital Solid State Soft Starters 18 – 1250A Setup and Use Pump systems vary greatly. To accommodate this, the Pump-Flex Decel control feature is designed to provide complete flexibility in how the deceleration process takes place by using the following settings.

[Page 78](#) TE Series Digital Solid State Soft Starters 18 – 1250A ALWAYS shuts the starter down WITHOUT Decel (as in setting 1 above) even if F025 is set to 2. F025 = Begin Decel Level (BDL) Factory Setting = 60% Range = 0 - 100% of line voltage Use to drop voltage to a level where there is a noticeable effect on motor torque during Decel mode.

[Page 79: Appendix 3: Parameter Lock / User Password Instructions](#)

Appendix 3: Parameter Lock / User Password Instructions CAUTION DO NOT LOSE YOUR PASSWORD. If the password has been lost or forgotten, contact Toshiba for assistance. Digital Solid State Soft Starters 18 – 1250A Provides users with the ability to prevent unauthorized operators from making changes to the programmed functions.

[Page 80](#) TE Series Example: Figure App 3 Enabling Password Protection / Parameter Lock Starting from the Status Display Mode, no previous function number entered, no existing password... Press the Fn key. Displays F001 to indicate the beginning of the function list. Press

the LEFT arrow key Selects the second digit (from the right).

[Page 81: Appendix 4: Process Control Timer Functions](#)

TE Series Ramp 0mofile Appendix 4: Process Control Timer Functions F030 through F039; Overview of Process Timer Control and Time Clock Controller Features: The following special functions allow your TE Series starter to operate automatically from an internal Process Control Timer and Time Clock Controller (TCC) using a real time clock. The Process Control Timer (F030 and F031) can be used independently or together with the TCC feature (F032-39).

[Page 82](#) TE Series Example: Figure App 4.1 Minimum Run (Batch) Timer An irrigation pump needs to come on when called for by a soil moisture control system, and run for ½ hour. If during that ½ hour the well level drops and shuts the pump down, the pump needs to restart when the well recovers and finish the ½...

[Page 83](#) TE Series Digital Solid State Soft Starters 18 - 1250A F030 = 2: Permissive Run Timer. In this mode, the Process Control Timer engages differently according to the settings of the Time Clock Controller (TCC). When the TCC is set to 0 (using "One Shot" operation), the Process Control Timer begins counting down after the first Start command.

[Page 84](#) TE Series Example: Figure App 4.2 Permissive Run Timer An air compressor controlled by a pressure switch feeds a large air distribution system that has small normally insignificant leaks. If left on over night when the system is not in use, leaks drop the air pressure and the compressor cycles on and off even though the facility is unoccupied, wasting energy.

[Page 85](#) TE Series IMPORTANT NOTE: When F030 or F031 is changed in program mode, the timer will not respond to the new settings until after control power has been cycled (off and back on again). CAUTION If F030 = 0 (Disabled), the TCC will be ignored. So if F032 = 1-8 and F030 = 0, the starter will not operate! Make sure that if F030 = 0, F032 = 0 as well.

[Page 86](#) TE Series Digital Solid State Soft Starters 18 - 1250A F033 = Event #1 Start Time Factory Setting = OFF Range = 00:00 through 23:59, or OFF This function is used to select the start time for Event #1 in the TCC above.

[Page 87](#) TE Series Function Setting Type No Process Control Timer operation (default setting from factory) Minimum (Batch) Run Timer (works the same with or without TCC control) Process Control F030 Timer Permissive Run Timer, without TCC Mode (F032 = 0, "One Shot") Permissive Run Timer, with TCC (F032 = 2 thru 8) Process...

[Page 88](#) TE Series Example: Figure App 4.3 Time Clock Controller with Minimum Run Timer An irrigation pump fed from a well with a single float level control needs to come on every other day at 5:30 PM, and run for ½ hour. If during that ½...

[Page 89: Appendix 5: External Over Load Relay Applications](#)

TE Series Appendix 5 - External Overload Relay Applications Digital Solid State Soft Starters 18 - 1250A Your TE Series starter comes equipped with a very intelligent internal electronic overload protection system, and does not need an external Over Load Relay (OLR). There are instances however where external OLRs are needed or desired because of the application.

[Page 90](#) TE Series Digital Solid State Soft Starters 18 - 1250A TE Bypass Control Terminal Location Diagrams Bypass Control Terminals Bypass Control 18 - 48A Units Terminals 62 - 160A Units NOTE: Use these terminals only when separate control of the Bypass Contactor is necessary Bypass Control Terminals: 210 -...

[Page 91](#) TE Series Appendix 5 (cont.) External OL Relay Applications Figure APP5.2: TE Wiring for Across-the-Line Bypass Operation with External Overload Relay CAUTION The circuit on TB-4 is at the same potential as the AC control voltage, but should not be directly connected to it.

[Page 92](#) TE Series Appendix 5 (cont.) External OL Relay Applications Digital Solid State Soft Starters 18 - 1250A SPECIAL MOTOR APPLICATIONS Multiple Motors When more than one motor is connected downstream from the TE Series starter, the internal electronic overload protection cannot provide proper protection of the individual motors.

[Page 93](#) TE Series Appendix 5 (cont.) External OL Relay Applications Digital Solid State Soft Starters 18 – 1250A SPECIAL MOTOR APPLICATIONS 2S2W Motors 2 speed / 2 winding motor applications require a separate OLR sized for each set of windings. These would need to be external OLRs. Disconnect Circuit Breaker...

[Page 94: Appendix 6: Soft Starter Settings Record](#)

TE Series The following chart may be used to record the changes made to the factory settings.
Fn # Group Function Description Motor Nameplate FLA F001 FLA must be programmed for starter to function. Motor Nameplate F002 Service Factor F003 Overload Class During Start F004 Overload Class During Run...

[Page 95](#) TE Series Appendix 6 (cont.) Soft Starter Settings Record Fn # Group Function Description Pump Flex Control / F024 Deceleration Ramp Begin Decel Level (BDL), F025 Immediate Drop Down Torque F026 Decel Shut Off Voltage F027 Decel Ramp Time Restart Delay Time F028 (Sequential Start Delay) Reserved for Factory Use...

[Page 96](#) TE Series Fn # Group Function Description F040 Current Imbalance Trip F041 Current Imbalance Trip Delay F042 Over Current Trip F043 Over Current Trip Delay F044 Under Current Trip F045 Under Current Trip Delay F046 Ground Fault Trip F047 Ground Fault Trip Delay Coast Down (Back Spin) F048 Lockout Timer...

[Page 97](#) TE Series Appendix 6 (cont.) Soft Starter Settings Record Fn # Group Function Description F065 Communications F066 Baud Rate F067 Modbus Address F068 Remote Starter Control F069 Reserved for factory use Parameter Lock F070 Customer Password F071 System Clear / Reset F072 Reserved for Factory Use F073...

[Page 98](#) TE Series Appendix 6 (cont.) Soft Starter Settings Record Fn # Group Function Description F085 Fault History #1, Latest Fault Time Stamp, Fault #1 F086 Based on F078-80 Date Stamp, Fault #1 F087 Based on F076-77 Fault History #2, Previous F088 Fault F089...

[Page 99: Warranty Information](#)

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This manual is also suitable for:

Te series