EAST GROVE PUMP STATION
MIDDLEBOROUGH, MASSACHUSETTS
OPERATION & MAINTENANCE MANUALS

Graybar Sales Order #:
379059285

[ ]	**Approval**	[x]	**Operations & Maintenance Manual**
[ ]	**Record**		
[ ]	**Revision**	[ ]	**Copies Provided**

Project Manager:
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Customer Service Information Center: 1-800-GRAYBAR
www.Graybar.com

Contractor / Installer:
SPARKS COMPANY, INC.

Consulting Engineer:
SAR ENGINEERING

Distributor:
GRAYBAR

Sales Location:
WESTWOOD, MA

Table of Contents

BILL OF MATERIAL

Item No.	Purch. Line No.	Qty.	Catalog Number / Details

ENCLOSED CIRCUIT BREAKER

001-00 1

Designation: MCB
JGL36200YQ
Molded Case Circuit Breaker
JGL36200YQ
UL/CSA Rated
PowerPact J Frame
Termination: Lugs Line/Load Side
200 Amp Capacity
3 Pole Device
600 Vac Rated
80% Rated - Standard rated
Interrupting Rating
65kA @ 240Vac/35kA @ 480Vac/18kA @ 600Vac
Handle padlock attachment - OFF position only
Revision - 5/2/2022 - (S20220331/S20220501)
5/2/2022 1:57:12 PM
Source -Selector

Ship Id: 01 **Estimated On-site Dt:** 6/29/2022

002-00 1

Designation: MCB
J250DS
ENCLOSURE FOR CIRCUIT BREAKER NEMA 4 4X

Ship Id: 01 **Estimated On-site Dt:** 6/3/2022

003-00 1

Designation: MCB
SN400LA
NEUTRAL ASSEMBLY INSULATED GROUNDABLE

Ship Id: 01 **Estimated On-site Dt:** 6/3/2022

004-00 1

Designation: MCB
PKOGTJ250
J ENCLOSURE EQUIPMENT GROUND KIT

Ship Id: 01 **Estimated On-site Dt:** 6/3/2022

SURGE PROTECTION DEVICE

005-00 1

Designation: SPD
SSP04EMA24SD
SPD T1 EMA 240KA 480Y/277V SS IS 3P4W
480Y/277V 3 Phase 4 Wire, 240kA per phase UL Type 1 SPD
LED Lights, Dry Contacts, Audible Alarm, Surge Counter, Integral Disconnector
NEMA 4X Stainless Steel
Surge Protection Device Type: Externally Mounted
System Voltage: 480/277 3P 4W
UL 1449 SPD Type: Line Side (UL SPD Type 1)
Processed by ACE 2.0 - 03112022

Ship Id: 01 **Estimated On-site Dt:** 6/3/2022

Item No.	Purch. Line No.	Qty.	Catalog Number / Details

VOLTAGE COMBINATION MOTOR CONTROLLER

006-00 1

Designation: SSRVS
863922UNA4YC06A07B08F10G10J10
Combination Altistart 22 Controller
863922UNA4YC06A07B08F10G10J10
Designation: SSRVS
Thermal Mag circuit breaker disconnect
100K AIC rated
Isolation contactor (AC3)
Non-reversing
Selected for 460 Vac 3 phase motor
100 Horsepower
Type 12K Enclosure
Full voltage bypass
Control options:
Keypad as standard
Hand-Off-Auto selector switch
Pilot light options:
Off pilot light (green)
Run pilot light (red)
Auxiliary contacts:
1 NO/NC run contact
1 NO/NC trip contact
1 NO/NC bypass run contact
B08 - Elapsed time meter (non-resettable)
Delivery schedule is based upon an APPROVED RELEASE with acceptance by factory personnel. For large quantities, please contact the Enclosed Drives Customer Service group for confirmed lead times.
Revision - 5/2/2022 - (20220130/20220424)
5/2/2022 1:57:16 PM

Ship Id: 01 **Estimated On-site Dt:** 7/13/2022

VARIABLE FREQUENCY DRIVE

007-00 1

Designation: WELL PUMP VFD
ATV660D90T4H2AAWABNDLXEP220EP221E+
Altivar 660
ATV660D90T4H2AAWABNDLXEP220EP221EP240
Designation: WELL PUMP VFD
Main circuit breaker disconnect
100k AIC rated
Selected for 460 Vac 3 phase motor
100 Horsepower
Sized for Heavy duty.
Drive controller rated for 145 Max Output Amps
Type 12 Enclosure
UL508A Label
RAL7035 (Gray)
Power Circuit W: Drive combination package
Dv/Dt Motor Filter
Control options:
Hand-Off-Auto selector switch
Speed Potentiometer
Pilot light options:
Power on pilot light (red)
Run PTT pilot light (green)
Trip PTT pilot light (yellow)
Auxiliary contacts:
1 Standard Form C run contact And 1 Additional Form C Run Contact EP220

Item No.	Purch. Line No.	Qty.	Catalog Number / Details

1 Standard Form C Trip contact And 1
Additional Form C Trip Contact EP221
A09 - 5% Line Impedance
Elapsed time meter EP240
Drive extended relay module - 3 NO Relays
Output Filter
This device contains selected features that require factory engineered configurations. Standard published lead times no longer apply. Enclosure dimensions are subject to change.
Revision - 5/2/2022 - (20220130/20220424)
5/2/2022 9:01:35 PM

Ship Id: 01 **Estimated On-site Dt:** 7/14/2022

SAFETY SWITCH - MTS

008-00 1 **Designation:** MTS
82344
SWITCH NONFUSIBLE DT 600V 200A 3P NEMA 1
82344-SWITCH NONFUSIBLE DT 600V 200A 3P NEMA 1

Ship Id: 01 **Estimated On-site Dt:** 6/3/2022

009-00 1 **Designation:** MTS
SN0310
NEUTRAL ASSEMBLY INSULATED GROUNDABLE
SN0310-NEUTRAL ASSEMBLY INSULATED GROUNDABLE

Ship Id: 01 **Estimated On-site Dt:** 6/3/2022

WARRANTY

Schneider Electric Conditions of Sale

Proposal-based Projects

Note

The following Conditions of Sale are subject to change. All transactions for all products sold by Schneider Electric USA ("Schneider Electric"), including all Schneider Electric brand products, are subject to the latest published Conditions of Sale of Schneider Electric and to any Special Conditions of Sale which may be contained in applicable Schneider Electric quotations and acknowledgments.

Schneider Electric Standard conditions of Sale will apply in all transactions between customers and Schneider Electric, unless the Proposal-based Project Conditions of Sale, apply as defined in the following paragraph.

Proposal-based Projects Definitions

Transactions that exhibit some or all of the following attributes: Unique customer requirements that are typically negotiated and quoted, requires approval drawings and project management by Schneider Electric, and for which there is a specific direct-ship address.

Governing Provisions and Acceptance

All quotations are subject to these conditions of sale. Acceptance of an order by Schneider Electric shall be expressly conditioned on Purchaser's assent to these conditions. Purchaser's direction to proceed with engineering, manufacture or shipment by Schneider Electric shall be deemed evidence of this assent. No modified or other conditions will be applicable unless those conditions are so stated in Schneider Electric's proposal or are specifically agreed to in writing and signed by an authorized official of Schneider Electric. Failure to object to provisions contained in any Purchase Order or other communication from the Purchaser (including, without limitation, penalty clauses of any kind) shall not be construed as a waiver of these Conditions nor an acceptance of any other provisions. These terms are a complete statement of the parties' agreement and may only be modified in writing signed by both parties. These terms may not be modified by course of dealing, course of performance or usage of trade. These terms supersede all previous written or oral quotations, statements or agreements. Any contract for sale by and between the parties shall be governed by and construed according to the laws of the State of Illinois without regard to its rules on the conflict of laws. The Convention on the International Sale of Goods is expressly excluded.

Quotations

Quotations shall be valid for no more than thirty (30) days from the date quotation is communicated from seller to purchaser, unless otherwise stated in the quotation. All quotations are subject to change by Schneider Electric Company at any time upon notice to Purchaser. Quotations are made based on Schneider Electric's interpretation of the plans and specifications submitted to Schneider Electric by the Purchaser. It is Purchaser's obligation to review the quotation carefully and to immediately advise Schneider Electric of any differing interpretation Purchaser has so any necessary change can be made.

Order Entry

A complete, signed purchase order must be received before entry of an order into Schneider Electric's system. Considerable detail is involved in the manufacture of power equipment. To facilitate timely shipment, complete details and information, including Purchaser's requested on-site dates must be provided at the time of order entry. Shipment dates are approximate and are based upon timely receipt of all necessary information from the Purchaser. Lack of complete information may result in delays of drawings or manufacture. Such delays shall relieve Schneider Electric from compliance with the quoted delivery dates and may lead to price escalation. Failure to provide a complete signed purchase order within twenty (20) days of notification of award may result in renegotiation of price or shipment dates.

Approval Drawings

When required by a specific Purchase Order, drawings will be submitted for approval per agreed upon schedules, and price policy, below, to assure Schneider Electric has designed the equipment as described in Purchaser's specifications, as modified by Schneider Electric's quotation. If at time of drawing approval Schneider Electric has not designed the equipment to meet the specifications, as modified by Schneider Electric's quotation, Schneider Electric will make the appropriate changes at no charge to Purchaser. Where the Purchaser's specification is not definitive, Schneider Electric shall have the right to design the product in line with good commercial practice, without further obligation to Purchaser. If at drawing approval, Purchaser makes changes outside the design as stated in the specifications, such changes shall be treated as a change order as provided below.

Price Policy

Project prices are firm provided the Purchaser unconditionally releases to manufacturing (a) within 30 calendar days of order entry or (b) if at time of order entry approval drawings are requested, within 30 calendar days of Seller delivering approval drawings. If Purchaser does not meet the requirement set previously, then the Seller shall have the right to change the price for the products and/or services.

