TOSHIBA

DOCUMENT: NBZ0006 Rev.0

QUICK START GUIDE

TE3 Series

Low Voltage
Digital
Solid State Soft Starter
18 – 1250A

Issued: 7/30/21

This Page Intentionally Left Blank

Important Notice

The instructions contained in this manual are not intended to cover all details or variations in equipment types nor may it provide for every possible contingency concerning the installation, operations, or maintenance of this equipment. Should additional information be required, contact your Toshiba Customer Support Center.

The contents of this manual shall not become a part of or modify any prior or existing agreement, commitment, or relationship. The sales contract contains the entire obligation of Toshiba International Corporation. The warranty contained in the contract between the parties is the sole warranty of Toshiba International Corporation and any statements contained herein do not create new warranties or modify the existing warranty.

Any electrical or mechanical modifications to this equipment without the prior written consent of Toshiba International Corporation may void all warranties or other safety certifications. Unauthorized modifications may also result in safety hazard or equipment damage.

Misuse of this equipment could result in injury and equipment damage. In no event will Toshiba International Corporation be responsible or liable for direct, indirect, special, or consequential damage or injury that may result from the misuse of this equipment.

About This Manual

Every effort has been made to provide accurate and concise information to you, our customer.

At Toshiba International Corporation we are continuously striving for better ways to meet the constantly changing needs of our customers. E-mail your comments, questions, or concerns about this publication to tic-controls@toshiba.com.

Purpose and Scope of Manual

This manual provides information on how to safely install, operate, maintain, and dispose of your TE2 solid state starter. The information provided in this manual is applicable to the **TE2 starter** only.

This manual provides information on the various features and functions of this powerful device, including:

• Installation

• System operation

• Configuration and menu options

• Mechanical and electrical specifications.

Included is a section on general safety instructions that describe the warning labels and symbols that are used on the device and throughout the manual. Read the manual completely before installing, operating, performing maintenance, or disposing of this equipment.

This manual and the accompanying drawings should be considered a permanent part of the equipment and should be readily available for reference and review. Dimensions shown in the manual are in imperial units and/or the metric equivalent. Connection drawings within this document convey the typical topology of the TE3 starter.

Because of our commitment to continuous improvement, Toshiba International Corporation reserves the right, without prior notice, to update information, make product changes, or to discontinue any product or service identified in this publication.

Toshiba International Corporation (TIC) **shall not be liable for direct, indirect, special, or consequential damages resulting from the use of the information contained within this manual.**

Printed in the U.S.A.

Contacting the TIC Customer Support Center

Toshiba International Corporation's Customer Support Center can be contacted to obtain help in resolving any system problem that you may experience or to provide application information.

The Support Center is open from 8 a.m. to 5 p.m. (CST), Monday through Friday. The toll free number is US (800) 231-1412/Fax (713) 937-9349 CAN (800) 872-2192 MEX 01 (800) 527-1204. For after-hours support follow the directions of the outgoing message when calling.

You may also contact Toshiba International Corporation by writing to:

Toshiba International Corporation

13131 West Little York Road

Houston, Texas 77041-9990

Attn: PAC Product Manager

For further information on Toshiba International Corporation's products and services, please visit our website at www.toshiba.com/tic.

TOSHIBA INTERNATIONAL CORPORATION

TE3 Solid State Starter

Please complete the following information and retain for your records.

Model Number: _____

Serial Number: _____

Project Number (if applicable):_____

Date of Installation: _____

Inspected By: _____

Name of Application: _____

Important Notice

The instructions contained in this manual are not intended to cover all details or variations in equipment types. Nor may it provide for every possible contingency concerning the installation, operations, or maintenance of this equipment. Should additional information be required, contact Toshiba.

The contents of this manual shall not become part of or modify any prior or existing agreement, commitment, or relationship. The sales contract contains the entire obligation of Toshiba International Corporation. The warranty contained in the contract between parties is the sole warranty of Toshiba International Corporation and any statements contained herein do not create new warranties or modify the existing warranty.

Any electrical or mechanical modifications to this equipment without the prior written consent of Toshiba International Corporation may void all warranties and may void the UL listing or other safety certifications. Unauthorized modifications may also result in a safety hazard or equipment damage.

Misuse of this equipment could result in injury and/or equipment damage. In no event will Toshiba International Corporation be responsible or liable for direct, indirect, special, or consequential damage or injury that may result from the use or misuse of this equipment.

Warranty Information

Toshiba International Corporation (TIC) warrants that the received goods will be free of defects in materials.

The complete Toshiba warranty for this equipment is located at the www.toshiba.com/tic website.

Qualified Personnel

Installation, operation, and maintenance shall be performed by **Qualified Personnel ONLY**. A Qualified Person is one that has the skills and knowledge relating to the construction, installation, operation, and maintenance of the electrical equipment and has received safety training on the hazards involved (Refer to the latest edition of NFPA 70E for additional safety requirements).

Qualified Person shall:

1) Have read and understood the entire manual.

2) Be familiar with the construction and function of the starter, the equipment being driven, and the hazards involved.

3) Be able to recognize and properly address hazards associated with the application of motor-driven equipment.

4) Be trained and authorized to safely energize, de-energize, ground, lock-out/tag-out circuits and equipment, and clear faults in accordance with established safety practices.

5) Be trained in the proper care and use of protective equipment such as safety shoes, rubber gloves, hard hats, safety glasses, face shields, flash clothing, etc., in accordance with established safety practices.

For further information on workplace safety, visit www.osha.gov.

Safety Codes **(For additional Safety Information, see the Safety section of this manual)**

WARNING! All installations must comply with all applicable state and local codes.

In the United States, installations must adhere to all applicable National Electric Code (NFPA 70) standards.

Installations must follow all instructions provided in this manual.

Failure to follow all applicable codes, standards, or the instructions in this manual May cause accidents resulting in death or severe injuries.

Modifications

WARNING **Never attempt to modify the starter.**
Any attempted modification may impair the performance of the starter.
Any attempted modification may cause accidents that result in death or severe Injuries.

Equipment Inspection

• Upon receipt of the equipment, inspect the packaging and equipment for shipping damage.

• Carefully unpack the equipment and check for parts that may have been damaged during shipping, missing parts, or concealed damage. If any discrepancies are discovered, it should be noted with the carrier prior to accepting the shipment, if possible. File a claim with the carrier if necessary and immediately notify your Toshiba Customer Support Center.

• **DO NOT** install the starter if damaged or if it is missing any component(s).

• Ensure the rated capacity and model number specified on the nameplate conform to the order specifications.

• Inspections may be required after moving the equipment.

• Contact your Toshiba Customer Support Center to report discrepancies or for assistance if required.

Handling and Storage

• Use proper lifting techniques when moving the starter; including properly sizing up the load, getting assistance, and using a forklift if required.

• Store in a well-ventilated location and preferably in the original packaging if the equipment will not be used upon receipt.

• Store in a cool, clean, and dry location. Avoid storage locations with extreme temperatures, rapid temperature changes, high humidity, moisture, dust, corrosive gases, or metal particles.

• The storage temperature range of the breaker is 23° to 104° F (-5° to 40° C).

• **DO NOT** store the unit in places that are exposed to outside weather conditions (e.g., wind, rain, snow).

• Store in an upright position.

Disposal

• Never dispose of electrical components via incineration. Contact your local state environmental agency for details on disposal of electrical components and packaging in your area.

Installation Precautions

Location and Ambient Requirements

• The TIC starter is intended for permanent installations only.

• Installation shall conform to the National Electrical Code (NEC) – Article 110 (Requirement For Electrical Installations), all regulations of the Occupational Safety and Health Administration, and any other applicable national, regional, or industry codes and standards.

Note: For ALL references to the NEC, see the latest release of the National Electrical Code book.

• Select a mounting location that is easily accessible, has adequate personnel working space, and adequate illumination for adjustment, inspection, and maintenance of the equipment (refer to the NEC Article 110-13).

• **DO NOT** mount the starter in a location that would produce catastrophic results if it were to become dislodged from its mounting location (equipment damage or injury).

• **DO NOT** mount the starter in a location that would allow it to be exposed to flammable chemicals or gases, solvents, explosive/corrosive mists or gases, or other combustible fluids.

• Avoid installation in areas where vibration, heat, dust, fibers, metal particles, or sources of electrical noise are present.

• Allow proper clearance space for installation. Refer to Enclosure Ventilation section for details.

• Install the unit in a secure and upright position.

• Installation practices shall conform to the latest revision of NFPA 70E Electrical Safety Requirements for Employee Workplaces.

• It is the responsibility of the starter installer/maintenance personnel to ensure that the unit is installed into an enclosure that will protect personnel against electrical shock.

Conductor Routing and Grounding Precautions

WARNING

• Use separate metal conduits for routing the input power, output power, and control circuits.

• A separate ground cable shall be run inside the conduit with input power, output power, and control circuits.

• If multiple conductors are used in parallel for input or output power, each parallel set shall have its conduit and not share its conduit with other parallel sets (i.e., place U1, V1, W1, and a ground wire in one conduit and U2, V2, W2 and a ground wire in another; refer to the NEC Article 310 adjustment factors).

Note: National and local codes shall be referenced when running more than three conductors in the same conduit.

• Always ground the unit to prevent electrical shock and to help reduce electrical noise.

• It is the responsibility of the unit installer/maintenance personnel to provide proper grounding and branch circuit protection.

• Branch circuit protection must be provided in accordance with the NEC and ay applicable local codes.

--- The Metal Conduit Is Not An Acceptable Ground ---

Power Connections Precautions

DANGER

CONTACT WITH ENERGIZED WIRING WILL CAUSE SEVERS INJURY OR LOSS OF LIFE

• Turn off and lock-out/tag-out all power sources are turned off and isolated in accordance with established lock-out/tag-out procedures before connecting the 3-phase power source wiring to the unit input terminals and connect the output terminals to a motor of the correct voltage and type for the application (refer to the NEC Article 300 – Wiring Methods and Article 310 – Conductors For General Wiring). Size the branch circuit conductors in accordance with the NEC Table 310.13.

• Ensure that the 3-phase input power is NOT connected to the output of the starter. This may cause injury to personnel.

• Ensure the correct phase sequence and the desired direction of the motor rotation.

Protection

• Ensure that primary protection exists for the input wiring to the equipment. This protection must be able to interrupt the available fault current from the power line. The equipment may or may not be equipped with an input disconnect.

• All cable entry openings must be sealed to reduce the risk of entry to reduce risk of entry by vermin.

• Follow all warnings and precautions and do not exceed equipment ratings.

System Integration Precautions

The following precautions are provided as general guidelines for the setup of the starter within the system.

• The TIC starter is a general-purpose product. It is a system component only and the system design should take this into consideration. Please contact Toshiba for application-specific information or for training support.

• The TIC starter is part of a larger system and the safe operation of the starter will depend upon observing certain precautions and performing proper system integration.

• Improperly designed or improperly installed system interlock may render the motor unable to start or stop on command.

• The failure of external or ancillary components may cause intermittent system operation (i.e., the system may start the motor without warning).

• A detailed system analysis and job safety analysis shall be performed by the systems designer and/or systems integrator before the installation of the starter component. Contact the Toshiba for options availability and for application-specific system integration information if required.

Personnel Protection

• Installation, operation, and maintenance shall be performed by Qualified Personnel ONLY.

• A thorough understanding of the starter will be required before the installation, operation, or maintenance of the starter.

DANGER

• Rotating machinery and live conductors can be hazardous and shall not come into contact with personnel. Personnel shall be protected from all rotating machinery and electrical hazards at all times.

• Insulators, machine guards, and electrical safeguards may fail or be defeated by the purposeful or inadvertent actions of workers. Insulators, machine guards, and electrical safeguards are to be inspected (and tested where possible) at installation and periodically after installation for potential hazardous conditions.

• **DO NOT** allow personnel near rotating machinery. Warning signs to this effect must be clearly posted at or near the machinery/hazard.

• **DO NOT** allow personnel near electrical conductors. Contact with electrical conductors can be fatal. Warning signs to this effect must be clearly posted at or near the machinery/hazard.

• Personal Protection Equipment (PPE) shall be provided and used to protect the installer, user, maintenance personnel, and all employees from any hazards inherent to system operation.

System Setup Requirements

CAUTION

• When using the starter as an integral part of a larger system, it is the responsibility of the installer/maintenance personnel to ensure that there is a fail-safe in place (i.e., an arrangement designed to switch the system to a safe condition if there is a fault or failure).

• Use of the built-in system protective features is highly recommended (i.e., Overload Protection, etc.).

• The operating controls and system status indicators shall be clearly readable and positioned where they may be viewed without obstruction.

• Additional warnings and notifications shall be posted at the equipment installation location as deemed required by Qualified Personnel.

• System safety features shall be employed and designed into the integrated system in a manner such that system operation, even in the event of system failure, will not cause harm or result in system damage or injury to personnel (i.e., Emergency Off, System Interlocks, etc.).

• When using a starter output disconnect, the starter and the motor must be stopped before the disconnect is either opened or closed.

Operational and Maintenance Precaution

DANGER

• Turn off and lock-out/tag-out the main power, the control power, and instrumentation connections before inspecting or servicing the starter, or connecting/disconnecting the power wiring to the equipment.

• If/when taking a live reading is required (equipment is powered), it is to be performed by Qualified Personnel ONLY. Proper and approved personal protection equipment is to be used by trained personnel for all electrical measurements.

• Turn power on only after closing the front main door.

• **DO NOT** place any objects inside of the starter.

WARNING

• An open branch-circuit protective device may be an indication that a fault current has been interrupted. To reduce the risk of fire or electric shock, current-carrying parts and other components of the controller should be examined and replaced if damaged.

• If the starter should emit smoke, or an unusual odor or sound, turn off the power immediately.

• The heat sink and other components may become extremely hot to touch. Allow the unit to cool before coming in contact with these items.

• Inspect the system annually (as a minimum) for damaged or improperly functioning parts, cleanliness, and to ensure that the connectors are tightened securely. Inspect more frequently when operating in a harsh environment.

CAUTION

• **DO NOT** connect power factor correction capacitor to the 3-phase output of the starter. If the motor is equipped with a capacitor for power factor correction, remove the capacitor from the motor. Connecting this device may cause the starter to malfunction and trip, or may cause an over-current condition resulting in damage to the starter.