Pricing-Purchaser Changes

All prices cover a bill of material as described in Schneider Electric specifications or quotations to be designed and manufactured to Schneider Electric standard designs, unless otherwise agreed in writing between the parties. Purchaser may make minor changes not affecting the time or cost of performance without charge prior to the start of manufacture. If any changes are requested by the Purchaser after submission of the original Purchase Order which affect the cost or time of performance, additional billing will be made with the amount of price adder dependent on the change and status of the order when the change is made. Changes may also result in an extension of time for shipment. All changes will be agreed to by the parties, in writing, prior to implementation. Purchaser's rescheduling shipment will be considered a change. All expenses incurred by Schneider Electric in connection with the storage of equipment, including demurrage, packing, storage charges, insurance and handling charges by Schneider Electric will be paid by the Purchaser upon submission of invoices by Schneider Electric. Schneider Electric will issue price changes for any change requested by the Purchaser that affects modification of equipment, changes the bills of material, engineering or drawings or delivery schedule as follows: A) If Purchaser makes a change to an order prior to being released to engineering, the net price will be adjusted by re-pricing the equipment with prices in effect at the time of the change. A commensurate delay in the shipping date will be based on the changes involved. B) For changes made after the order is released to engineering, the net price and ship date will be adjusted as described in paragraph A above. An additional charge based on Schneider Electric standard engineering billing charges and cost of parts ($250 minimum) will be made to cover any extra engineering and drafting, scrap or rework of parts, or cost of modification. C) If during the drawing approval process, the Purchaser makes changes outside the design covered by the specifications, Schneider Electric will be reimbursed as described in paragraph A and B above, plus any additional charges for any extra cost incurred as a direct result of the changes and allowed a commensurate delay in shipping date based on the changes involved. Changes to the order can not be processed until a formal signed change order is received from the Purchaser.

Substitutions

Schneider Electric may furnish suitable substitutes for material unobtainable because of priorities or regulations established by governmental authority or non-availability of materials from suppliers, provided such substitutions do not adversely affect the technical soundness of the equipment. Schneider Electric assumes no liability for deviation from published dimensions and descriptive information not essential to proper performance of the product.

Taxes

Any manufacturer's tax, retailer's tax, occupation tax, use tax, sales tax, excise tax, (except federal excise tax on vehicles), duty, customs, inspecting or testing fee, or other tax, fee or charge of any nature whatsoever, imposed by any governmental authority or measured by any transaction between Schneider Electric and Purchaser, shall be paid by the Purchaser in addition to the prices quoted or invoiced, and such charges will appear as a separate line item on the invoice. In the event Schneider Electric will be required to pay any such tax, fee, or charge, Purchaser shall reimburse Schneider Electric or, in lieu of such payment, Purchaser shall supply Schneider Electric at the time the order is submitted with an exemption certificate or other document acceptable to the tax authority. Purchase Orders must state the existence and amount of any such tax, fee or charge for which Purchaser claims an exemption.

Terms of Payment

Acceptance of all Purchase Orders is subject to Purchaser meeting Schneider Electric credit standards. Terms are subject to change for failure to meet such standards. Terms are net thirty (30) days from date of invoice of each shipment, unless otherwise stated in Schneider Electric's quotation. For an authorized distributor or authorized reseller order, applicable terms of payment are stated in the quotation or applicable discount schedule. Schneider Electric reserves the right at any time to demand full or partial payment before proceeding with a contract of sale if, in its sole judgment, as a result of changes in the financial condition of the Purchaser the terms of payment originally specified are no longer justified.

Progress Payments/ Payment Term

All proposal-based projects are Net 30 days from date of invoice of each shipment. On projects exceeding $1,000,000 Net, progress payments are payable according to the following milestones:

- 30% Release to manufacturing
- 70% (balance) due at shipment

Payments

If delivery is delayed or deferred by the Purchaser beyond the scheduled date, payment shall be due in full when Schneider Electric is prepared to ship. The equipment may be stored at the risk and expense of the Purchaser. If the Purchaser defaults when any payment is due, then the whole contract price shall become due and payable upon demand, or Schneider Electric at its option, without prejudice to other lawful remedies, may defer delivery or cancel the contract for sale. If Purchaser become insolvent, or bankrupt or in the event any proceeding is brought against the Purchaser, voluntarily or involuntarily under the bankruptcy or any insolvency law, Schneider Electric may cancel any order then outstanding at any time and recover its proper cancellation charges from the Purchaser or the Purchaser's estate.

Delivery

F.O.B. Point of Shipment

When the Schneider Electric quotation is based on delivery F.O.B. point of shipment, freight prepaid and allowed for delivery within the continental United States, Product is sold F.O.B. point of shipment, freight prepaid and allowed for orders over $2000 net. Delivery by Schneider Electric to the point of shipment constitutes delivery to the Purchaser; and title and all risk of loss or damage in transit shall pass to the Purchaser at time of delivery at the F.O.B. point. Schneider Electric is not responsible for breakage or delays by carrier after having received "in good order" receipts from the carrier. Purchaser is responsible for pursuing any damage claims with the carrier. For orders under $2000 net the above terms apply except freight is prepaid not allowed. No allowance will be made in lieu of transportation if the Purchaser accepts shipment at factory, warehouse or freight station or otherwise supplies its own transportation. Freight prepaid is defined as: a) Shipments to destinations within the continental United States to the accessible common carrier point nearest the first destination. b) Shipments to U.S. destinations outside the continental United States shall be to the common carrier free delivery point in the United States nearest the original port of embarkation. All charges associated with F.A.S., C.I.F., or other charges such as pier transfer, lift, ocean freight, and marine or war insurance shall be paid by the Purchaser, unless otherwise specifically agreed in a specific Purchase Order. In no event will Schneider Electric be responsible for demurrage or detention charges.

Delivery: F.O.B. Destination

When the Schneider Electric quotation is based on delivery F.O.B. Destination, for shipments for delivery within the continental United States, Schneider Electric will retain title and all risk of loss or damage in transit to the common carrier free delivery point in the United States nearest the first destination for a price addition of 2% of the net price. If the Purchaser elects this Option, Purchaser's obligations shall be as follows: a) Purchaser shall have the responsibility of inspecting the equipment for apparent loss or damage immediately upon its arrival at the free delivery point. b) In the event of apparent shipping loss or damage, Purchaser shall make written notation of the loss on the carrier's delivery receipt and, within 72 hours of delivery shall notify the Schneider Electric Customer Information Center. Purchaser shall not remove product from the point of examination and shall retain the shipping container and packing

material. Purchaser shall request the carrier to make an inspection and send Schneider Electric a copy of the carrier's inspection report. c) In the event of concealed damage which occurred during transit and is discovered by the Purchaser after delivery, Purchaser shall report such damage immediately, but in no event later than 15 days after delivery, to the delivering carrier, and within 72 hours of discovery, shall notify the local Schneider Electric field office. If such notification is not made, Schneider Electric shall not be liable for loss or damage in transit.

Shipment and Routing

Schneider Electric shall select the point of origin of shipment, the method of transportation and the routing of the shipment. Purchasers that request expedited or special modes of transportation or routing involving air, premium or any other non-standard Schneider Electric shipping shall be assessed additional charges for shipping, handling, freight and expediting. Any rebates, allowances, discounts, or incentives received by Schneider Electric from its carriers shall be retained by Schneider Electric. All prices include domestic packaging only. When other than domestic packaging is required, contact your local Schneider Electric field office. Purchaser specified packaging and marking may be subject to additional charges.

Shortages

Claims for shortages or errors must be submitted to Schneider Electric within 30 days after invoice date, and failure to give such notice shall constitute unqualified acceptance and a waiver of all such claims by the Purchaser.

Installments

Schneider Electric reserves the right to make shipments in installments, unless otherwise expressly stipulated in a specific Purchase Order; and all such installments when separately invoiced shall be paid for when due per invoice without regard to subsequent shipments. Delay in shipment of any installment shall not relieve Purchaser of its obligation to accept remaining shipments.

Force Majeure

Schneider Electric shall not be liable for any damages as a result of any delays due to any causes beyond Schneider Electric's control, including, without limitation, an act of God; act of Purchaser or Schneider Electric supplier; embargo or other governmental act, regulation or request; fire; accident; strike; slowdown; flood; fuel or energy shortage; sabotage; war; riot; delay in transportation and inability to obtain necessary labor, materials or manufacturing facilities from usual sources. In the event of any such delay, the date of delivery shall be extended for a period of time reasonably necessary to overcome the effect of such delay.

Standard Warranty

Schneider Electric warrants equipment manufactured by it and sold through authorized sales channels to be free from defects in materials and workmanship for 12 months from the issuance of the customer provisional acceptance letter or 18 months from the invoice date of the last component of the order whichever occurs first. If within such period, any such equipment shall be proved to Schneider Electric's satisfaction to be non-conforming, such equipment shall be repaired or replaced at Schneider Electric's option. This warranty shall not apply (a) to equipment not manufactured by Schneider Electric, (b) to equipment that has been repaired or altered by other than Schneider Electric so as, in its judgment, to affect the same adversely, or (c) to equipment that has been subjected to negligence, accident, or damage by circumstances beyond Schneider Electric's control, or improper operation, maintenance or storage, or to other than normal use or service. With respect to equipment not manufactured by Schneider Electric, the warranty obligations of Schneider Electric shall in all respects conform and be limited to the warranty actually extended to Schneider Electric by its supplier. Non-conforming products must be returned at Schneider Electric's expense for evaluation unless this is waived in writing. Replacement products may be new or reconditioned. The foregoing warranties do not cover reimbursement for labor, transportation, removal, installation, temporary power, or any other expenses that may be incurred in connection with repair or replacement. Any part or component changed or repaired in the context of the contractual warranty will itself benefit of a 3 month warranty but shall not cause the warranty duration of the overall System / Solution to be extended. Warranty is voided on genuine Schneider Electric products if they are reconditioned. There is no warranty on counterfeit products.

Optional Warranties

(Only available on equipment to be located in the U.S.)
Option 1—Extended: 2 to 5 years from Shipment. If requested by the Purchaser, and specifically accepted in writing by Schneider Electric, the standard warranty will be extended to two (2) years from date of invoice for a price addition of 1% of the net face value of the Purchase Order, will be extended to three (3) years from date of invoice for a price addition of 3% of the net face value of the Purchase Order, will be extended to four (4) years from date of invoice for a price addition of 5% of the net face value of the Purchase Order, or will be extended to five (5) years from date of invoice for a price addition of 7% of the net face value of the Purchase Order.

Option 2—Special Warranty: If requested by the Purchaser, and specifically accepted in writing by Schneider Electric, the standard warranty will be extended, for a price addition of 3% of the net face value of the Purchase Order, to cover reimbursement of the direct costs of: a) Removal of non-conforming equipment or part thereof; b) Transporting equipment or parts to and from the place of repair; c) Off-loading of truck and reinstallation at the original site. Such special warranty, which may be chosen to cover a period not exceeding that of the standard or extended warranty (see above) selected, will not include the cost of providing temporary power or removing or replacing other apparatus or structures, or costs of transportation beyond a common carrier free delivery point in the continental United States. Further, the obligation of Schneider Electric for expenses and costs arising under this special warranty coverage will not exceed 50% of the net invoice price on the equipment being repaired. This warranty does not change or affect the allocation of risk or loss during shipment.
Option 3—Extended Warranty: Preventative Maintenance Agreements. If requested by the Purchaser, and specifically accepted by Schneider Electric, a Preventative Maintenance Agreement is available to provide preventative maintenance on equipment covered by the agreement. Terms of the preventative maintenance agreement shall be as defined in a separate Services Agreement agreed to by the parties.

Software

Any software or computer information, in whatever form, provided with equipment manufactured by Schneider Electric is licensed to Purchaser solely pursuant to standard licenses of Schneider Electric or its supplier of such software or computer information, which licenses are, hereby incorporated by reference. Schneider Electric does not warrant that such software or computer information will operate error free or without interruption, and warrants only that during the warranty period applicable to the equipment that the software will perform its essential functions. If such software or computer information fails to conform to such warranty, Schneider Electric will, at its option, provide an update to correct the non-conformance or replace the software or computer information with the latest available version containing a correction. Schneider Electric shall have no other obligation to provide updates or revisions.

Limitations

These disclaimers and limitations of remedies apply to all warranties offered to Purchaser and to all Purchase Orders. **The warranties set forth above are exclusive and in lieu of all other expressed or implied warranties (except warranties of title), including, but not limited to implied warranties of merchantability and fitness for a particular purpose.** Except as may be expressly provided in an authorized writing by Schneider Electric, Schneider Electric shall not be subject to any other obligations or liabilities whatsoever other than as stated above with respect to equipment sold or services rendered by Schneider Electric. Notwithstanding anything to the contrary herein contained **Schneider Electric Company, its contractors and suppliers of any tier, shall not be liable in contract, in tort (including negligence or strict liability) or otherwise for lost time, lost profits, or special, indirect, incidental or consequential damages of any kind whatsoever.** The remedies of the Purchaser are exclusive and the total cumulative liability of Schneider Electric, its contractors and suppliers of any tier, with respect to this contract or anything done in connection therewith, such as the use of any product covered by or furnished under the contract, whether in contract, in tort (including negligence or strict liability) or otherwise, shall not exceed the price of the product, part, or service on which such liability is based.

Intellectual Property

As to equipment proposed and furnished by Schneider Electric, Schneider Electric shall defend any suit or proceeding brought against Purchaser so far as based on a claim that such equipment constitutes an infringement of any copyright, trademark or patent of the United States.

This obligation shall be effective only if Purchaser shall have made all payments then due hereunder and if Schneider Electric is notified promptly in writing and given authority, information, and assistance at Schneider Electric's expense for the defense of the same. In the event the use of such equipment by Purchaser is enjoined in such a suit, Schneider Electric shall, at its expense, and at its sole option, either (a) procure for the Purchaser the right to continue using such equipment (b) modify such equipment to render it non-infringing (c) replace such equipment with non-infringing equipment, or (d) refund the purchase price (less depreciation) and the transportation and installation costs of such equipment. Schneider Electric will not be responsible for any compromise or settlement made without its written consent. The foregoing states the entire liability of Schneider Electric for patent, trademark or copyright infringement, and in no event shall Schneider Electric be liable if any infringement charge is based on the use of Schneider Electric equipment for a purpose other than that for which it was sold by Schneider Electric. As to any equipment furnished by Schneider Electric to Purchaser and manufactured in accordance with designs proposed by Purchaser, the Purchaser shall indemnify Schneider Electric against any award made against Schneider Electric for patent, trademark, or copyright infringements.

Witness of Tests and Factory Inspections

Normal production schedules do not provide the opportunity for Purchaser to witness routine factory tests on equipment or make factory inspections. Witnessing of tests or factory inspections by the Purchaser may result in delays of production for which Schneider Electric will not be responsible. Witness testing and factory inspections must be requested at time of quotation and confirmed at order entry. Standard Schneider Electric factory testing and inspection will apply. Schneider Electric will notify Purchaser fourteen (14) calendar days prior to scheduled witness testing or inspection. In the event Purchaser is unable to attend, the Parties may mutually agree on a rescheduled date. However, Schneider Electric, at its sole option, may consider the witness tests and/or inspection waived, and ship and invoice the Products. Purchaser will be responsible for paying for all scheduled witness testing, whether or not Purchaser attends.

Return of Equipment

No equipment may be returned without first obtaining Schneider Electric's written permission and a returned material identification tag. Returned equipment must be of current manufacture, in the original packaging, unused, undamaged and in saleable condition, securely packed to reach Schneider Electric without damage and labeled with the return authorization number. Any cost incurred by Schneider Electric to put equipment in first class condition will be charged to the Purchaser. Returns will be credited at price invoiced by Schneider Electric less a restocking fee of 25% invoice price. Special Order and Custom equipment is not returnable. Schneider Electric shall bear the cost of returns resulting from Schneider Electric error, and method and route of return will be at the discretion of Schneider Electric. Costs incurred by failure to follow Schneider Electric direction will be borne by the Purchaser.

Nuclear Applications Terms and Conditions

Unless otherwise agreed in writing by a duly authorized representative of Schneider Electric, products sold hereunder are not intended for use in or in connection with any nuclear facility or activity. If so used, Schneider Electric disclaims all liability for any damage, injury or contamination; and Purchaser shall indemnify Schneider Electric against any such liability, whether arising as a result of breach of contract, warranty or tort (including negligence) or otherwise.

Patterns and Tools

Notice will be given if special patterns or tools are required to complete any order. Charges for such patterns or tools do not convey title thereto or the right to remove them from Schneider Electric's plant. If patterns or tools are not used for a period of two years, Schneider Electric shall have the right to scrap them without notice.

Product Notices

Purchaser shall promptly supply the user (including its employees) of the product with all Schneider Electric supplied product notices, warnings, instructions, recommendations and similar materials.

Errors

Schneider Electric reserves the right to correct errors or omissions in quotations, acknowledgments, invoices, or other documents.

OSHA Compliance

Compliance with OSHA or similar federal, state or local laws during the operation or use of the product(s) is the sole responsibility of the Purchaser.

Termination

Any order may be terminated by the Purchaser only upon written notice to Schneider Electric will be subject the following cancellation schedule:

- 20% after issuance of approval drawings
- 50% at release to manufacturing
- 100% at start of fabrication

Cancellation

Schneider Electric shall have the right to cancel any order or contract at any time by written notice for any material breach of the contract by the Purchaser, including material delays in releasing equipment for manufacture or approval drawings and excessive changes to specifications or drawings.

Excusable Delay

Purchaser acknowledges that products sold hereunder and/or parts thereof may be produced in, or otherwise sourced from, or will be installed in areas already affected by, or that may be affected in the future by, the prevailing COVID-19 epidemics/pandemic and that the situation may trigger stoppage, hindrance or delays in the capacity of Schneider Electric (or its subcontractors) to produce, deliver, install or service the products, irrespective of whether such stoppage, hindrance or delays are due to measures imposed by authorities or deliberately implemented by Schneider Electric (or its subcontractors) as preventive or curative measures to avoid harmful contamination exposure of the employees of

Schneider Electric (or its subcontractors). Purchaser therefore recognizes that such circumstances shall be considered as a cause for excusable delay not exposing Schneider Electric to contractual sanctions including without limitation any delay penalties, liquidated or other damages or termination for default.

WARRANTY

Warranty to customers purchasing through authorized Square D distributors and customers purchasing directly from Square D. This warranty includes the following products: EMA, EBA, L-L Enhanced, IMA, BIA Series (SurgeLoc), HWA and XDSE.

Protection Limits
With regard to any Square D Surgelogic Surge Protective Device (”SPD”) that has been properly installed in compliance with all applicable electrical code requirements, Square D warrants the SPD to be free from defects in materials and workmanship for a period of ten (10) years from date of invoice from Square D or its authorized sales channel. If within the applicable warranty period, purchaser discovers such item was not as warranted and promptly notifies Square D in writing, Square D shall repair or replace the items or refund the purchase price, at Square D’s option. This warranty shall not apply (a) to electrical equipment in which the SPD is installed, including, but not limited to panelboards, motor control centers, busway, switchboards, switchgear, (b) to equipment not manufactured by Square D, (c) to SPDs which shall have been repaired or altered by others, other than Square D, (d) to SPDs which shall have been subjected to negligence, accident, or damage by circumstances beyond Square D’s control, or to improper operation, maintenance or storage, or to other than normal use or service. The foregoing warranty does not cover reimbursement for labor, transportation, removal, installation, or other expenses which may be incurred in connection with repair or replacement.

Except as may be expressly provided in an authorized writing by Square D, Square D shall not be subject to any other obligations or liabilities whatsoever with respect to equipment manufactured by Square D or services rendered by Square D.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESSED AND IMPLIED WARRANTIES EXCEPT WARRANTIES OF TITLE, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Limitation of Liability
Notwithstanding anything to the contrary contained herein, SQUARE D COMPANY, ITS CONTRACTORS AND SUPPLIERS OF ANY TIER SHALL NOT BE LIABLE IN CONTRACT, IN TORT (INCLUDING NEGLIGENCE OR STRICT LIABILITY) OR OTHERWISE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES WHATSOEVER. The remedies of the purchaser set forth herein are exclusive where so stated and the total cumulative liability of Square D, its contractors and suppliers of any tier, whether in contract, in tort (including negligence or strict liability) or otherwise, shall not exceed the price of the product or part on which such is based.