Intelligent Energy Recovery (iERS)

iERS can produce energy savings in suitable applications. However, the user should have an understanding of the application and load characteristic before enabling the feature.

Loads which exhibit frequent changes in motor torque may cause the TE3 to switch rapidly between the iERS on state and the 'bypassed' state as the motor torque changes. If left unchecked, such switching may cause premature wear of the internal bypass components and may invalidate the warranty.

If the loaded / unloaded state changes more than 4 times per minute, iERS should not be enabled.

Applications that are typically well suited to the iERS feature include; Artificial Lift Pump Jacks, Injection Molding Machines, Mixers, Saws, Rolling Mills, Grinders, Hydraulic Pumps, Crushers, Conveyors, Compressors and Vertical Transport applications.

If the user requires further support regarding the suitability of the application, he should seek support from Toshiba International Corporation or an Authorized Distributor before enabling the iERS function.

Safety

Important information
Installers should read and understand the instructions in this guide prior to installing, operating and maintaining the soft start. The following symbols may appear in this guide or on the soft start to warn of potential hazards or to draw attention to certain information.

 **Dangerous Voltage**
Indicates the presence of a hazardous voltage which could result in personal injury or death.

Tension dangereuse
Indique la présence d'une tension dangereuse qui peut entaîner des blessures ou la mort.

 Warning/Caution
Indicates a potential hazard. Any instructions that follow this symbol should be obeyed to avoid possible damage to the equipment, and personal injury or death.

Avertissement/Mise en garde
Indique un danger potentiel. Toutes les instructions suivant ce symbole doivent être observées, afin d'éviter les dommages de l'équipement et les blessures ou la mort.

Protective Earth (Ground)
Indicates a terminal which is intended for connection to an external conductor for protection against electric shock in case of a fault.

Mise à la terre (Masse)
Indique une borne dont l'usage prévu est d'être connecter à conducteur externe pour assurer la protection contre les chocs électriques en cas de défauts.

Caution Statements
The examples and diagrams in this manual are included solely for illustrative purposes. The information contained in this manual is subject to change at any time and without prior notice. In no event will responsibility or liability be accepted for direct, indirect or consequential damages resulting from the use or application of this equipment.

Mises en garde
Les exemples et les schémas de ce manuel ne sont donnés qu'à titre illustratif. Les informations présentées dans ce manuel peuvent être modifiées sans avis préalable.En aucun cas nous n'assumons la responsabilité ou l'obligation pour les dommages directs, indirects ou consécutifs qui résultent de l'utilisation ou application de cet équipement.

Short Circuit
Toshiba soft starts are not short circuit proof. After severe overload or short circuit, the operation of the soft start should be fully tested by an authorized service agent.

Court-circuit
Les démarreurs progressifs Toshiba ne sont pas à l'épreuve des courts-circuits. Après une forte surcharge ou un court-circuit, le fonctionnement du démarreur progressif doit être intégralement vérifié par un agent de maintenance agréé.

Safety

• **TE3 soft starts contain dangerous voltages when connected to the mains supply. Only qualified personnel that have been completely trained and authorized, should carry out installation, operation and maintenance of this equipment.**

• ***Les démarreurs progressifs TE3 contiennent des tensions dangereuses, lorsqu'ils sont connectés à la tension secteur. Les activités d'installation, d'utilisation et d'entretien de cet équipement doivent être effectuées par un personnel qualifié, dûment formé et habilité.***

• **Installation of the soft start must be made in accordance with existing local and national electrical codes and regulations and have a minimum protection rating.**

• ***Le démarreur progressif doit être installer conformément au code local et nationale d'électricité et à la réglementation en vigueur, et il doit avoir un indice de protection minimal***

• **It is the responsibility of the installer to provide suitable grounding and branch circuit protection in accordance with local electrical safety codes.**

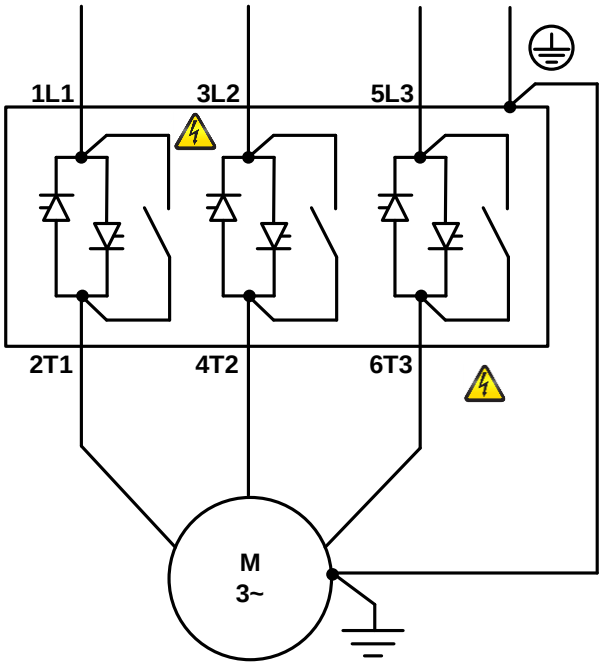
• ***Il appartient à l'installeur d'assurer la mise à la terre et la protection du circuit de branchement, conformément au code de sécurité électrique local.***

• **This soft start contains no serviceable or re-usable parts.**

• ***Ce démarreur progressif ne contient pas de pièces réparables ou réutilisables***

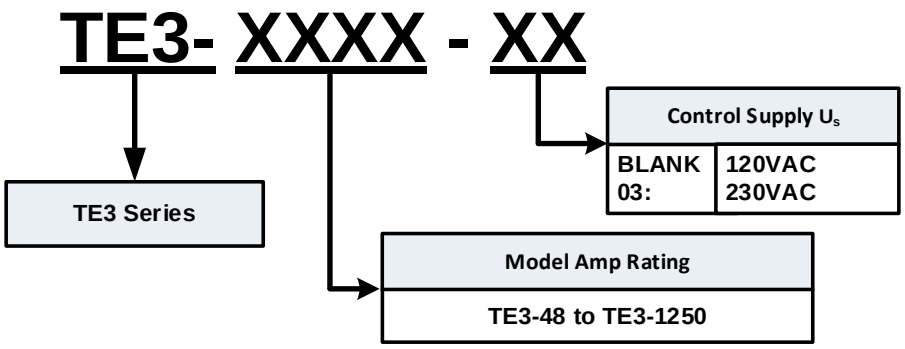
• **The STOP function of the soft start does not isolate dangerous voltages from the output of the soft start. An approved electrical isolation device must be used to disconnect the soft start from the incoming supply before accessing electrical connections.**

• ***La fonction STOP du démarreur progressif n'isole pas les tension dangereuses en sortie du démarreur progressif. Avant d'accéder aux raccordement électriques, il faut utiliser un dispositif d'isolation électrique approuvé pour déconnecter le démarreur progressif de la tension d'entrée.***

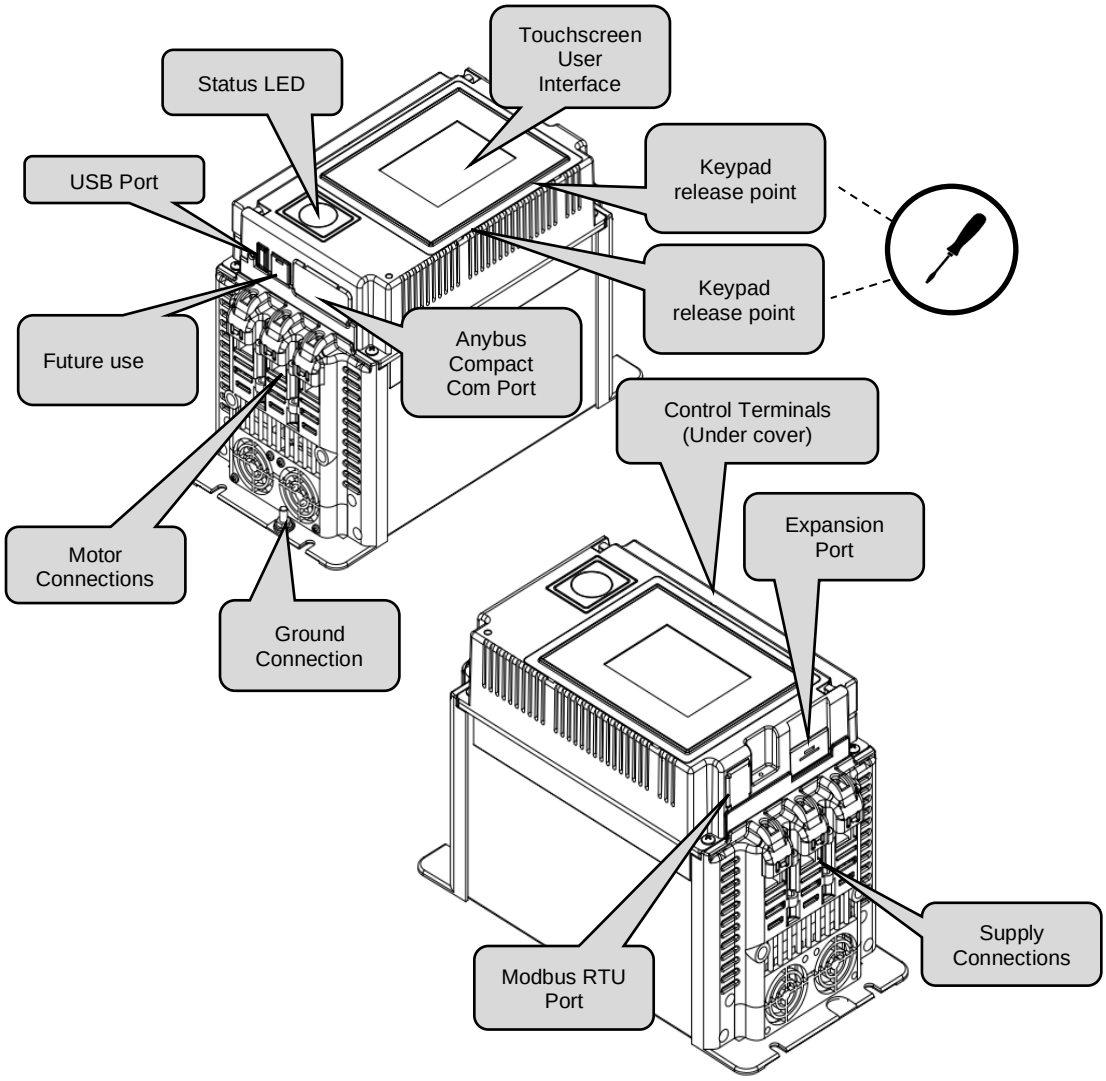


Model Number Description

It is essential to check the TE3 nameplate and make sure that the soft starter is properly sized for your AC motor.



Key Features



Environment - Installation

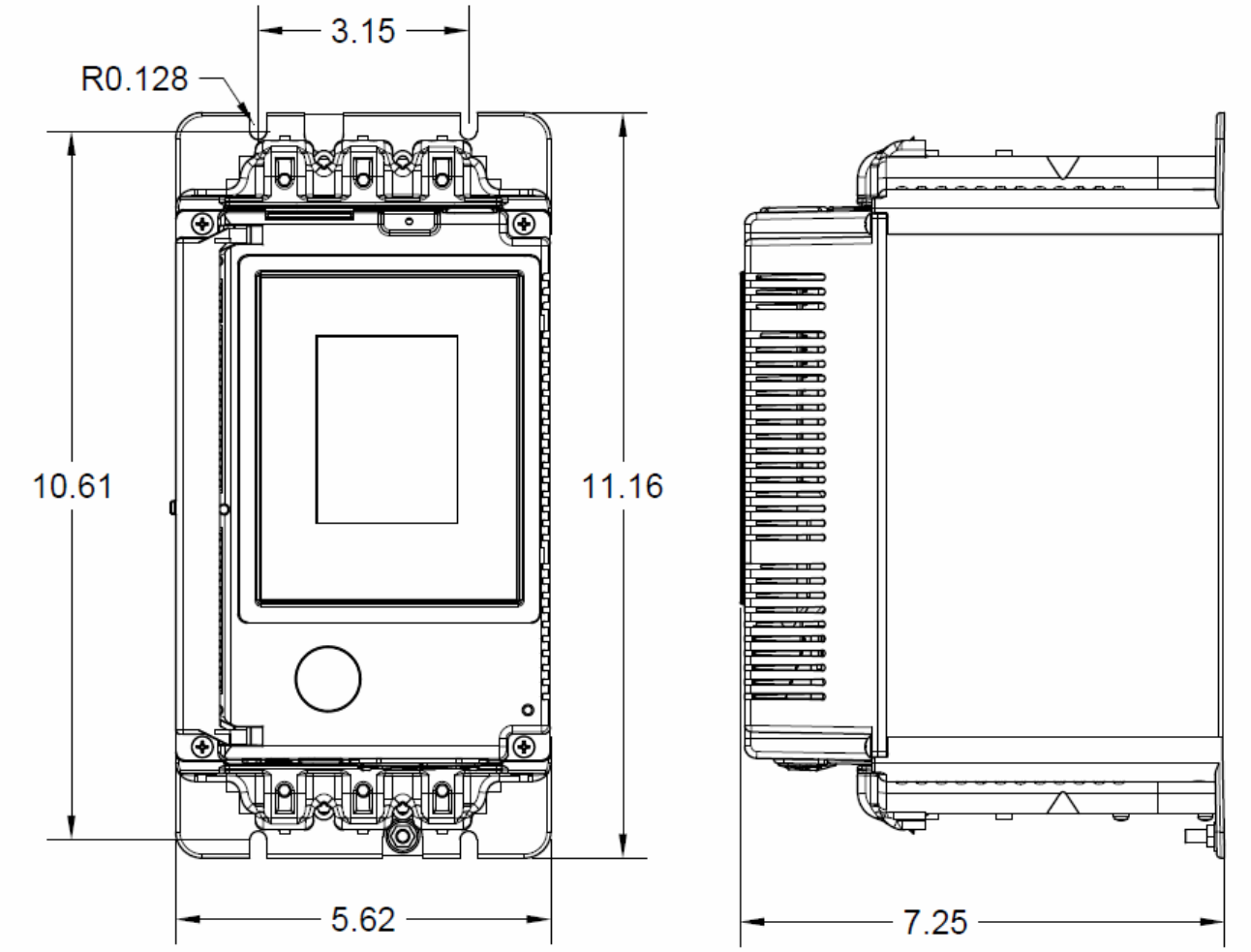
Model (TE3-)	**48**	**62**	**78**	**92**	**112**	**150**	**160**	**210**	**275**
Frame Size	1	2				3		4	
Control Power (VA)	48	60				100		300	300
Weight lb [kg]	8.8 [4.0]	23 [10]				33 [15]		130 [59]	140 [64]
Model (TE3-)	**361**	**450**	**550**	**600**	**862**	**900**	**1006**	**1250**	
Frame Size	4				5		6		
Control Power (VA)	350				500		750		
Weight [lb] kg	145 [66]		165 [75]		325 [147]		400 [181]		
Model (TE3-)	48 to 1250								
Ambient Operating Temp.	-4°F [-20°C] to 122°F [50°C]; not above 122°F (50°C)								
Transportation and Storage Temperature	[-13°F to 158°F (-25°C to 70°C) continuous								
Humidity	max 85% non-condensing, not exceeding 50% @ 40°C [104°F]								
Maximum Altitude	3281ft [1,000m] above 1000m derate by 1% of TE3 current rating per 328ft (100m) to a maximum altitude of 6562ft (2,000m)								
Environmental Rating	Main Circuit: Open Chassis (Optional finger guards available for power terminals on TE3-48); Control Circuit: NEMA 1; No corrosive gases permitted								

Model (TE3-)	**Recommended minimum CPT Rating (VA)**
TE3-48	100
TE3-62 to 112	250
TE3-150 to 160	500
TE3--210 to 276	500
TE3-361 to 600	750
TE3-862 to 900	1000
TE3-1006 to 1250	1500

Environment - Installation

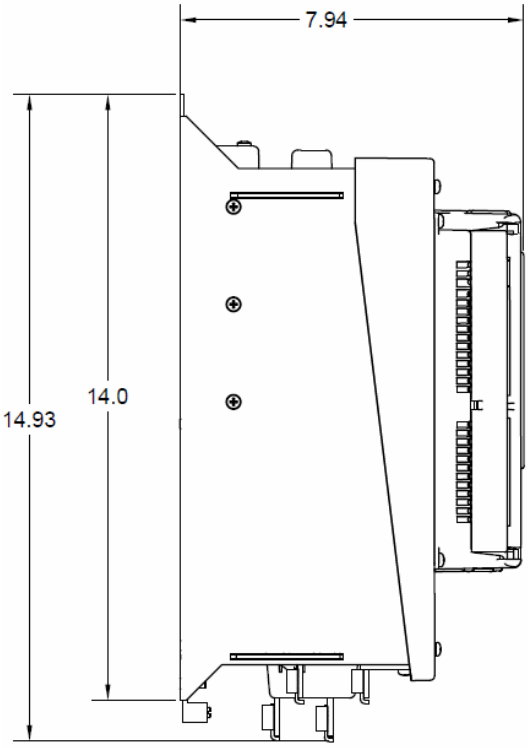
Dimensions

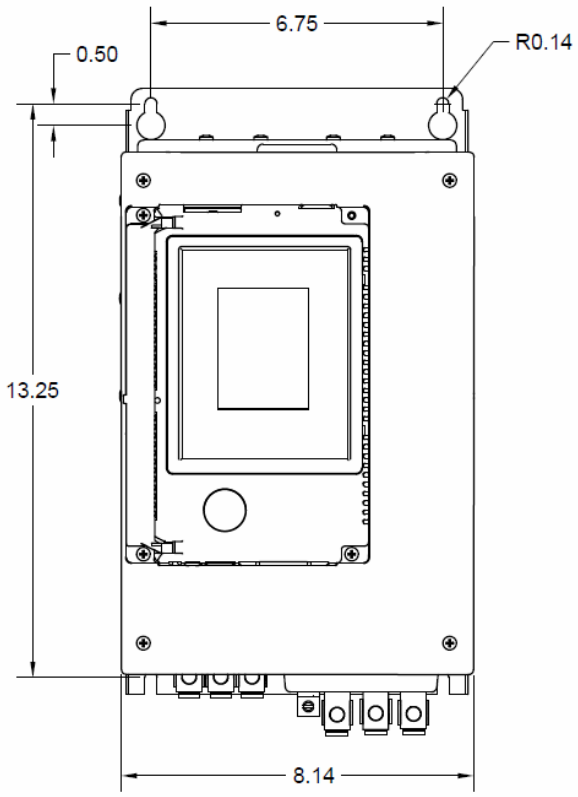
TE3-48



Environment - Installation

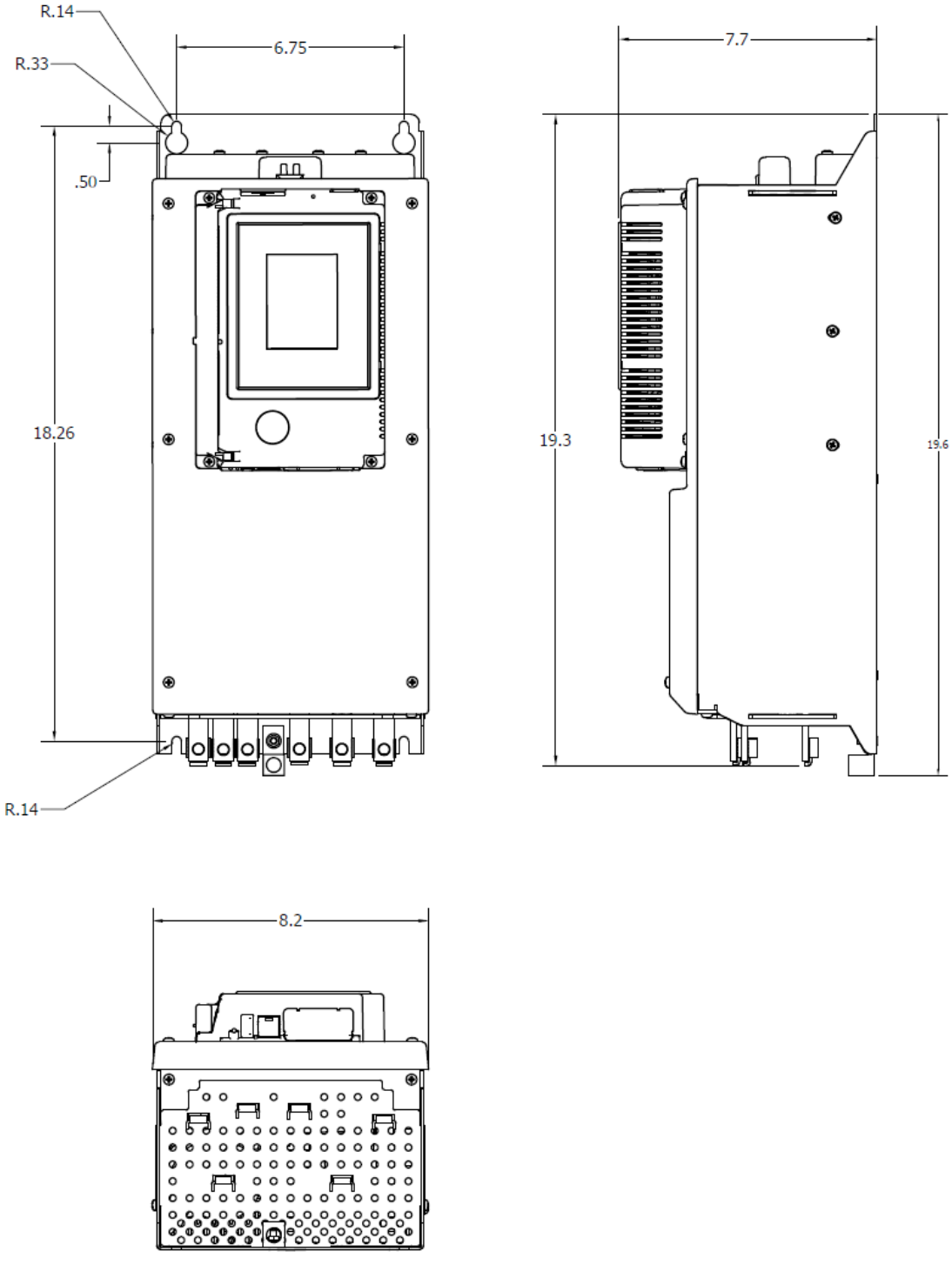
TE3-62 to TE3-112





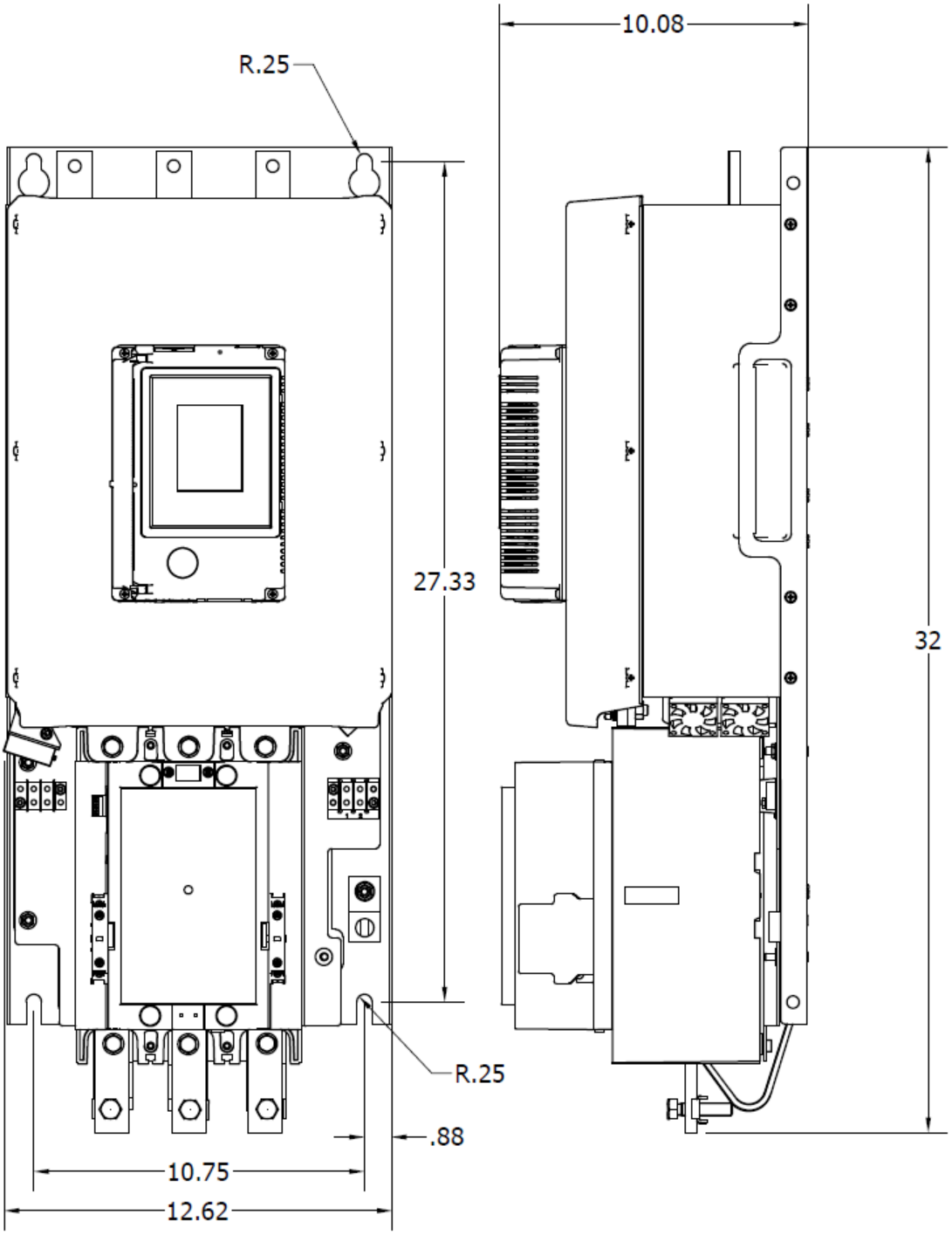
Environment - Installation

TE3-150 to TE3-160



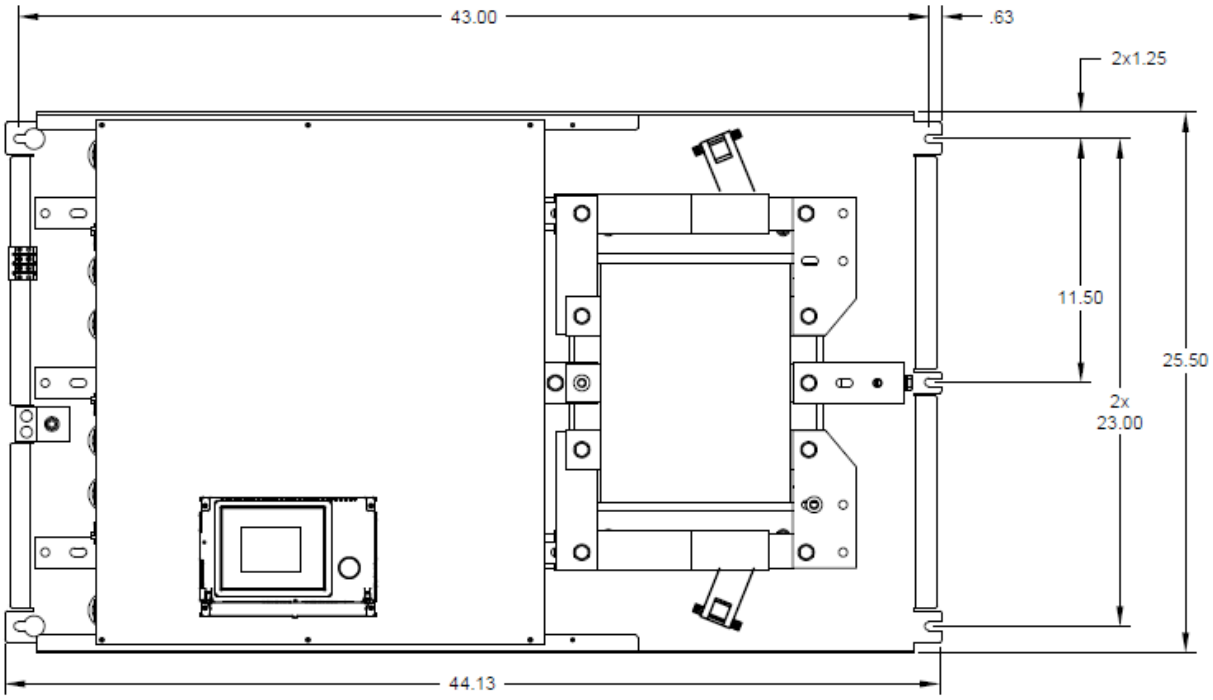
Environment - Installation

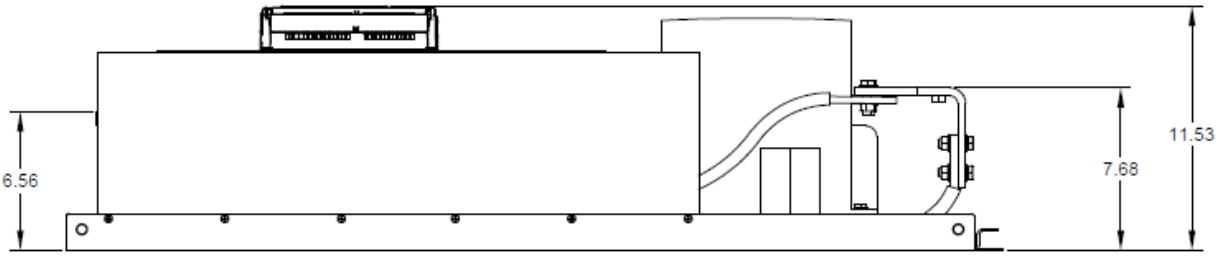
TE3-210 to TE3-600



Environment - Installation

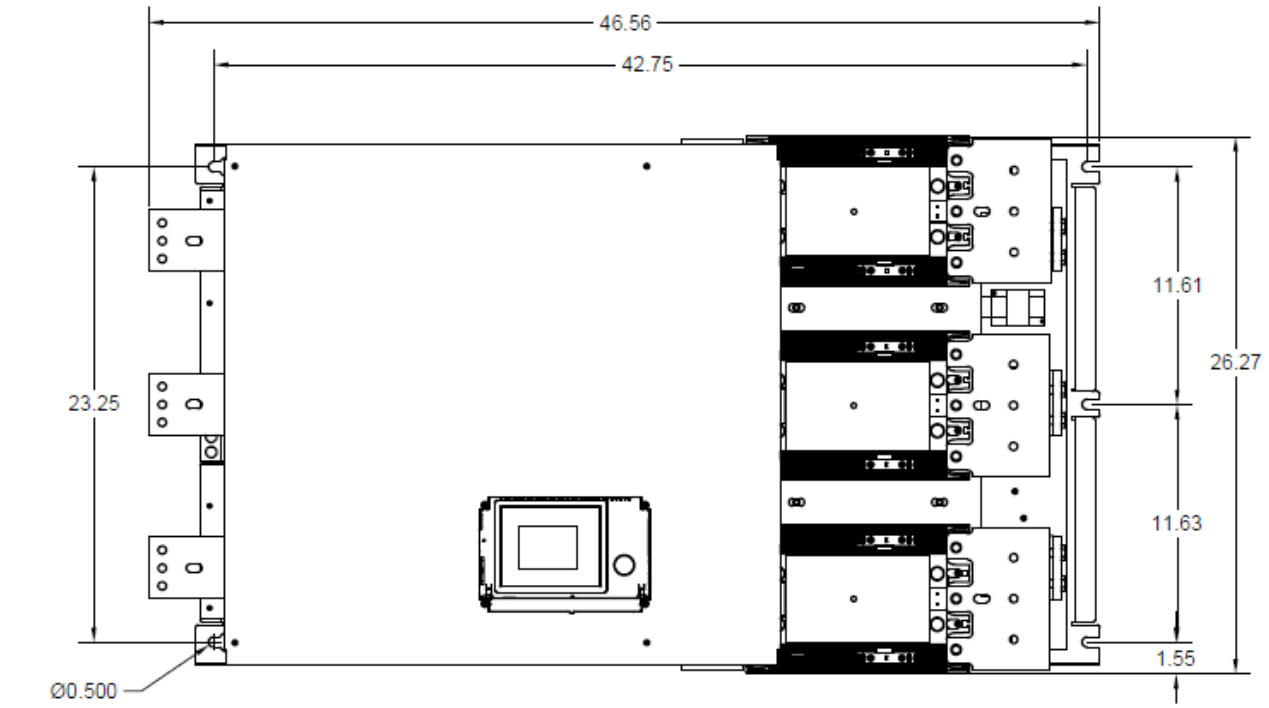
TE3-862 to TE3-900

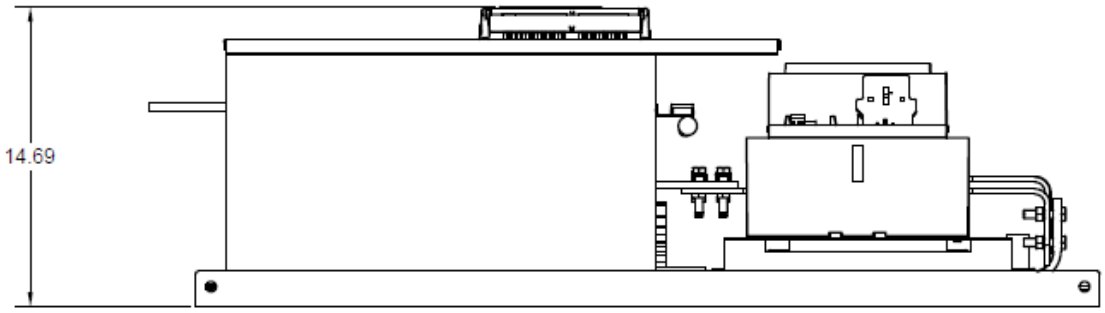




Environment - Installation

TE3-1006 to TE3-1250





Environment - Installation

Enclosure Ventilation

When installing a TE3 into an enclosure, ventilation must be provided if the heat output of the unit is greater than the cabinet will dissipate. Use the following formula to determine the fan requirement. An allowance has been incorporated into the formula so that the figure for Q is the air delivery in the fan supplier's data.

Heat dissipated can be approximated with the formulas: -

Starting
Watts (TE3) = start current(A) x start time(s) x number of starts per hour/1200

iERs Disabled
Watts (TE3) = (TE3 current rating) x 0.6

iERs Enabled
The maximum power dissipation occurs when energy saving and the iERS is turned on