ENCLOSED CIRCUIT BREAKER

Replaces / Reemplaza / Remplace 40281-251-01 Rev. 01, 03/2012

J250 Enclosed Circuit Breaker Installation Instructions for PowerPact™ H and J Circuit Breakers

Class / Clase / Classe: 611

Instrucciones de instalación de los interruptores automáticos PowerPact™ marco H y J en gabinetes J250

Directives d'installation des disjoncteurs PowerPact™ à châssis H et J dans les coffrets J250

Retain for future use. / Conservar para uso futuro. / À conserver pour usage ultérieur.

Enclosure Installation Instructions J250AWK, J250DS, J250SS, J250AWKVW, J250DSVW, J250SSVW and CJ250NAWK / Instrucciones de instalación de los gabinetes J250AWK, J250DS, J250SS, J250AWKVW, J250DSVW, J250SSVW y CJ250NAWK /

Directives d'installation des coffrets J250AWK, J250DS, J250SS, J250AWKVW, J250DSVW, J250SSVW et CJ250NAWK

Introduction

This instruction bulletin contains instructions for the installation of the J250 (AWK, DS, SS, AWKVW, DSVW, SSVW) and CJ250NAWK enclosures.

Introducción

Este boletín contiene las instrucciones para la instalación de los gabinetes J250 (AWK, DS, SS, AWKVW, DSVW, SSVW) y CJ250NAWK.

Introduction

Ce bulletin contient les directives d'installation des coffrets J250 (AWK, DS, SS, AWKVW, DSVW, SSVW) et CJ250NAWK.

Precautions

Precauciones

Précautions

⚠ DANGER / PELIGRO / DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462 or NOM-029-STPS.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

PELIGRO DE DESCARGA ELÉCTRICA, EXPLOSIÓN O DESTELLO POR ARQUEO

- Utilice equipo de protección personal (EPP) apropiado y siga las prácticas de seguridad eléctrica establecidas por su Compañía, consulte la norma 70E de NFPA o Z462 de CSA y NOM-029-STPS.
- Solamente el personal eléctrico calificado deberá instalar y prestar servicio de mantenimiento a este equipo.
- Desenergice el equipo antes de realizar cualquier trabajo dentro o fuera de él.
- Siempre utilice un dispositivo detector de tensión nominal adecuado para confirmar la desenergización del equipo.
- Vuelva a colocar todos los dispositivos, las puertas y las cubiertas antes de volver a energizar el equipo.

El incumplimiento de estas instrucciones podrá causar la muerte o lesiones serias.

RISQUE D'ÉLECTROCUTION, D'EXPLOSION OU ÉCLAIR D'ARC ÉLECTRIQUE

- Portez un équipement de protection personnelle (ÉPP) approprié et observez les méthodes de travail électrique sécuritaire. Voir NFPA 70E, CSA Z462 ou NOM-029-STPS
- Seul un personnel qualifié doit effectuer l'installation et l'entretien de cet appareil.
- Coupez l'alimentation de l'appareil avant d'y travailler.
- Utilisez toujours un dispositif de détection de tension ayant une valeur nominale appropriée pour vous assurer que l'alimentation est coupée.
- Replacez tous les dispositifs, les portes et les couvercles avant de mettre l'appareil sous tension.

Si ces directives ne sont pas respectées, cela entraînera la mort ou des blessures graves.

Note: Read the wiring diagram and labels inside the cover when preparing to install the equipment. Notice labels contain hub, cable and accessory requirements.

Nota: Lea el diagrama de alambrado y etiquetas dentro de la cubierta cuando esté preparando el equipo para su instalación. Las etiquetas de aviso especifican los requisitos de receptáculos, cables y accesorios.

Remarque : Lire le schéma de câblage et les étiquettes à l'intérieur du couvercle lors de la préparation à l'installation de l'appareil. Les étiquettes d'avis mentionnent les exigences concernant les manchons, câbles et accessoires.

Installing the Circuit Breaker Enclosure

1. Mount the enclosure to the wall.
2. Open the enclosure door.
3. Install the conduit and necessary fittings.
4. Follow local and national electrical codes for proper wiring methods.

Note: If the enclosure will be used in an outdoor application, remove the drain screw in the bottom endwall and discard.

Instalación del gabinete del interruptor automático

1. Monte el gabinete en la pared.
2. Abra la puerta del gabinete.
3. Instale el tubo conduit y los accesorios necesarios.
4. Siga los códigos eléctricos locales y nacionales para utilizar los métodos de alambrado adecuados.

Nota: Si va a utilizar el gabinete en aplicaciones para uso en exteriores, retire y deseche el tornillo de drenaje ubicado en la pared final inferior.

Installation du coffret du disjoncteur

1. Monter le coffret sur le mur.
2. Ouvrir la porte du coffret.
3. Installer le conduit et les raccords nécessaires.
4. Observer les codes de l'électricité, local et national, pour les méthodes de câblage appropriées.

Remarque : Si le coffret est utilisé dans une application à l'extérieur, enlever et jeter la vis de vidange de la paroi d'extrémité inférieure.

Installing the Circuit Breaker

1. Open the door.
2. Insert the tabs of U-shaped insulator into the enclosure mounting pan as shown in Figure 1 below.
3. Refer to the circuit breaker instructions to place the circuit breaker in “tripped” (∇) position. Place the circuit breaker red push-to-trip button toward the bottom of the enclosure. Slide the circuit breaker handle into the slot of the operating arm.
4. Attach the circuit breaker to the mounting pan using the mounting screws provided with the circuit breaker. Torque per circuit breaker instructions.See Figure 1 below.

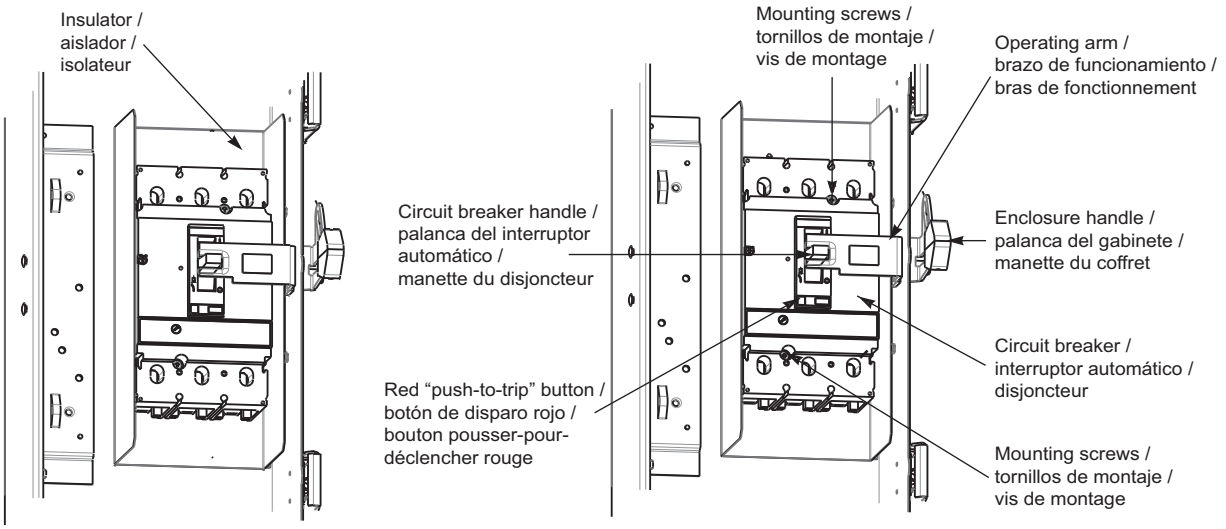
Instalación del interruptor automático

1. Abra la puerta.
2. Inserte las lengüetas del aislador en forma de U en la bandeja de montaje del gabinete como se muestra en la figura 1 a continuación.
3. Consulte las instrucciones del interruptor automático para colocar el interruptor en la posición de "disparado" (∇). Oriente el interruptor automático con el botón de disparo rojo hacia la parte inferior del gabinete. Deslice la palanca del interruptor automático hasta introducirla en la ranura del brazo de funcionamiento.
4. Instale el interruptor automático en la bandeja de montaje utilizando los tornillos de montaje incluidos con el interruptor. Apriete los tornillos según las instrucciones del interruptor. Vea la figura 1 a continuación.

Installation du disjoncteur

1. Ouvrir la porte.
2. Insérer les onglets de l'isolateur en forme de U dans la cuve de montage du coffret comme montré à la figure 1 ci-après.
3. Se reporter aux directives du disjoncteur pour mettre celui-ci à la position « déclenchée » (∇). Orienter le disjoncteur avec le bouton rouge pousser-pour-déclencher vers le bas du coffret. Faire glisser la manette du disjoncteur dans la fente du bras de fonctionnement.
4. Attacher le disjoncteur à la cuve de montage à l’aide des vis de montage fournies avec le disjoncteur. Serrer les vis selon les directives du disjoncteur. Voir la figure 1 ci-après.

Figure / Figura / Figure 1 : Installing the Circuit Breaker / Instalación del interruptor automático / Installation du disjoncteur



Installing the Ground Lugs

(Not included order separately)
If required, install the ground lug assembly kit PKOGTH150 or PKOGTJ250 using the instructions provided with the kit.

Instalación de las zapatas de tierra

(No incluidas, solicítelas por separado)
En caso de ser necesario, instale el kit de ensamble de zapatas de tierra PKOGTH150 o PKOGTJ250 siguiendo las instrucciones incluidas con el kit.

Installation des cosses de m.à.l.t.