Watts (TE3) = (TE3 current rating) x 1.5

$$Q = \frac{4xWt}{(T_{max} - T_{amb})}$$

Q = volume of air (cubic meters per hour-m3/h)

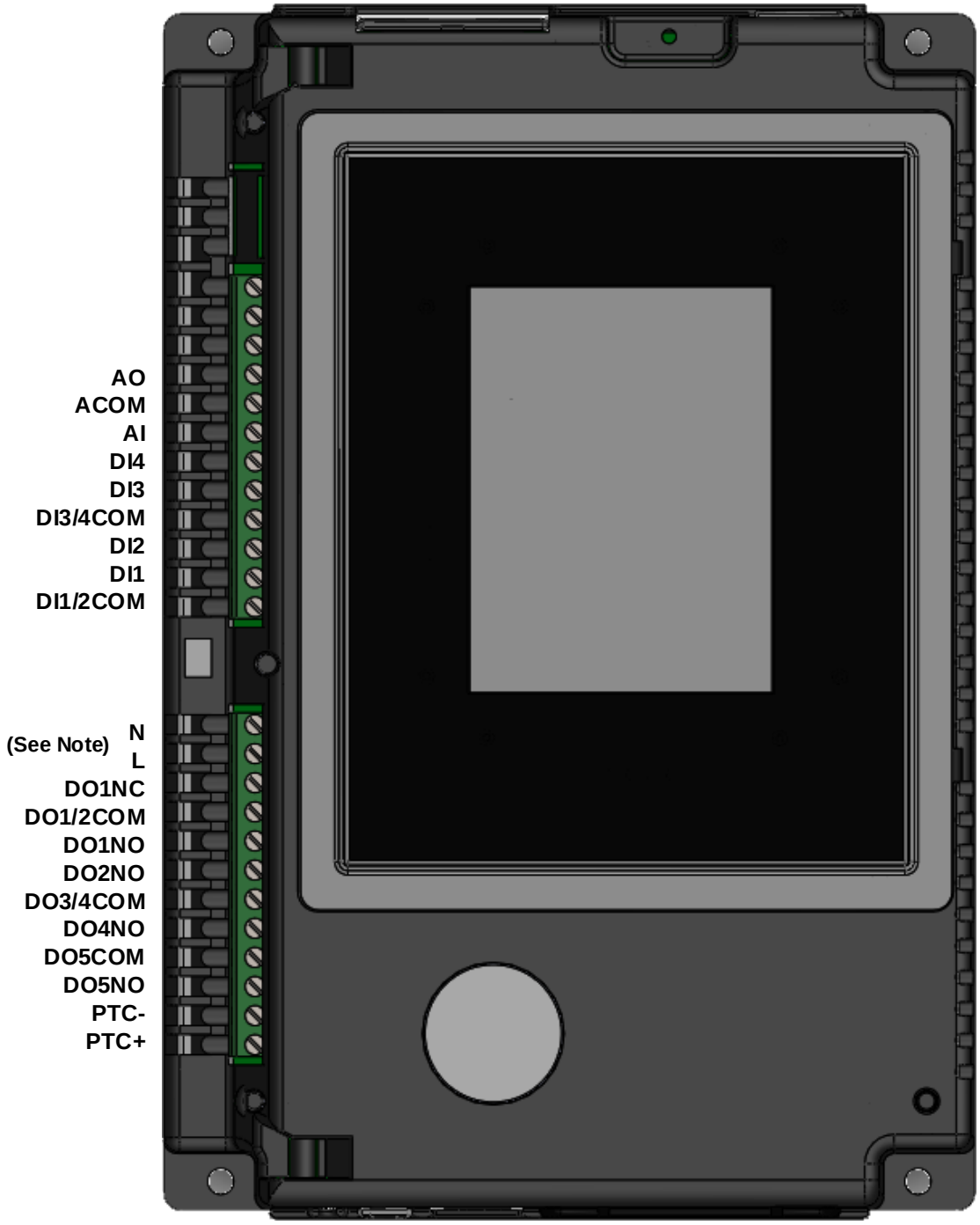
Wt = Heat produced by the unit and all other heat sources within the enclosure (Watts)
Tmax = Maximum permissible temperature within the enclosure (50°C for a fully rated TE3)
Tamb = Temperature of the air entering the enclosure (°C)

If you prefer to work in CFM, substitute °F for °C. Q is now in CFM

Conductor Size & Torque Requirements

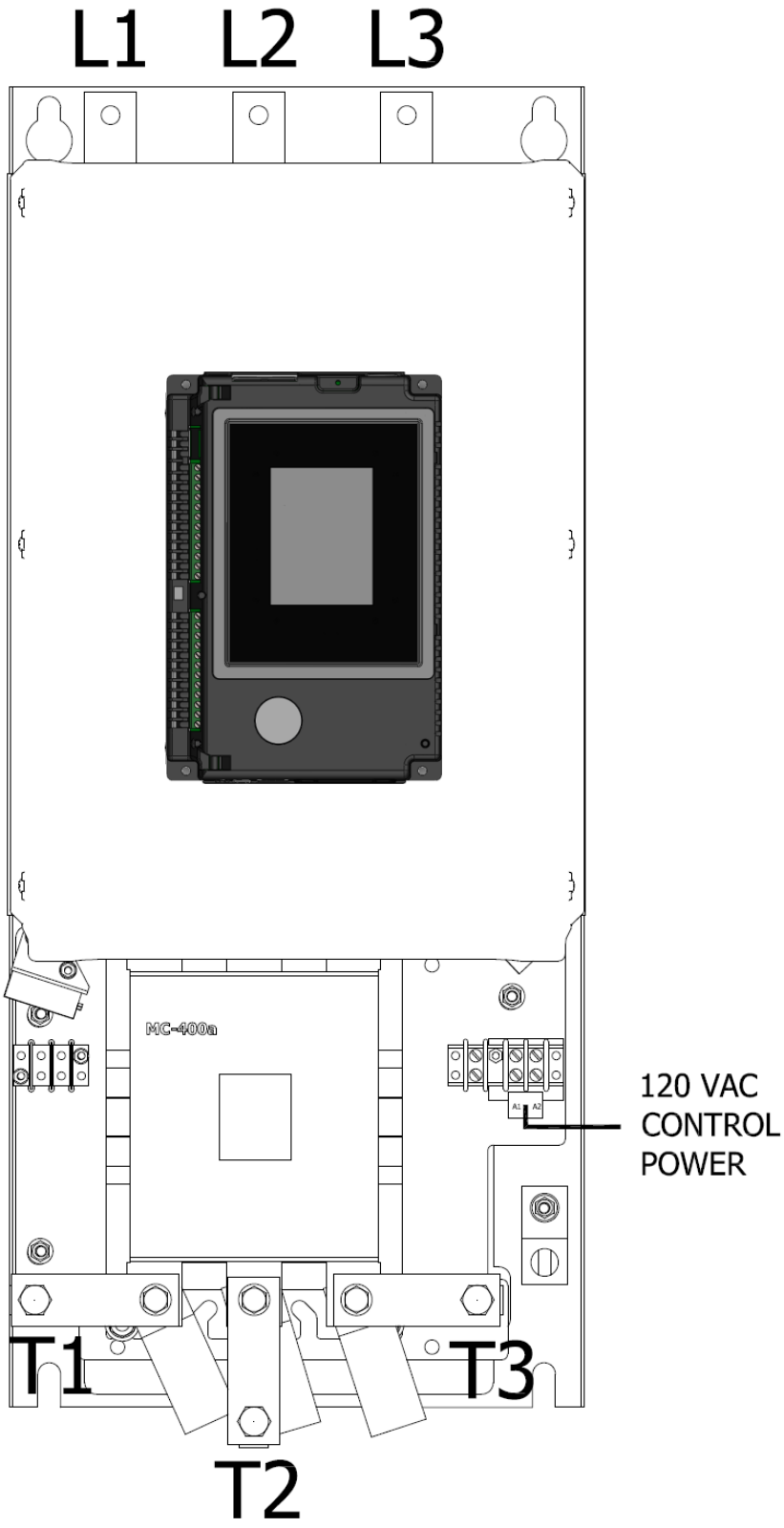
Model Number	Current Range Min.- Max.	Suggested Wire Size AWG	Tightening Torque in.-lbs.	Screw / Bolt Size	Tightening Torque Nm	Suggested Wire Size ISOmm^2
TE3-48	24 - 48	6	80	Saddle Clamp Terminal 12-2/0 AWG	9	16
TE3-62	36 - 62	4	45	1 x M8 (included)	5	25
TE3-78	39 - 78	3				35
TE3-92	46 - 92	2				35
TE3-112	56 - 112	1				50
TE3-150	75 - 150	2/0	80	1 x M8 (included)	9	70
TE3-160	80 - 160	3/0				95
TE3-210	105 - 210	250	200	1 x 0.38" hole (M10) for User supplied lugs	15	150
TE3-275	138 - 275	350 kCMIL				185
TE3-361	180 - 361	2 x 300 kCMIL				2 x 150
TE3-450	225 - 450	2 x 300 kCMIL				2 x 150
TE3-550	275 - 550	2 x 400 kCMIL				2 x 240
TE3-600	300 - 600	2 x 500 kCMIL	TBD	TBD	TBD	2 x 300
TE3-862	431 - 862	3 x 400 kCMIL	TBD	TBD	TBD	3 x 240
TE3-900	450 - 900	3 x 500 kCMIL	TBD	TBD	TBD	3 x 300
TE3-1006	503 - 1006	4 x 350 kCMIL	TBD	TBD	TBD	4 x 185
TE3-1250	625 - 1250	4 x 500 kCMIL	TBD	TBD	TBD	4 x 300