(Non incluses, les commander séparément)
En cas de besoin, installer le kit d'assemblage des cosses de m.à.l.t. PKOGTH150 ou PKOGTJ250 à l'aide des directives fournies avec le kit.

Installing the Neutral Assembly

J250 (AWK, DS, SS, AWKVW, DSVW or SSVW) Enclosures (neutral not included, order separately)

CJ250NAWK (neutral included with enclosure)

1. For J250 (AWK, DS, SS, AWKVW, DSVW or SSVW) enclosures: Install the circuit breaker prior to installation of the neutral to prevent equipment damage. If required, install the neutral assembly SN100FA and torque the mounting screws to 30 lb-in, or SN400LA and torque the mounting screws to 60 lb-in.

Instalación del ensamble del neutro

Gabinetes J250 (AWK, DS, SS, AWKVW, DSVW o SSVW), neutro no incluido, solicítelo por separado.

CJ250NAWK (neutro incluido con el gabinete)

1. Para los gabinetes J250 (AWK, DS, SS, AWKVW, DSVW o SSVW): Instale el interruptor automático antes de instalar el neutro para evitar daños al equipo. Si es necesario, instale el ensamble de neutro SN100FA y apriete los tornillos de montaje en 30 lbs-pulg (3,4 N•m), o el ensamble SN400LA y apriete los tornillos de montaje en 60 lbs-pulg (6,8 N•m).

Installation de l’assemblage du neutre

Coffrets J250 (AWK, DS, SS, AWKVW, DSVW ou SSVW) (neutre non inclus, commander séparément)

CJ250NAWK (neutre inclus avec le coffret)

1. Pour les coffrets J250 (AWK, DS, SS, AWKVW, DSVW ou SSVW) : Installer le disjoncteur avant le neutre afin d'éviter d'endommager l'appareil. Si nécessaire, installer l'assemblage du neutre SN100FA et serrer les vis de montage au couple de 30 lb-po (3,4 N•m) ou l'assemblage SN400LA et serrer les vis de montage au couple de 60 lb-po (6,8 N•m).

For CJ250NAWK enclosures:

Enclosures include a factory installed and bonded neutral assembly. After the circuit breaker is installed, the two aluminum lugs supplied in the bag inside the enclosure, must be installed to the neutral as indicated in SN400LA below. See Figure 2. Connect the two 600 kcmil lugs to the plate on the neutral assembly with the two 3/8-16x1 in. flat head cap screws provided in the bag with the lugs. Use a socket and torque to 175-225 lb-in. Install the wire binding screws provided in lugs.

2. Install the neutral conductors into the lug(s). (Observe wire range). Torque the wire binding screws according to the instructions provided on the neutral assembly.

Para los gabinetes CJ250NAWK:

Los gabinetes incluyen un ensamble de neutro instalado y unido en la fábrica. Después de instalar el interruptor automático, las dos zapatas de aluminio (incluidas en la bolsa dentro del gabinete) deben ser instaladas en el neutro como se indica a continuación para el ensamble SN400LA. Vea la figura 2. Conecte las dos zapatas de 600 kcmil a la placa en el ensamble de neutro utilizando los dos tornillos de casquete de cabeza plana de 3/8-16 x 1 incluidos en la bolsa con las zapatas. Utilice un receptáculo hembra y apriete de 175 a 225 lbs-pulg (19,8 a 25,4 N•m). Instale los tornillos de sujeción de cables incluidos con las zapatas.

2. Instale los conductores de neutro en las zapatas. (Asegúrese de utilizar el calibre de conductor adecuado). Apriete los tornillos de sujeción de cables de acuerdo con las instrucciones proporcionadas con el ensamble de neutro.

Pour les coffrets CJ250NAWK :

Les coffrets comprennent un assemblage du neutre installé et mis à la masse à l'usine. Après avoir installé le disjoncteur, les deux cosses en aluminium, fournies dans le sac à l'intérieur du coffret, doivent être installées au neutre comme indiqué pour l'assemblage SN400LA ci-après. Voir la figure 2. Raccorder les deux cosses de 600 kcmil à la plaque sur l'assemblage du neutre à l'aide des deux vis d'assemblage à tête plate de 3/8-16x1 po fournies dans le sac avec les cosses. Utiliser une clé à douille et serrer au couple de 175 à 225 lb-po (19,8 à 25,4 N•m). Installer les vis de fixation des fils fournies dans les cosses.

2. Installer les conducteurs du neutre dans les cosses. (Utiliser le calibre des fils approprié). Serrer les vis de fixation au couple selon les directives fournies sur l'assemblage du neutre.

Installing the Bonding Screw

For service entrance applications:

Install the green bonding screw (provided) in the neutral clearance hole as indicated in Figure 2. The screw will self thread into the enclosure engagement hole. Tighten the screw to 25-35 lb-in. (CJ250NAWK green bonding screw is installed at the factory).

For non-service entrance applications:

Remove the green bonding screw from the CJ250NAWK enclosure(s). For other enclosures, do not install the green bonding screw.

Instalación del tornillo de unión

Para aplicaciones de entrada de acometida:

Inserte el tornillo de unión verde (provisto) en el agujero de paso de neutro como se indica en la figura 2. El tornillo se autoenroscará en el agujero de enganche del gabinete. Apriete el tornillo de 25 a 35 lbs-pulg (2,8 a 3,9 N•m) (en los gabinetes CJ250NAWK, el tornillo de unión verde viene instalado de fábrica).

Para aplicaciones de entrada no de acometida:

Retire el tornillo de unión verde de los gabinetes CJ250NAWK. Para otros gabinetes, no instale el tornillo de unión verde.

Installation de la vis de mise à la masse

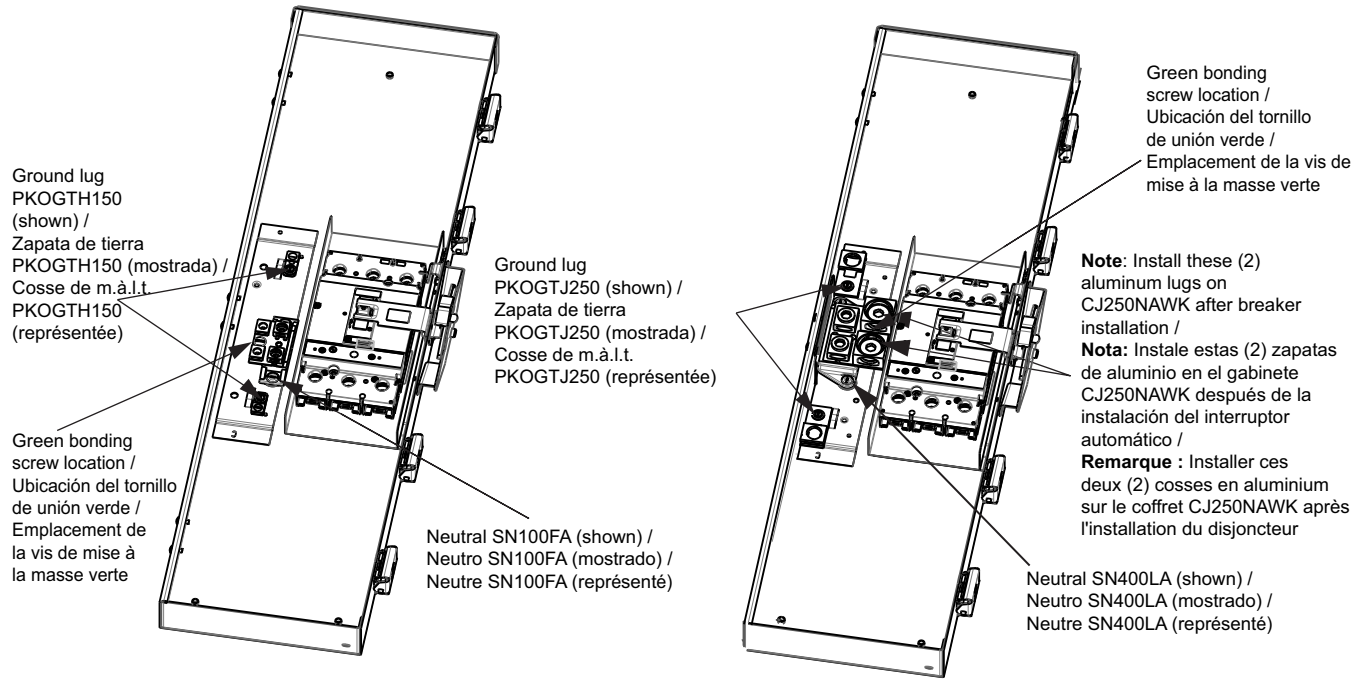
Pour les applications d'entrée de service :

Installer la vis de mise à la masse verte (fournie) dans le trou de dégagement du neutre comme indiqué à la figure 2. La vis crée son propre filetage dans le trou d'engagement du coffret. Serrer la vis au couple de 25 à 35 lb-po (2,8 à 3,9 N•m) (la vis de mise à la masse verte CJ250NAWK est installée à l'usine).

Pour les applications autres que celles d'entrée de service :

Retirer la vis de mise à la masse verte des coffrets CJ250NAWK. Pour les autres coffrets, ne pas installer la vis de mise à la masse verte.

Figure / Figura / Figure 2 : Installing the Ground Lugs and Neutral Assembly / Instalación de las zapata de tierra y ensamble de neutro / Installation des cosses de m.à.l.t. et de l'assemblage du neutre



Installing the Circuit Breaker Conductors

Install the conductors into the circuit breaker lugs and torque the wire binding screws according to the instructions provided with the circuit breaker. See circuit breaker instructions for wire size.

Energizing

1. Close enclosure door and latch.
2. With enclosure handle in the OFF (O) position, turn ON (I) the power to the equipment in sequence; start at the source end of the system and work toward the device.
3. Turn the enclosure circuit breaker handle to the ON (I) position.

Instalación de los conductores del interruptor automático

Instale los conductores en las zapatas del interruptor automático y apriete los tornillos de sujeción de cables según las instrucciones incluidas con el interruptor. Consulte las instrucciones del interruptor automático para obtener el tamaño de conductor.