Terminal Designations and Wiring Connection



NOTE: AC Input terminals L & N on starter module only available on models TE3-48 to TE3-160. For all other models the control power input is located on the chassis frame mounted terminal block (see next page).

Control power input location for TE3-210 and up



Terminal Description

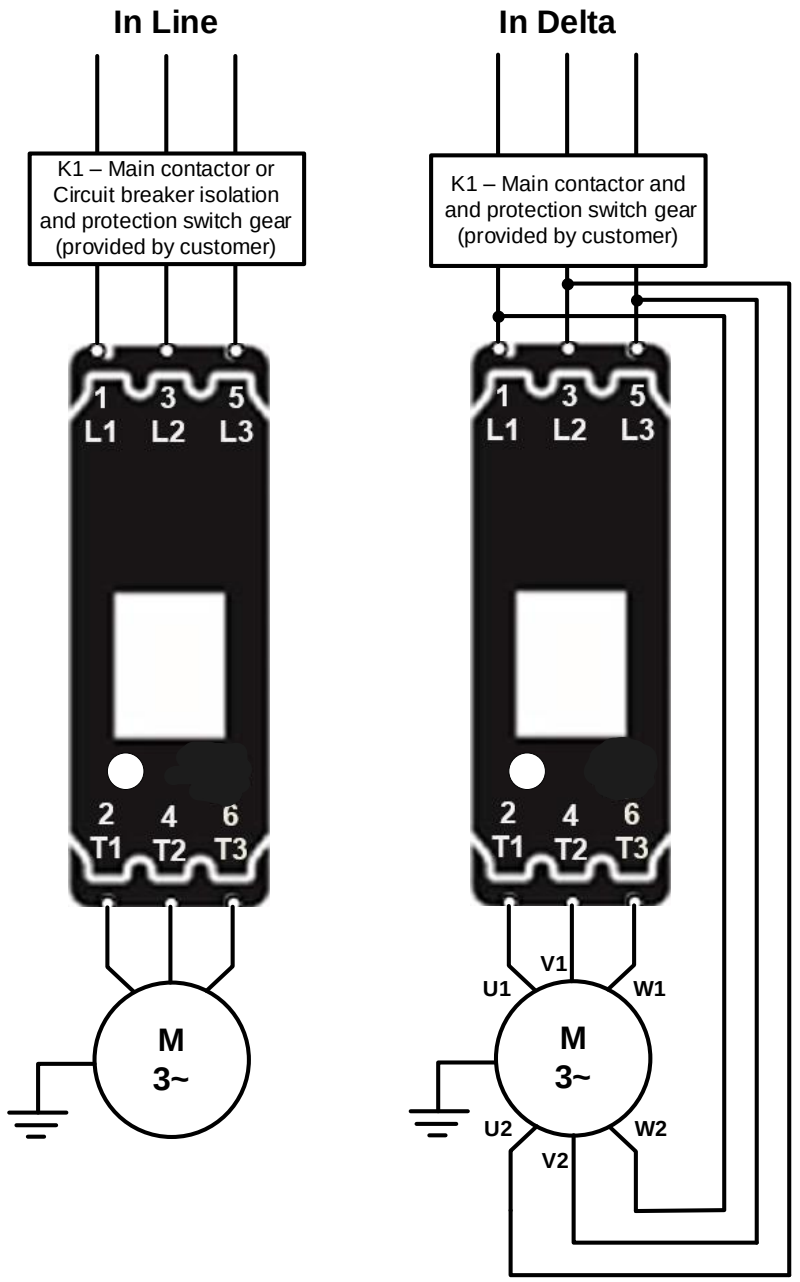
Terminal Name	Description	Programmable		Rating	Notes
AO	Analog Output	0-10V or 4-20mA			
ACOM	Analog Common				
AI	Analog Input	0-10V or 4-20mA			
DI4	Digital Input Group 2	240VAC or 120VAC			#1
DI3	Digital Input Group 2	240VAC or 120VAC			#1
DI3/4COM	Digital Input Group 2 Common				#1
DI2	Digital Input Group 1	240VAC or 120VAC	None		#1
DI1	Digital Input Group 1	240VAC or 120VAC	Start / Stop		#1
DI1/2COM	Digital Input Group 1 Common				#1
N	Neutral - Control supply			120VAC-240VAC	#2
L	Line - Control supply				#2
DO1NC	Group 1 relay N/C	Yes	Fault	240VAC 1A AC15	
DO1/2COM	Group 1 relay common				
DO1NO	Group 1 relay N/O	Yes	Fault	240VAC 1A AC15	
DO2NO	Group 2 relay N/O	Yes	Running	240VAC 1A AC15	
DO3/4COM	Group 2 relay common				
DO4NO	Group 2 relay N/O	Yes	End of Start	240VAC 1A AC15	
DO5COM	Group 3 relay common				
DO5NO	Group 3 relay N/O	Yes	Running	240VAC 3A AC15	
PTC-	PTC Temperature sensor input				
PTC+	PTC Temperature sensor input				

TABLE 1

Notes

#1	Digital input voltage must be set to the voltage applied to the digital input terminals DI1/2COM, DI3/4COM, DI1-DI4. Afin d'éviter d'endommager l'équipement, le réglage de l'entrée numérique programmé sur DI1/2COM, DI3/4COM, DI1-DI4 doit correspondre à la tension appliquée à ces bornes.
#2	The control supply can be 120 to 240V applied to the N, L. The correct voltage is specified by model # at time of order. L'alimentation contrôle peut être 120 ã 240 Vca, appliquée aux bornes N et L. Afin d'éviter d'endommager l'équipement, la tension appropriée selon les indications ne doit être appliquée qu'à une entrée d'alimentation.

Wiring Connection



Terml	FWD	REV
2/T1	U1	U1
4/T2	V1	W1
6/T3	W1	V1
1/L1	W2	V2
3/L2	U2	U2
5/L3	V2	W2

⚠ For suitable short circuit protection devices (SCPD's) see short Circuit Protection in the Technical Information/ standards section of this guide. Pour un dispositif de protection approprié contre le court-circuit, voir la protection contre le court-circuit dans la section « Informations techniques/normes » du présent guide.	⚠ For wire size and torque requirements see Technical Information/ standards section of this guide. Pour les dimensions de câble et les besoins en couple, voir la section « Informations techniques/normes » du présent guide.	⚠ In Delta For this configuration applying the equation. TE3 Ie = ie (motor) / √3 Allows lower current rating TE3 than the motor. The contactor K1 can also be connected inside the delta circuit. When connected in the delta K1 current rating = ie (motor) / √3	⚠ En Delta Pour cette configuration, appliquer l'équation.suivante: TE3 Ie = Ie (moteur)/ √3 Cela permet le courant nominal inférieur de TE3 par rapport au moteur.

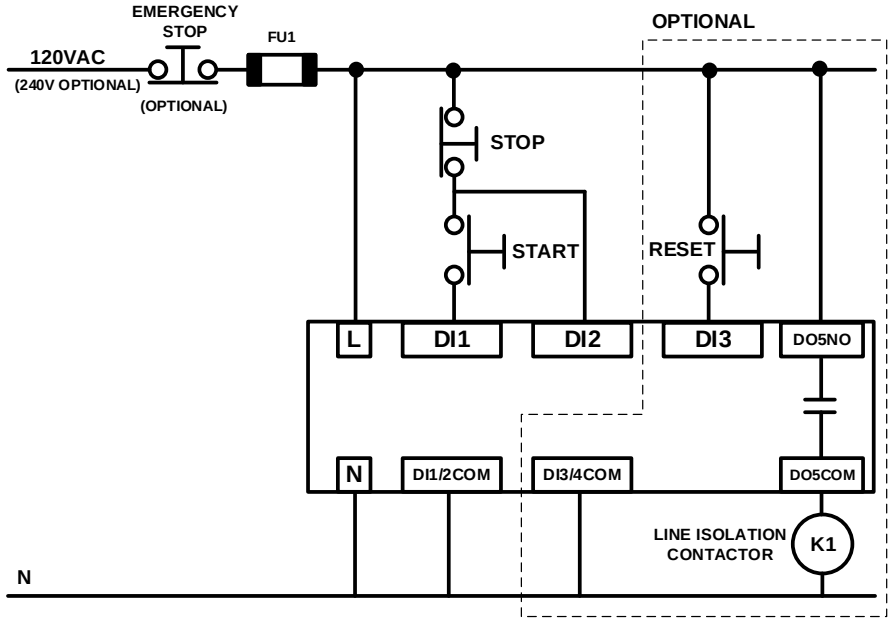
Wiring Connection

The programmed digital input voltage settings match the voltage applied to these terminals to avoid risk of damage to the equipment.

The control supply can be 120 to 240Vac applied to the N, L terminals. Check model number to determine correct control supply voltage (240AC is optional) to avoid risk of damage to the equipment.

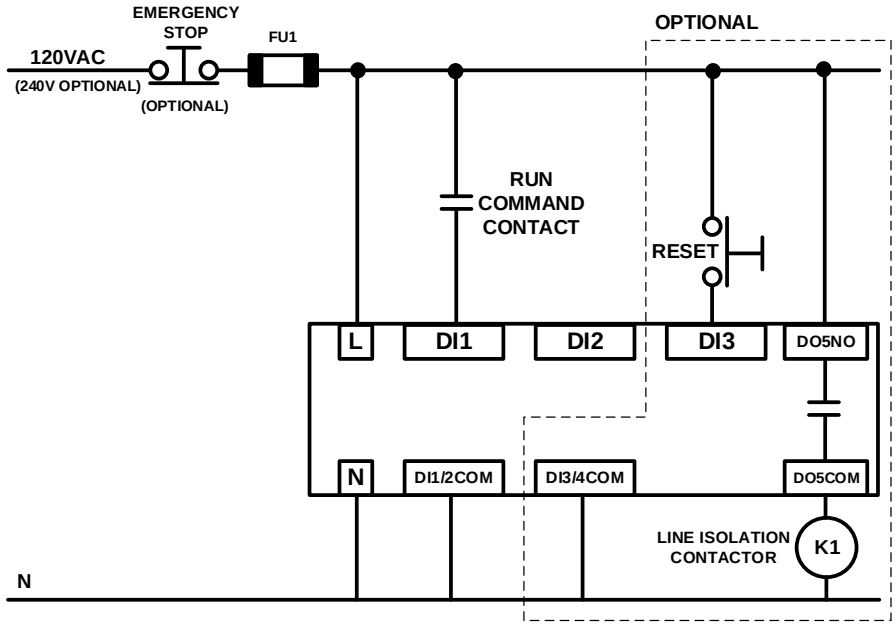
Three Wire Control

3 Wire Control Diagram 120VAC control supply and digital input programming.



Two Wire Control

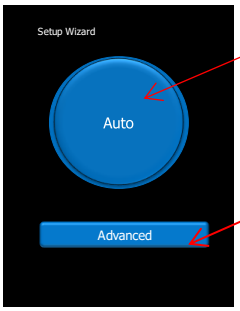
2 Wire Control Diagram 120VAC control supply and digital input programming.



On Screen Menus

Initial Screen

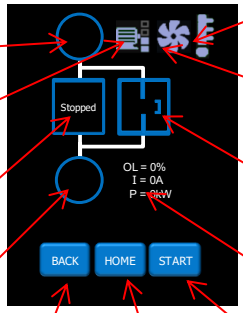
Displayed on FIRST switch-on ONLY.



Auto Setup wizard.

Advanced menu

Status Screen



Supply Status
Turns RED if unit has tripped on supply failure

Motor Overload Status
Turns RED if unit has tripped on overload

Status Messages

Motor Side Status
Turns RED if unit has tripped on motor side phase loss

Returns to previous screen/menu

Enters Sub-Menus

Start/Stop Motor
Only active if Local Control Enabled

Displays Overload Percentage, Instantaneous running Current and power

Internal Bypass Status (open/closed)

Cooling Fan Status
Turns RED if unit has tripped on fan failure

Temperature Status
Turns RED if unit has tripped on over temperature

Home Screen

Auto-Setup Menu

Input/Output Menus

Logging Menus

Advanced Menus

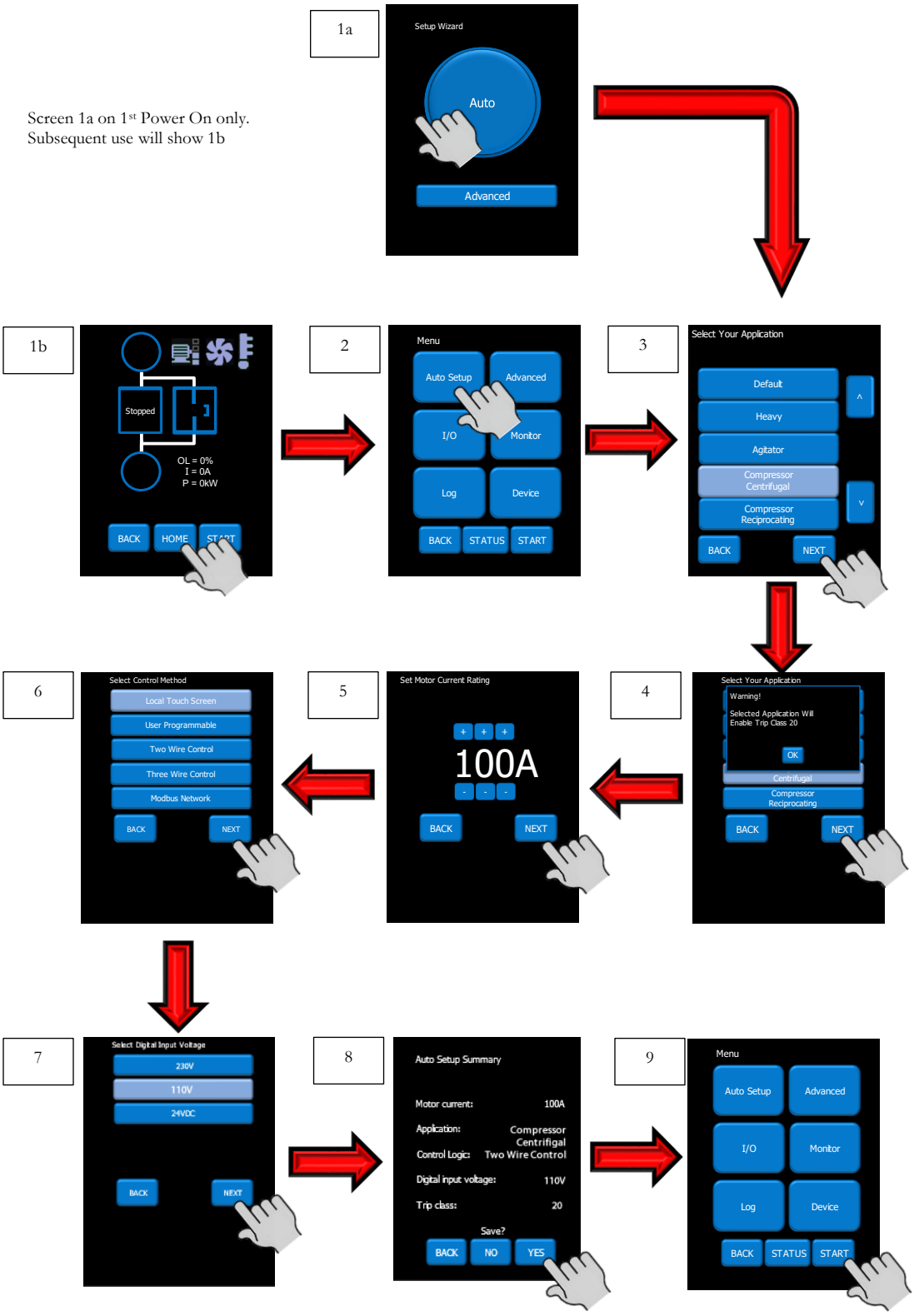
Monitor Screens

Device Menus

See ‘Status Screen’