Energización

1. Cierre la puerta del gabinete y ponga seguro.
2. Con la palanca del gabinete en la posición de abierto (O/OFF), energice el equipo en secuencia, comenzando por el extremo fuente del sistema y procediendo hasta el dispositivo.
3. Coloque la palanca del interruptor automático en gabinete en la posición de cerrado (I/ON).

Installation des conducteurs du disjoncteur

Installer les conducteurs dans les cosses du disjoncteur et serrer les vis de fixation des fils selon les directives d'utilisation fournies avec le disjoncteur. Voir les directives du disjoncteur pour obtenir le calibre des fils.

Mise sous tension

1. Fermer la porte et le verrou.
2. La manette du coffret étant à la position d'arrêt (O/OFF), mettre l'appareil sous tension en séquence ; commencer à l'extrémité source du système et continuer en direction du dispositif.
3. Amener la manette du disjoncteur sous coffret à la position de marche (I/ON).

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PowerPact™ H- and J-Frame Circuit Breakers and Switches
Desconectadores e interruptores automáticos PowerPact™ marco H y J
Interrupteurs et disjoncteurs PowerPact^MC à châssis H et J
PowerPact™ H 型和 J 型断路器和隔离开关

Retain for future use. / Conservar para uso futuro. / À conserver pour usage ultérieur. / 请妥善保管，供日后参考。

Necessary Tools

Screwdriver, Phillips® #1 and 2
Screwdriver, long-shanked slotted
H-frame lug: Torque wrench, 3/16 in. hex bit
J-frame lug: Torque wrench, 5/16 in. hex bit
Bus connection: Torque wrench, 5/32 in. hex bit

Herramientas necesarias

Desatornillador Phillips® no. 1 y 2
Desatornillador de punta plana y cuerpo largo
Zapata del marco H: llave de apriete prefijado con broca hexagonal de 3/16
Zapata del marco J: llave de apriete prefijado con broca hexagonal de 5/16
Conexión de la barra: llave de apriete prefijado con broca hexagonal de 5/32

Outils nécessaires

Tournevis, Phillips® nº 1 et 2
Tournevis, plat à longue tige
Cosse du châssis H : clé dynamométrique avec douille hex. de 3/16 po
Cosse du châssis J : clé dynamométrique avec douille hex. de 5/16 po
Connexion de barre-bus: clé dynamométrique avec douille hex. de 5/32 po

必备工具

Phillips®1 号和 2 号螺丝刀
长柄一字螺丝刀
H 型端子：转矩扳手，3/16 英寸六角头
J 型端子：转矩扳手，5/16 英寸六角头
总线连接：转矩扳手，5/32 英寸六角头

Precautions

Precauciones

Précautions

注意事项

⚠ DANGER / PELIGRO / DANGER / 危险

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462, or NOM-029-STPS.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

PELIGRO DE DESCARGA ELÉCTRICA, EXPLOSIÓN O DESTELLO POR ARQUEO

- Utilice equipo de protección personal (EPP) apropiado y siga las prácticas de seguridad en trabajos eléctricos establecidas por su Compañía, consulte la norma 70E de NFPA o Z462 de CSA y NOM-029-STPS.
- Solamente el personal eléctrico especializado deberá instalar y prestar servicio de mantenimiento a este equipo.
- Desenergice el equipo antes de realizar cualquier trabajo en él.
- Siempre utilice un dispositivo detector de tensión nominal adecuado para confirmar la desenergización del equipo.
- Vuelva a colocar todos los dispositivos, las puertas y las cubiertas antes de volver a energizar el equipo.

El incumplimiento de estas instrucciones podrá causar la muerte o lesiones serias.

RISQUE D'ÉLECTROCUTION, D'EXPLOSION OU D'ECLAIR D'ARC

- Portez un équipement de protection personnelle (ÉPP) approprié et observez les méthodes de travail électrique sécuritaire. Voir NFPA 70E ou CSA Z462.
- Seul un personnel qualifié doit effectuer l'installation et l'entretien de cet appareil.
- Coupez l'alimentation de l'appareil avant d'y travailler.
- Utilisez toujours un dispositif de détection de tension auant une valeur nominale appropriée pour vous assurer que l'alimentation est coupée.
- Replacez tous les dispositifs, les portes et les couvercles avant de mettre l'appareil sous tension.

Si ces directives ne sont pas respectées, cela entraînera la mort ou des blessures graves.

可能有触电、爆炸或者电弧灼伤的危险

- 穿戴适当的个人防护设备（PPE），遵循安全电气操作惯例。请参见 NFPA 70E。
- 本设备只能由专业电气人员安装和维修。
- 在此设备内部或外部进行操作时，请先断开所有电源。
- 用恰当 的电压测量装置来确 定电压的状况。
- 在对设备通电之前，装回所有的联锁，门和面罩。

不遵循上述说明将导致人员伤亡。

Installation

1. Turn off all power supplying this equipment before working on or inside equipment.
2. Trip the circuit breaker (Figure 1, a–c).
3. Use a properly rated voltage sensing device to confirm power is off.
4. Remove the handle extension (d) if it will interfere with the enclosure door closing.

NOTE: The handle extension is on all circuit breakers with YE suffix.

Instalación

1. Desenergice el equipo antes de realizar cualquier trabajo en él.
2. Dispare el interruptor automático (figura 1, a–c).
3. Utilice un dispositivo detector de tensión nominal adecuado para confirmar la desenergización del equipo.
4. Retire la extensión (d) de la palanca si interfiere con el cierre de la puerta del gabinete.

NOTA: La extensión de palanca se encuentra en todos los interruptores automáticos con sufijo YE.

Installation

1. Couper l'alimentation de l'appareil avant d'y travailler.
2. Déclencher le disjoncteur (figure 1, a–c).
3. Utiliser un dispositif de détection de tension ayant une valeur nominale appropriée pour vous assurer que l'alimentation est coupée.
4. Retirer le prolongateur de la manette (d) s'il risque d'interférer avec la fermeture de la porte du coffret.

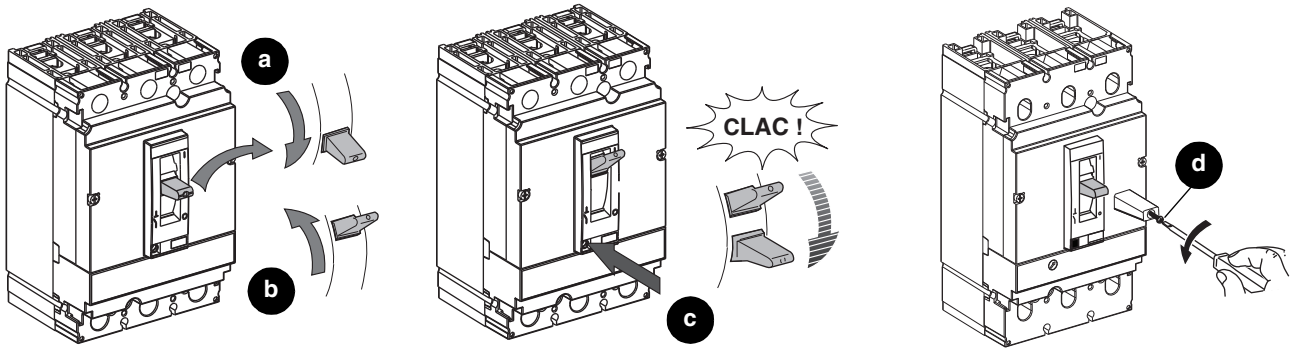
REMARQUE : Le prolongateur de la manette est sur tous les disjoncteurs avec le suffixe YE.

安装

1. 在此设备内部或外部进行操作时，请先断开所有电源。
2. 先断开断路器 (a)，再连接 (b)。
   按下脱扣按钮 (c)，将断路器置于脱扣位置。
3. 用恰当 的电压测量装置来确 定电压的 状况。
4. 如果安装的手柄伸长部会妨碍门的闭合，应松开手柄伸长部末端的螺钉 (d) 并移除手柄伸长部。

注：手柄伸长部不是带有 YE 后缀的断路器的标准配置。

Figure / Figura / Figure / 图 1 :



Individually-Mounted Circuit Breaker Installation

Instalación del interruptor automático de montaje individual

Installation du disjoncteur monté individuellement

独立安装式断路器的安装

⚠ DANGER / PELIGRO / DANGER / 危险

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH Install circuit breaker so minimum clearance distance to grounded metal is maintained.	**PELIGRO DE DESCARGA ELÉCTRICA, EXPLOSIÓN O DESTELLO POR ARQUEO** Instale el interruptor automático de manera que se conserve la distancia mínima de espacio libre a las partes metálicas conectadas a tierra.	**RISQUE D'ÉLECTROCUTION, D'EXPLOSION OU D'ÉCLAIR D'ARC** Installez le disjoncteur de sorte qu'une distance d'isolement minimale avec le métal mis à la terre soit maintenue.	**可能有触电、爆炸或电弧灼伤的危险** 安装断路器的最小间隙应保留接地金属的空间。
Failure to follow these instructions will result in death or serious injury.	**El incumplimiento de estas instrucciones podrá causar la muerte o lesiones serias.**	**Si ces directives ne sont pas respectées, cela entraînera la mort ou des blessures graves.**	**不遵循上述说明将导致人员伤亡。**

1. Check electrical clearances (Figure 2, a).

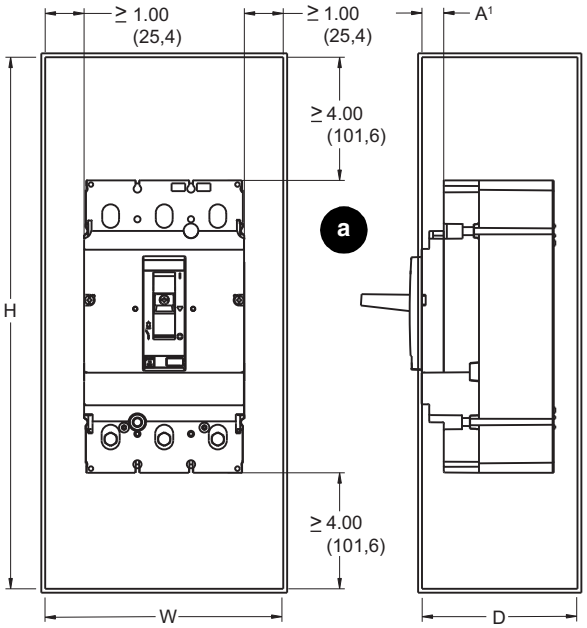
1. Verifique el espacio libre para realizar conexiones eléctricas (figura 2, a).

1. Vérifier les distances d'isolement électrique (figure 2, a).

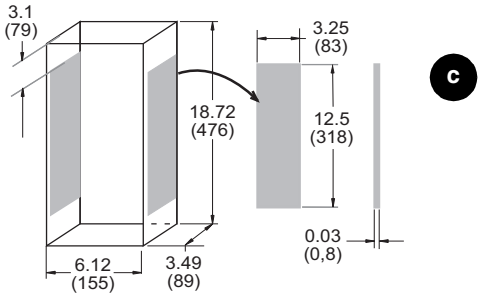
1. 检查断路器和最近的接地金属之间的间隙。

Figure / Figura / Figure / 图 2 :

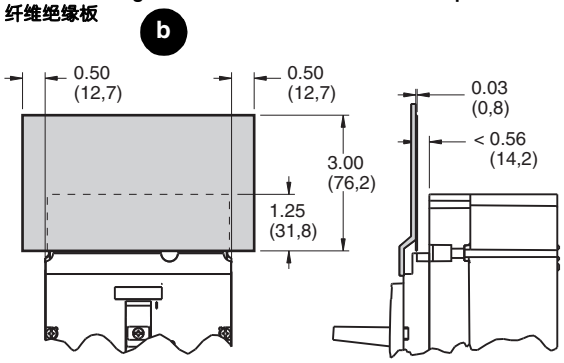
Enclosure Clearances / Espacio libre en el gabinete / Dégagements de l'armoire / 与开关柜的间隙



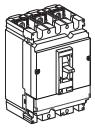
J-Frame Enclosure Insulation[2] / Marco J, aislamiento del gabinete[2] / Châssis J, isolation du coffret[2] / J-Frame 最小外壳绝缘 [2]

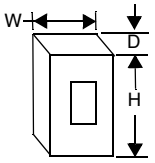


Fiber Insulating Plate / Placa aislante de fibra / Plaque isolante en fibre / 纤维绝缘板



Enclosure Dimensions / Dimensiones del gabinete / Dimensions du boîtier / 开关柜尺寸





H x W x D
in / pulg / po (mm) /
单位：英寸 [毫米]

Frame / Marco / Châssis / 型		Standard (80%) Rated / Estándar (valor nominal al 80%) / Standard (classé à 80 %) / 额定标准 （80%）	100% Rated / Valor nominal al 100% / Classé à 100 % / 额定 100%
HD/HG/HJ/HL	15–150 A	15.6 x 6.12 x 3.49 in. (396 x 155 x 89 mm)	15.6 x 6.12 x 3.49 in. (396 x 155 x 89 mm)
HR		18.13 x 8.63 x 4.13 in. (461 x 219 x 105 mm)	62 x 22.5 x 14 in. (1575 x 572 x 356 mm)
JD/JG/ JJ/JL[2]	150–250 A	18.72 x 6.12 x 3.49 in. (476 x 155 x 89 mm)	18.72 x 6.12 x 3.49 in. (476 x 155 x 89 mm)
JR		28.5 x 12.38 x 5.38 in. (724 x 314 x 137 mm)	62 x 22.5 x 14 in. (1575 x 572 x 356 mm)

Dimensions:
Dimensiones :
Dimensions :
in. / pulg / po
(mm)
尺寸：英寸 （毫米）

[1] If dimension "A" is less than 0.56 in. (14.2 mm), attach fiber insulating plate (not provided) to enclosure cover.

[2] Insulation required if circuit breaker side is < 4.13 in. (105 mm) from metal.

[1] Si la medida A es menor que 14.2 mm (0,56 pulg), instale la placa aislante de fibra (no provista) en la cubierta de gabinete.

[2] Aislamiento requerido si el lado del interruptor automático está a una distancia < 105 mm (4,13 pulgadas) del metal.

[1] Si la dimension A est inférieure à 14,2 mm (0,56 po), fixer une plaque isolante en fibre (non fournie) au couvercle de l'armoire.

[2] Une isolation est requise si le côté du disjoncteur est < 105 mm (4,13 po) du métal.

[1] 如果尺寸 "A" 小于 0.56 英寸 （14.2 毫米），应为开关柜的绝缘板加入绝缘纤维 （不提供）。

[2] 如断路器侧面与金属的距离< 4.13 英寸 （105mm），则必须采取绝缘措施。

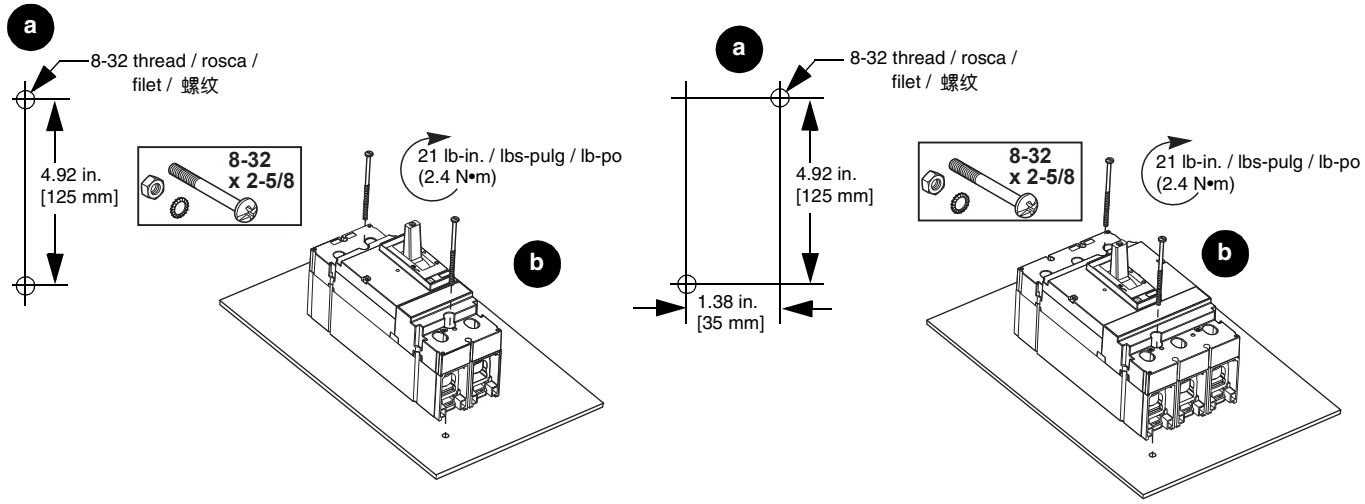
2. Install circuit breaker (Figure 3, a–b).

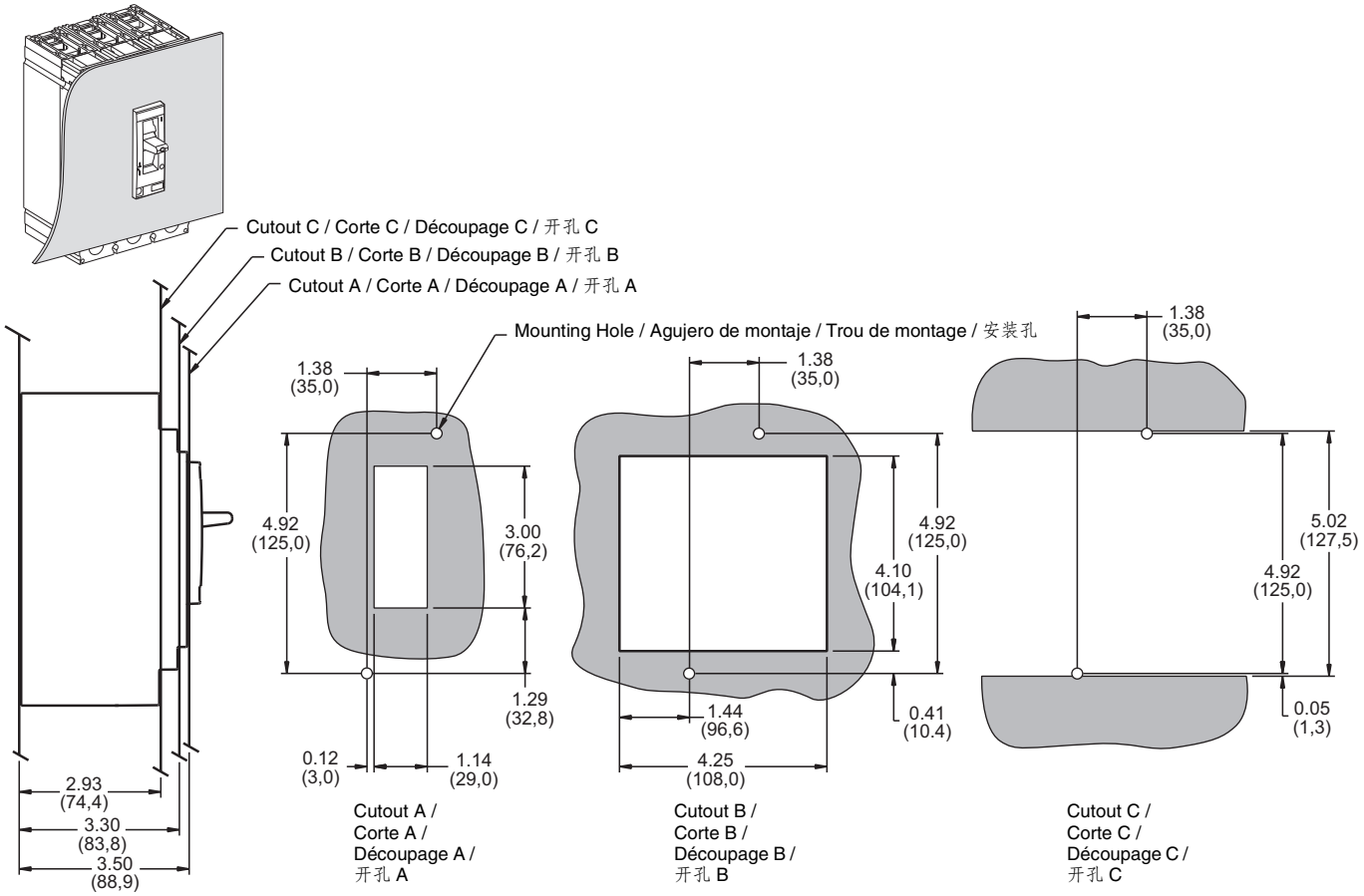
2. Instale el interruptor automático (figura 3, a–b).