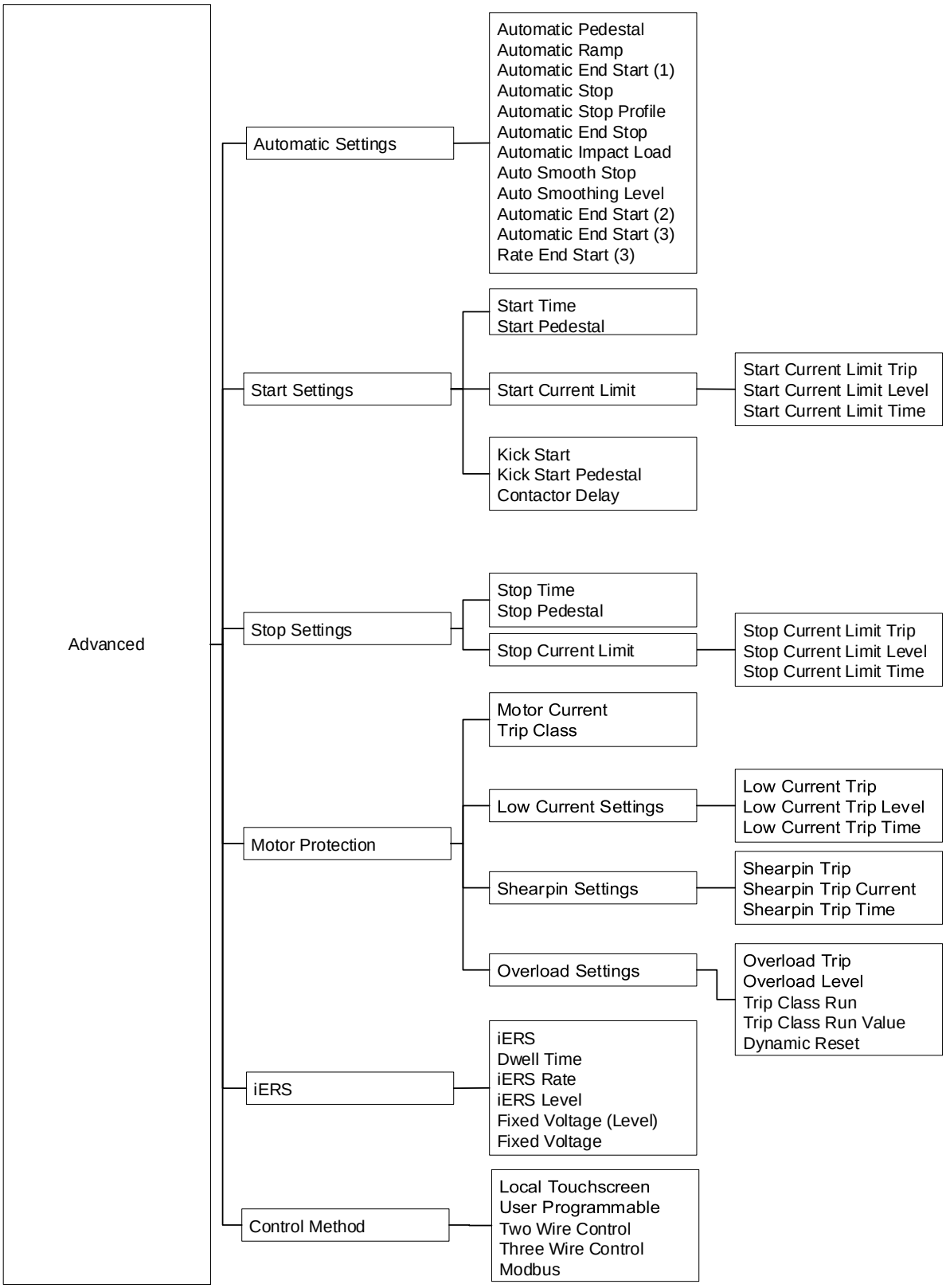
Auto Setup Example

Screen 1a on 1st Power On only.
Subsequent use will show 1b

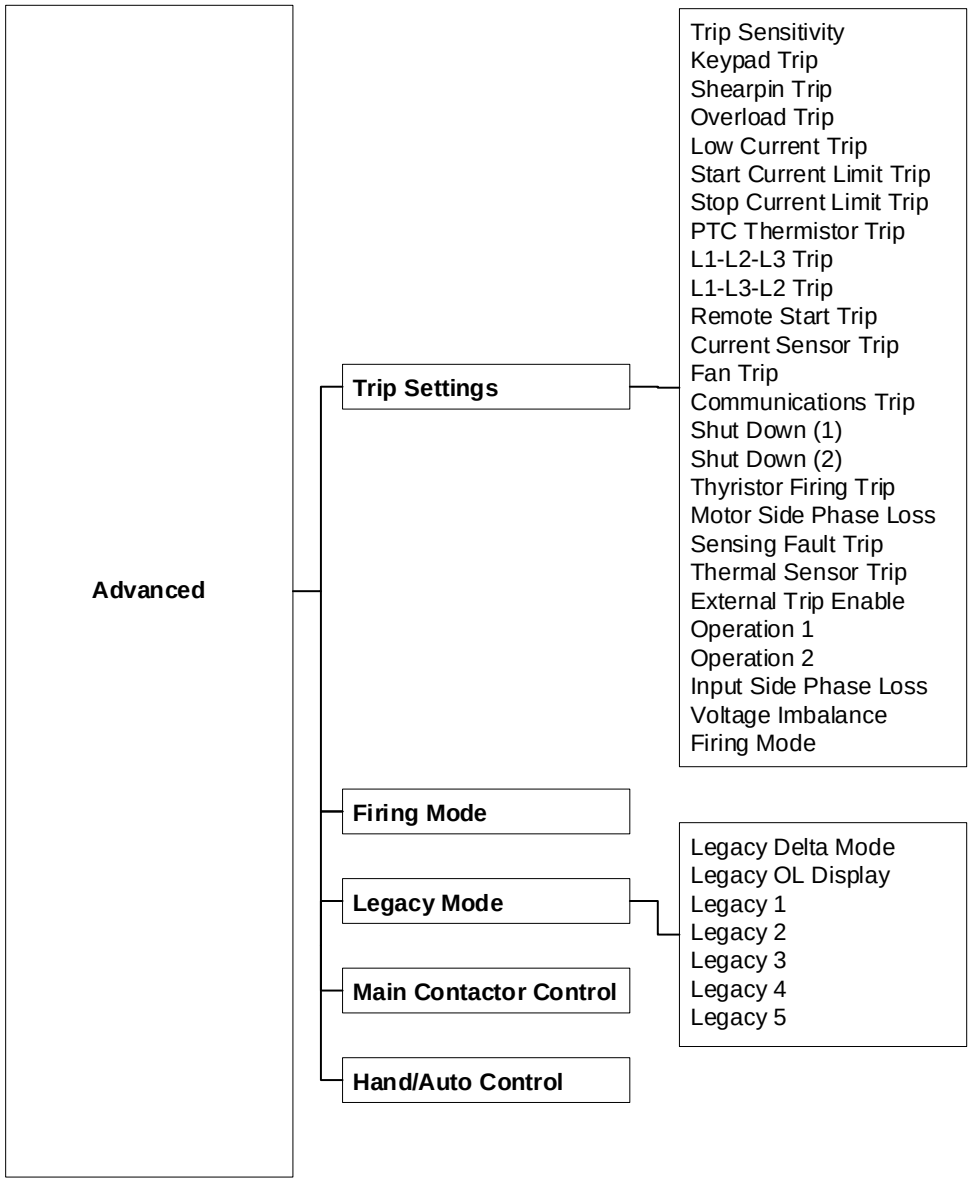


Programming Menu Structure

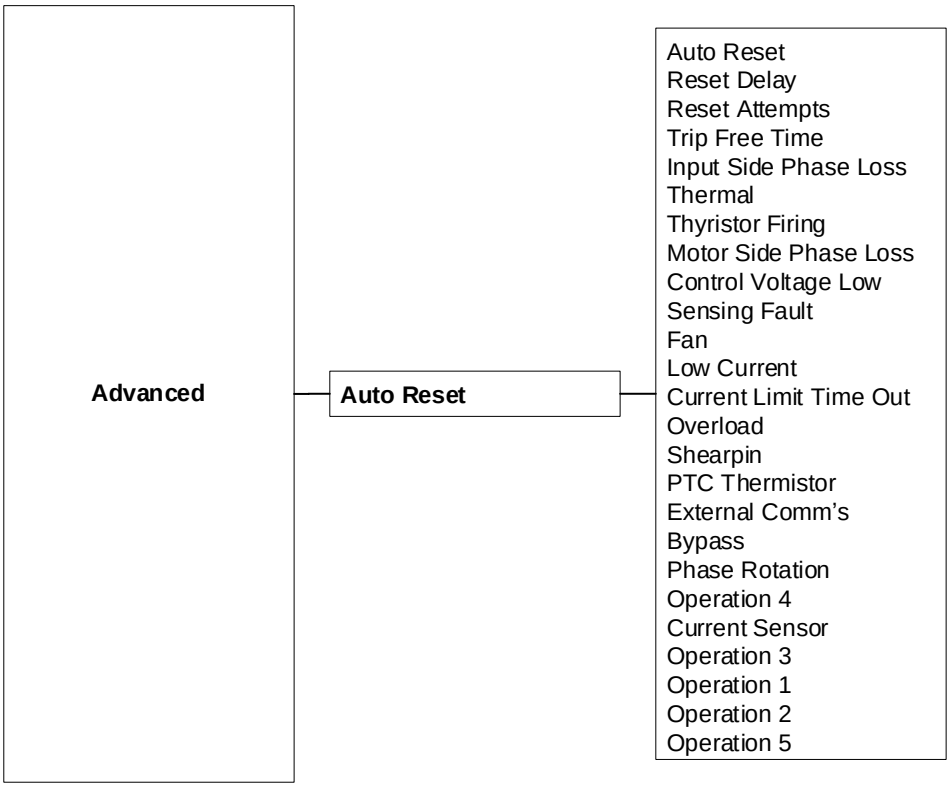
Advanced Menu



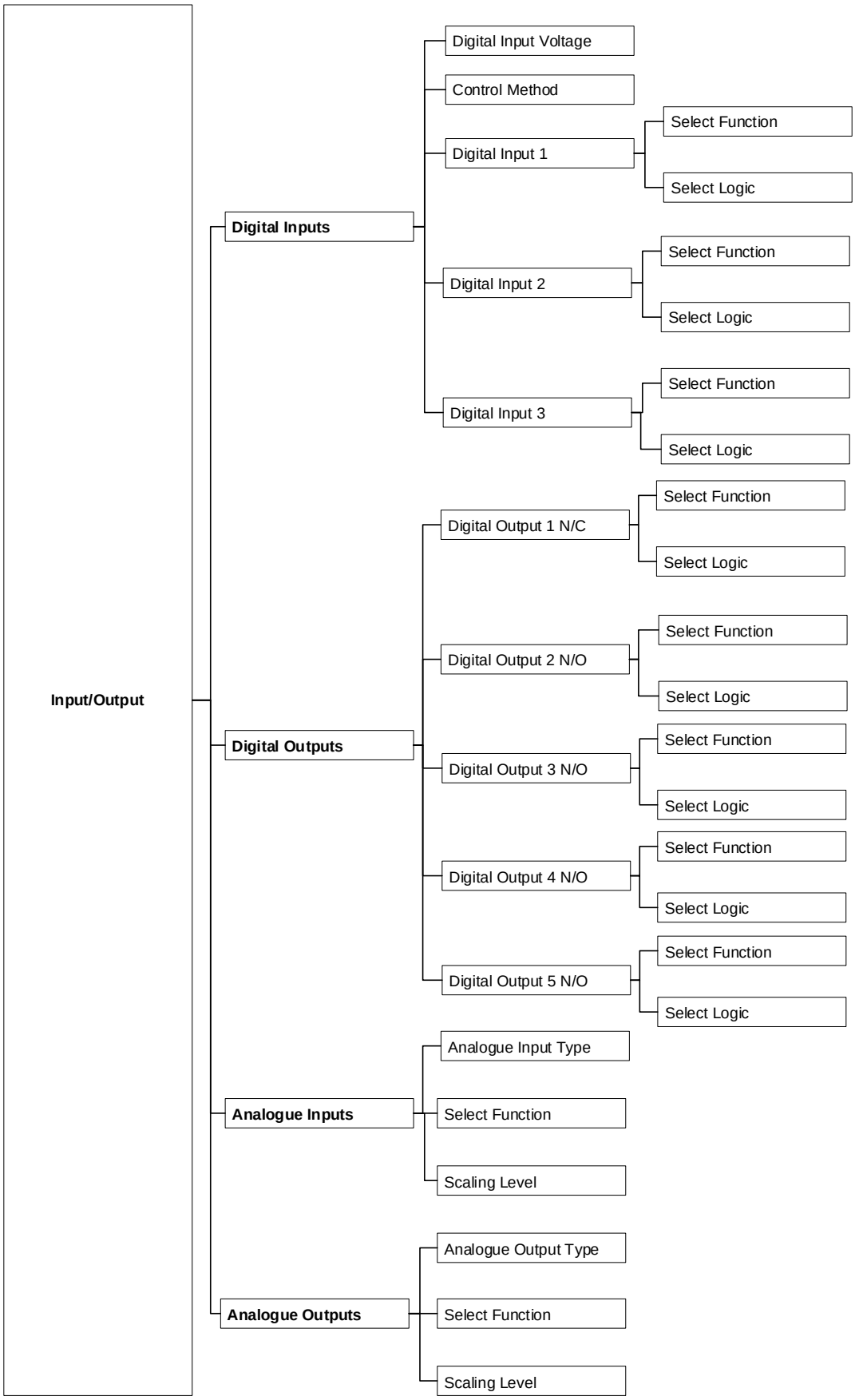
Advanced (continued)



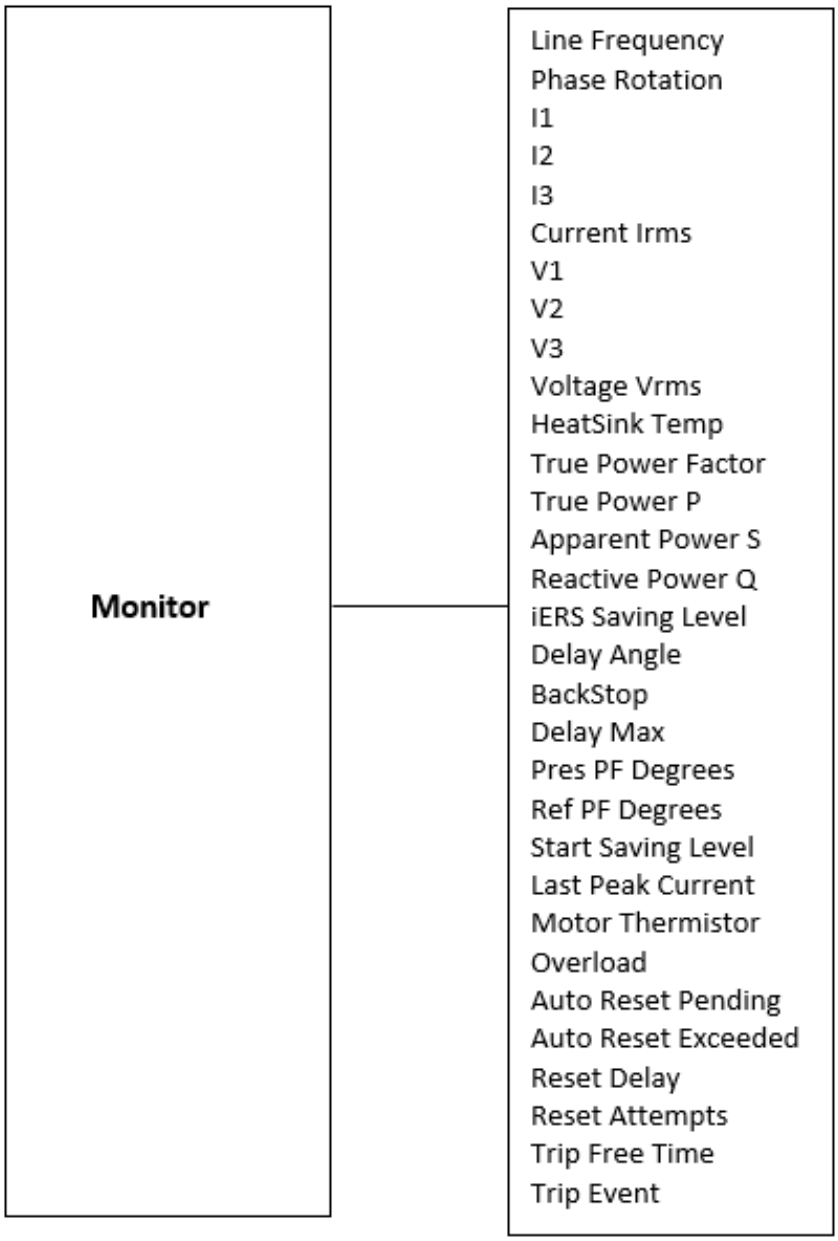
Advanced (continued)



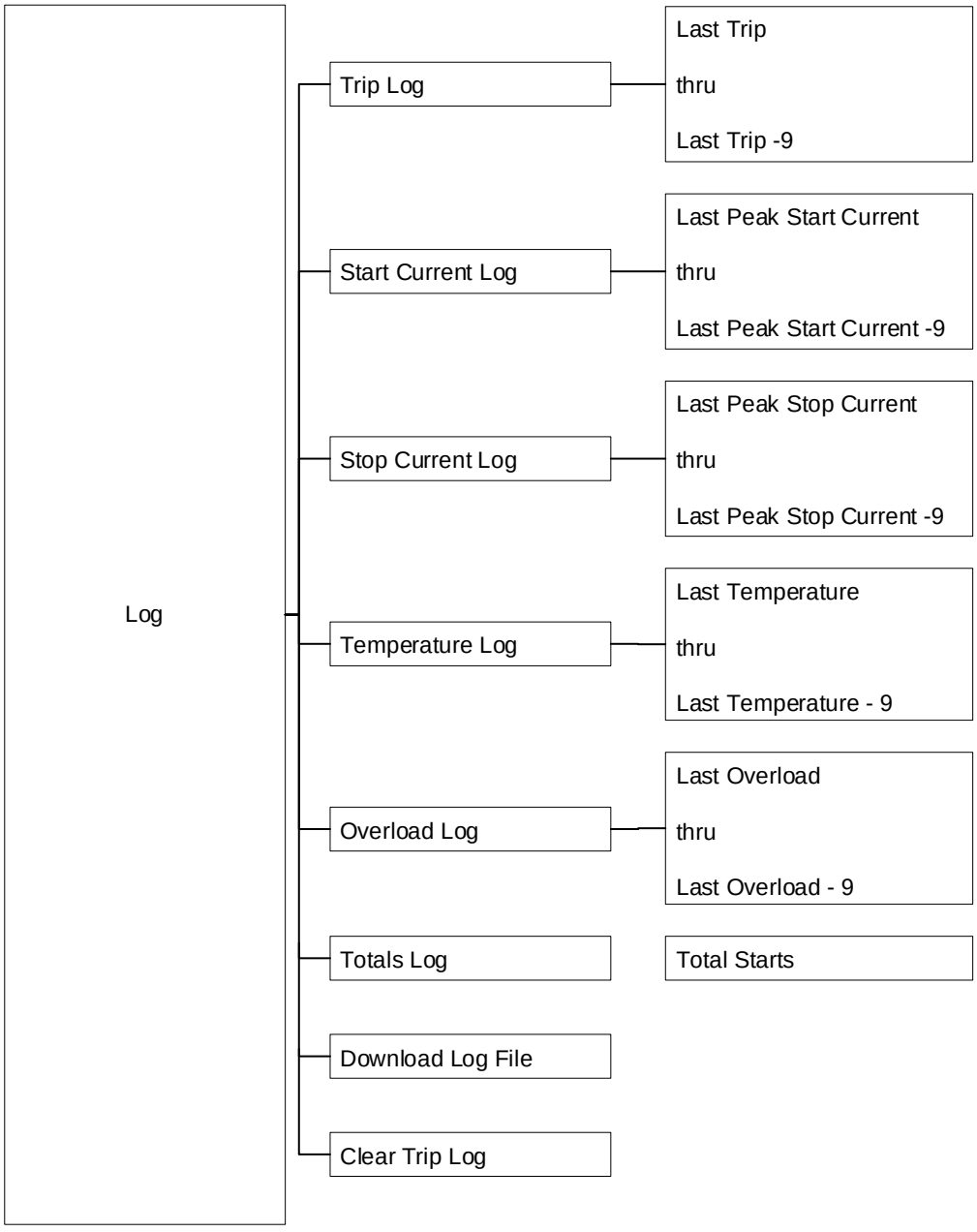
Input / Output Menu



Monitor


Monitor
Line Frequency
Phase Rotation
I1
I2
I3
Current Irms
V1
V2
V3
Voltage Vrms
HeatSink Temp
True Power Factor
True Power P
Apparent Power S
Reactive Power Q
iERS Saving Level
Delay Angle
BackStop
Delay Max
Pres PF Degrees
Ref PF Degrees
Start Saving Level
Last Peak Current
Motor Thermistor
Overload
Auto Reset Pending
Auto Reset Exceeded
Reset Delay
Reset Attempts
Trip Free Time
Trip Event

Log Menu


Log
Trip Log
Last Trip
thru
Last Trip -9
Start Current Log
Last Peak Start Current
thru
Last Peak Start Current -9
Stop Current Log
Last Peak Stop Current
thru
Last Peak Stop Current -9
Temperature Log
Last Temperature
thru
Last Temperature - 9
Overload Log
Last Overload
thru
Last Overload - 9
Totals Log
Total Starts
Download Log File
Clear Trip Log

Fault Code List

Fault Code	Description
F101 - F117	Input Side Phase Loss
F101 - F208	Soft Start Temperature Trip
F300 - F357	Thyristor Firing Trip
F401 - F403	Motor Side Phase Loss
F601	Control Voltage too low
F701 – F710	Sensing Fault Trip (check all power connections)
F801 – F802	Fan Problem
F1001	Shorted Thyristor (SCR)
F1201 – F1202	Current Limit Timeout Trip
F1301 – F1302	Overload Trip
F1401	Shearpin Trip
F1501	PTC Thermistor Trip (Motor Temperature Sensor)
F1701	Communications Trip
F1801 – F1803	Bypass Relay Trip
F2001	Remote Start is enabled (Remove Run Command and Reset)
F2101 – F2103	Rotation Trip
F2201 – F2209	MPU (Main Processing Unit) Trip
F2402 – F2406	Main Board Trip
F2501 – F2581	Touchscreen Trip
F2601 – F2603	Logging Trip

Rating Table

Minimum current ratings based on typical rated operation currents of motors for the corresponding rated operational powers

Model Number	Amps	208V / HP		240V / HP		480V / HP		600V / HP	
		Shunt Bypass	Start Bypass	Shunt Bypass	Start Bypass	Shunt Bypass	Start Bypass	Shunt Bypass	Start Bypass
TE3-48	18-48	15	10	15	15	30	30	40	30
TE3-62	31-62	20	15	20	20	40	40	50	50
TE3-78	39-78	25	20	25	25	60	50	60	60
TE3-92	46-92	30	25	30	30	60	60	75	75
TE3-112	56-112	30	30	40	30	75	75	100	75
TE3-150	75-150	40	40	50	50	100	100	125	75
TE3-160	80-160	50	40	60	50	125	100	150	75
TE3-210	105-210	60	50	75	60	150	150	200	150
TE3-275	138-275	75	60	100	75	200	150	200	150
TE3-361	181-361	125	75	125	125	300	250	350	300
TE3-450	225-450	150	125	150	150	350	300	450	300
TE3-550	275-550	150	150	200	200	450	400	500	500
TE3-600	300-600	200	200	200	200	500	500	600	600
TE3-862	431-862	250	250	300	300	600	500	700	600
TE3-900	450-900	300	250	350	300	700	600	900	600
TE3-1006	503-1006	350	300	400	400	800	800	1,000	900
TE3-1250	625-1250	450	350	500	450	1,000	900	1,200	1,000

1) Rated operational powers in HP corresponding to FLA current rating according to UL508 and Table 430.250 of the National Electrical Code.
2) The FLA rating applies for a maximum surrounding air temperature of 122 °F (50°C).
3) 690V Rated units available – Contact Factory.
4) Size the Soft Starter based on the actual motor nameplate FLA.
5) All TE3 units rated 500% current 60 sec; Start bypass ratings allow for use of 1.15 service factor motors.
6) TE3-600 @ 480V and 600VAC is1.0 S.F.
7) Control power is required for all units.
8) Fuses are required for 65kA SCCR on all Models

Short Circuit Protection

Type designation (e.g., TE3-…)			48	62	78	92	112	150	160
Rated operational currents	I_e	A	**48**	**62**	**78**	**92**	**112**	**150**	**160**
Rated short circuit current at 600V	I_q	kA	5kA	10kA	10kA	10kA	10kA	10kA	10kA
Class RK5 time-delay fuse #1	Maximum rating Z_1	A	125A	-	-	-	-	-	-
Class J time-delay fuse #1	Maximum rating Z_1	A	-	-	-	-	-	-	-

Type designation (e.g., TE3-…)			210	275	361	450	550	600	862	900	1006	1250
Rated operational currents	I_e	A	**210**	**275**	**361**	**450**	**550**	**600**	**862**	**900**	**1006**	**1250**
Rated short circuit current at 600V	I_q	kA	10kA	10kA	18kA	30kA	30kA	30kA	42kA	42kA	N/A	N/A
Class RK1 time-delay fuse #1	Maximum rating Z_1	A	-	-	600A	-	**-**		**-**	**-**	**-**	**-**
Class L time-delay fuse #1	Maximum rating Z_1	A	**-**	**-**	**-**	600A	-	-	1200A	1200A	**-**	**-**
Class J time-delay fuse #1	Maximum rating Z_1	A	600A	600A	**-**	**-**	800A	800A	-	**-**	**-**	**-**
UL Listed inverse-time delay circuit breaker #1	Maximum rating Z_2	A	400A	400A	-	-	**-**	**-**	-	-	-	-

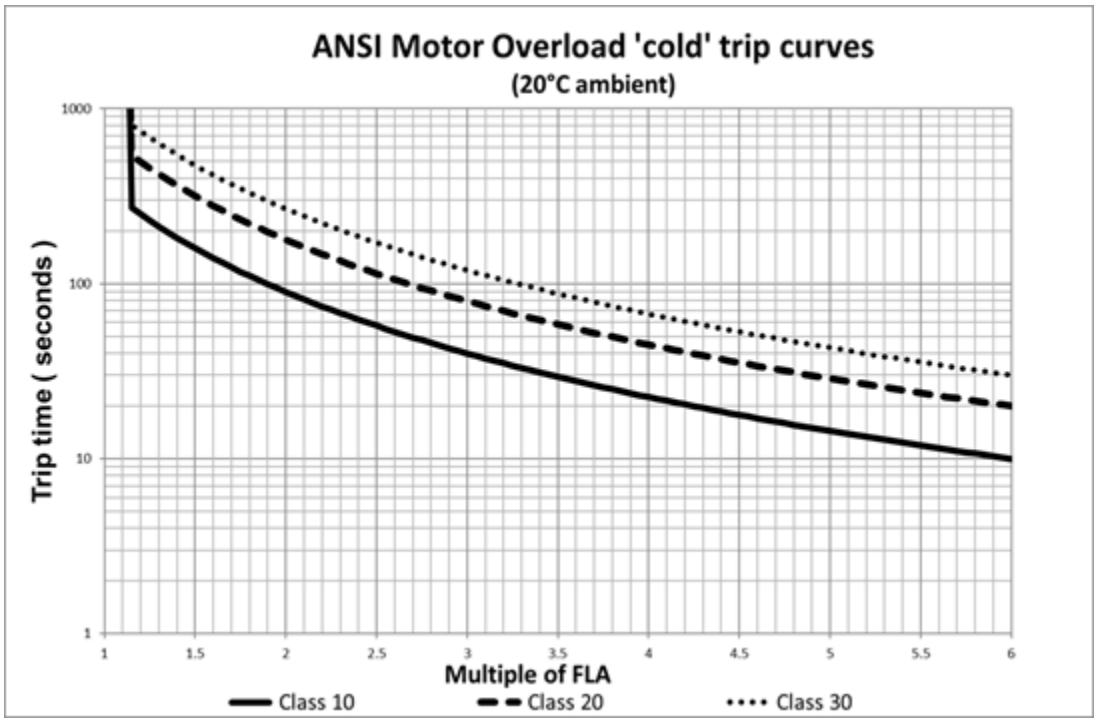
Type designation (e.g., TE3-…)			48	62	78	92	112	150	160
Rated operational currents	I_e	A	**48**	**62**	**78**	**92**	**112**	**150**	**160**
Short circuit current at 208-480V	I_q	kA	65kA	65kA	65kA	65kA	65kA	65kA	65kA
Class J time-delay fuse #1	Maximum rating Z_1	A	60A	200A	200A	200A	200A	200A	200A
UL Listed inverse-time delay circuit breaker #1	Maximum rating Z_2	A	**-**	250A	250A	250A	250A	250A	250A

Type designation (e.g., TE3-…)			210	275	361	450	550	600	862	900	1006	1250
Rated operational currents	I_e	A	**210**	**275**	**361**	**450**	**550**	**600**	**862**	**900**	**1006**	**1250**
Short circuit current at 208-480V	I_q	kA	65kA	65kA	65kA	65kA	65kA	65kA	65kA	65kA	85kA	85kA
Class J time-delay fuse #1	Maximum rating Z_1	A	300A	300A	500A	500A	**-**	**-**	**-**	**-**	**-**	**-**
Class L time-delay fuse #1	Maximum rating Z_1	A	**-**	**-**	**-**	**-**	800A	800A	1200A	1200A	1600A	1600A
UL Listed inverse-time delay circuit breaker #1	Maximum rating Z_2	A	600A	600A	600A	600A	800A	800A	N/A	N/A	1600A	1600A

1. Suitable for Use On A Circuit Capable Of Delivering Not More Than ___I_q___ rms Symmetrical Amperes, 600 Volts Maximum, When Protected by Class J time delay Fuses with a Maximum Rating of ___Z_1___ or by a Circuit Breaker with a Maximum Rating of ___Z_2___.

2. Correctly selected semiconductor fuses can provide additional protection against damage to the TE3 unit (This is sometimes referred to as type 2 co-ordination).

Technical Information



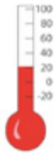
Note: When the overload has tripped, there is a forced cooling time to allow the overload to recover before the next start. The ‘warm’ trip times are 50% of the ‘cold’ trip time

Technical Information & Standards

Rated operational voltages	**U_e**	200VAC to 575V (600VAC maximum for UL / cUL)		
Rated operational currents	**I_e**	See Rating Table		
Rating index		See Sizing Guide		
Rated frequency/frequencies		50 - 60Hz ± 5Hz		
Rated duty		Uninterrupted.		
Form designation		Form 1, Internally Bypassed		
Rated insulation voltage	**U_i**	690V		
Rated impulse withstand voltage	**U_{imp}**	Main circuit	6kV	
		Control supply circuit	4kV	
Enclosure Rating		Main circuit	Open chassis / Panel Mount	
		Supply and Control circuit		
Overvoltage Category/Pollution Degree		III/3		
Rated conditional short-circuit current and type of co-ordination with associated short circuit protective device (SCPD)		Type 1 co-ordination See Short Circuit Protection Tables in user manual for rated conditional short-circuit current and required current rating and characteristics of the associated SCPD		
Rated control circuit voltage (programmable)	**U_c**	120VAC 240VAC (Optional)	50 - 60Hz ±5Hz	Protect with 4A UL Listed fuse
Rated control supply voltage	**U_s**	See Rating Table, 2 Amp supply (cont.)		
Relay specification	**RELAY 1** **RELAY 2**	AC-15, 240VAC, 1A DC-13 30VDC, 0.7A		
	RELAY 3	AC-15, 250VAC, 3A DC-13 24VDC, 2A		
Electronic Overload relay with manual reset	**Trip Class**	10, 20 or 30 (See Sizing Guide for associated I_e rating)		
	Current setting	10% or rated current		
	Rated frequency	50 to 60Hz ± 5Hz		
	Time-current characteristics	See user manual.		
EMC Emission levels	**EN 55011**	Class A		
EMC Immunity levels	**IEC 61000-4-2**	8kV/air discharge or 4kV/contact discharge		
	IEC 61000-4-3	10 V/m		
	IEC 61000-4-4	2kV/5kHz (main and power ports)		
		1kV/5kHz (signal ports)		
	IEC 61000-4-5	2kV line-to-ground / 1kV line-to-line		
	IEC 61000-4-6	10V		

NOTICE: This product has been designed for environment A. Use of this product in environment B may cause unwanted electromagnetic disturbances, in which case the user may be required to take adequate mitigation measures

Altitude



-4°F (-20°C) to 122°F (50°C).

Altitude above sea level 3281ft (1000m). Above 3281ft de rate by 1% of TE3 Ie per 328ft (100m) to a maximum altitude of 6532ft (2000m)
Please note for higher temperatures and altitudes contact your supplier.
TE3 models are listed CE, UL508 and cUL508.

(en) **Electric current! Danger to life!**
Only skilled or instructed persons may carry out the operations.

(de) **Lebensgefahr durch Strom!**
Nur Elektrofachkräfte und elektrotechnisch unterwiesene Personen dürfen die im Folgenden beschriebenen Arbeiten ausführen.

(fr) **Tension électrique dangereuse!**
Seules les personnes qualifiées et averties doivent exécuter les travaux ci-après.

(es) **¡Corriente eléctrica! ¡Peligro de muerte!**
El trabajo a continuación descrito debe ser realizado por personas cualificadas y advertidas.

(it) **Tensione elettrica: Pericolo di morte!**
Solo persone abilitate e qualificate possono eseguire le operazioni di seguito riportate.

(zh) **触电危险！**
只允许专业人员和受过专业训练的人员进行下列工作。

(ru) **Электрический ток! Опасно для жизни!**
Только специалисты или проинструктированные лица могут выполнять следующие операции.

(nl) **Levensgevaar door elektrische stroom!**
Uitsluitelijk deskundigen in elektriciteit en elektrotechnisch geinstrueerde personen is het toegestaan, de navolgend beschrevene werkzaamheden uit te voeren.

(da) **Livsfare på grund af elektrisk strøm!**
Kun uddannede el-installatører og personer der e instruerede i elektrotekniske arbejdsopgaver, må udføre de nedenfor anførte arbejder.

(el) **Προσοχή, κινδυνος ηλεκτροπληξιας!**
Οι εργασίες που αναφέρονται στη συνέχεια θα πρέπει να εκτελούνται μόνο από ηλεκτρολόγους και ηλεκτροτεχνίτες.

(pt) **Perigo de vida devido a corrente eléctrica!**
Apenas electricistas e pessoas com formação electrotécnica podem executar os trabalhos que a seguir se descrevem.

(sv) **Livsfara genom elektrisk ström!**
Endast utbildade elektriker och personer som undervisats i elektroteknik får utföra de arbeten som beskrivs nedan.

(fi) **Hengenvaarallinen jännite!**
Vain pätevät sähköasentajat ja opastusta saaneet henkilöt saavat suorittaa seuraavat työt.

(cs) **Nebezpečí úrazu elektrickým proudem!**
Níže uvedené práce smějí provádět pouze osoby s elektrotechnickým vzděláním.

(et) **Eluohtlik! Elektrilöögioht!**
Järgnevalt kirjeldatud töid tohib teostada ainult elektriala spetsialist või elektrotehnilise instrueerimise läbinud personal.

(hu) **Életveszély az elektromos áram révén!**
Csak elektromos szakemberek és elektrotechnikában képzett személyek végezhetik el a következőkben leírt munkákat.

(lv) **Elektriskā strāva apdraud dzīvību!**
Tālāk aprakstītos darbus drīkst veikt tikai elektrospeciālisti un darbam ar elektrotehniskām iekārtām instruētās personas!

(lt) **Pavojus gyvybei dėl elektros srovės!**
Tik elektrikai ir elektrotechnikos specialistai gali atlikti žemiau aprašytus darbus.

(pl) **Porażenie prądem elektrycznym stanowi zagrożenie dla życia!**
Opisane poniżej prace mogą przeprowadzać tylko wykwalifikowani elektrycy oraz osoby odpowiednio poinstruowane w zakresie elektrotechniki.

(sl) **Življenjska nevarnost zaradi električnega toka!**
Spodaj opisana dela smejo izvajati samo elektrostrokovnjaki in elektrotehnično poučene osebe.

(sk) **Nebezpečenstvo ohrozenia života elektrickým prúdom!**
Práce, ktoré sú nižšie opísané, smú vykonávať iba elektroodborníci a osoby s elektrotechnickým vzdelaním.

(bg) **Опасност за живота от електрически ток!**
Операциите, описани в следващите раздели, могат да се извършват само от специалисти-електротехници и инструктиран електротехнически персонал.

(ro) **Atenţie! Pericol electric!**
Toate lucrările descrise trebuie efectuate numai de personal de specialitate calificat şi de persoane cu cunoştiinţe profunde în electrotehnică.

California Customers: California Proposition 65 Warning
WARNING: this product and associated accessories may contain chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm. For more information visit https://p65warnings.ca.gov

Toshiba International Corporation
Motors & Drives
13131 West Little York Road
Houston, Texas 77041 USA
Tel +713-466-0277
US 1-800-231-1412
Rev.07ESSENCE2821

TOSHIBA
TOSHIBA INTERNATIONAL CORPORATION

TOSHIBA MOTORS & DRIVES

Adjustable Speed Drives • Motors • Motor Controls

www.toshiba.com/tic