2. Installer le disjoncteur (figure 3, a–b).

2. 安装断路器（图 3， a-b）。

Figure / Figura / Figure / 图 3 :





Dimensions:
Dimensiones :
Dimensions :
in. / pulg / po (mm)
尺寸：英寸 （毫米）

I-Line™ Circuit Breaker Installation

Instalación del interruptor automático I-Line™

Installation du disjoncteur I-Line^MC

I-Line™ 断路器的安装

NOTICE / AVISO / AVIS / 告示

HAZARD OF EQUIPMENT DAMAGE

- Do not adjust jaws.
- Do not remove joint compound.
- If necessary, use Square D™ joint compound PJC7201.

Failure to follow these instructions can result in equipment damage.

PELIGRO DE DAÑO AL EQUIPO

- No ajuste las mordazas.
- No retire el compuesto para juntas.
- Si es necesario, utilice el compuesto para juntas PJC7201 Square D™.

El incumplimiento de estas instrucciones puede causar daño al equipo.

RISQUE DES DOMMAGES MATÉRIELS

- N'ajustez pas les mâchoires.
- Ne retirez pas la pâte à joint.
- Si nécessaire, utilisez la pâte à joint Square D^MC PJC7201.

Si ces directives ne sont pas respectées, cela peut entraîner des dommages matériels.

可能有设备损坏的风险

- 切勿调节齿板。
- 切勿移除密封剂。
- 如有必要，使用 Square D™ 密封剂 PJC7201。

不遵循上述说明将导致人员伤亡。

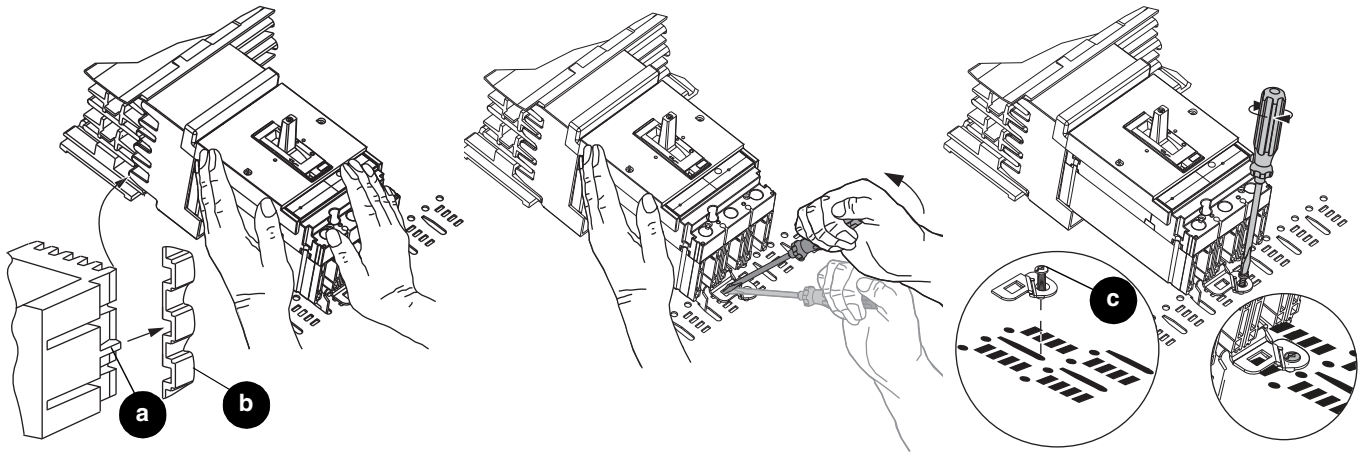
1. Rack the circuit breaker onto the bus (Figure 4, a–b).
2. Tighten the mounting bracket screw (c–d).

1. Inserte el interruptor automático en la barra (figura 4, a–b).
2. Apriete el tornillo del soporte de montaje (c–d).

1. Embrocher le disjoncteur sur les barres-bus (figure 4, a–b).
2. Serrer la vis du support de montage (c–d).

1. 将断路器外壳（A）后板孔盖对齐配电盘柜总线栈（a-b）的槽孔。
2. 拧紧支架螺钉 （c-d）。

Figure / Figura / Figure / 图 4 :



Cable Installation

NOTE: If circuit breaker has terminal nuts installed, remove terminal nuts and install lugs as directed in the instructions shipped with the lug kit.

Instalación de los cables

NOTA: Si el interruptor automático tiene instaladas las tuercas de conexión, retírelas e instale las zapatas como se indica en las instrucciones incluidas con el accesorio de zapatas.

Installation des câbles

REMARQUE : Si les écrous de raccordement sont installés sur le disjoncteur, les retirer et installer les cosses selon les directives d'utilisation expédiées avec le kit de cosses.

电缆安装

注：如果断路器安装了接线端子螺母，移除接线端子螺母并根据端子套件随附的说明安装接线端子。

NOTICE / AVISO / AVIS / 告示

HAZARD OF FALSE TORQUE INDICATION
Do not allow conductor strands to interfere with threads of wire binding screw.

Failure to follow these instructions can result in equipment damage.

PELIGRO DE INDICACIÓN FALSA DE PAR DE APRIETE
No permita que los hilos del conductor interfieran con las roscas del tornillo de sujeción de cables.

El incumplimiento de estas instrucciones puede causar daño al equipo.

RISQUE D'INDICATION ERRONÉE DU COUPLE
Ne laissez pas les torons du conducteur s'engager dans les filets de la vis de fixation.

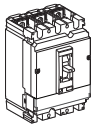
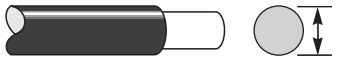
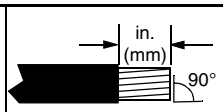
Si ces directives ne sont pas respectées, cela peut entraîner des dommages matériels.

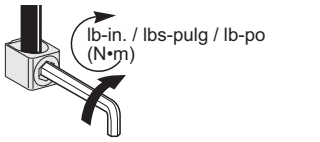
可能有错误的转矩指示危险

导体绞线不可破坏电线接线螺钉的螺纹。

不遵循上述说明将导致人员伤亡。

Table / Tabla / Tableau 1 : Lug Information / Información de las zapatas / Information sur les cosses / 端子信息



AL150HD	H	15–150 A	(1) Al/Cu	#14–#10 AWG (2.5–6 mm²)	0.65 in. (16 mm)	50 lb-in. / lbs-pulg / lb-po (5 N•m)
				#8–3/0 AWG (10–95 mm²)	0.65 in. (16 mm)	120 lb-in. / lbs-pulg / lb-po (14 N•m)
CU150HD	H	15–150 A	(1) Cu	#14–2/0 AWG (2.5–70 mm²)	0.65 in. (16 mm)	120 lb-in. / lbs-pulg / lb-po (14 N•m)
AL175JD	J	150–175 A	(1) Al/Cu	#4–4/0 AWG (25–95 mm²)	1 in. (25 mm)	225 lb-in. / lbs-pulg / lb-po (26 N•m)
AL250JD	J	200–250 A	(1) Al/Cu	#3/0–350 kcmil (95–185 mm²)	1 in. (25 mm)	225 lb-i.n / lbs-pulg / lb-po (26 N•m)
CU250JD	J	150–250 A	(1) Cu	#1/0–300 kcmil (50–150 mm²)	1 in. (25 mm)	250 lb-in. / lbs-pulg / lb-po (28 N•m)

[1] Conductors must be cut square for secure termination. /
Para obtener una conexión segura en las terminaciones, corte en forma cuadrada los conductores. /
Les conducteurs doivent être coupés droits pour assurer une terminaison sûre. / 导线应该方形切割以便固定末端。

NOTE: See Table 1 for strip lengths and torques.

1. Preform the conductors to their final configuration. Strip the conductor ends (Figure 5, a). Do not nick strands.
2. Install the cables in the lugs and torque the wire binding screws (b–c).
   — Install wire larger than 12 AWG in center of channel (d).

NOTA: Consulte la tabla 1 para conocer las longitudes sin aislamiento y los valores de par de apriete.

1. Prepare los conductores en la configuración final. Quite el aislamiento a los extremos del conductor (figura 5, a). Tenga cuidado de no dañar los hilos.
2. Instale los cables en las zapatas y apriete los tornillos de sujeción de cables (b–c).
   — Instale un conductor más grande que 4 mm² (12 AWG) en el centro del canal (d).

REMARQUE : Voir le tableau 1 pour le couple de serrage et les longueurs de dénudage.

1. Former préalablement les conducteurs à la configuration définitive. Dénuder les extrémités des fils conducteurs (figure 5, a). Ne pas entailler les torons.
2. Installer les câbles dans les cosses et serrer les vis de fixation des fils (b–c).
   — Installer un fil d'un calibre supérieur à 12 AWG au centre du profilé en U (d).

注：剥线长度和转矩请参见表 1。

1. 导线末端切割成方形并完成导线的最终配置。使用适当的绝缘剥线工具，根据表 1 的建议剥离导线末端。绞线应无缺口。
2. 根据面板和表 1 的建议将线缆安装在端子上并拧紧电线接线螺钉。
   — 大于 12 AWG 的电线应安装在线槽中心位置。

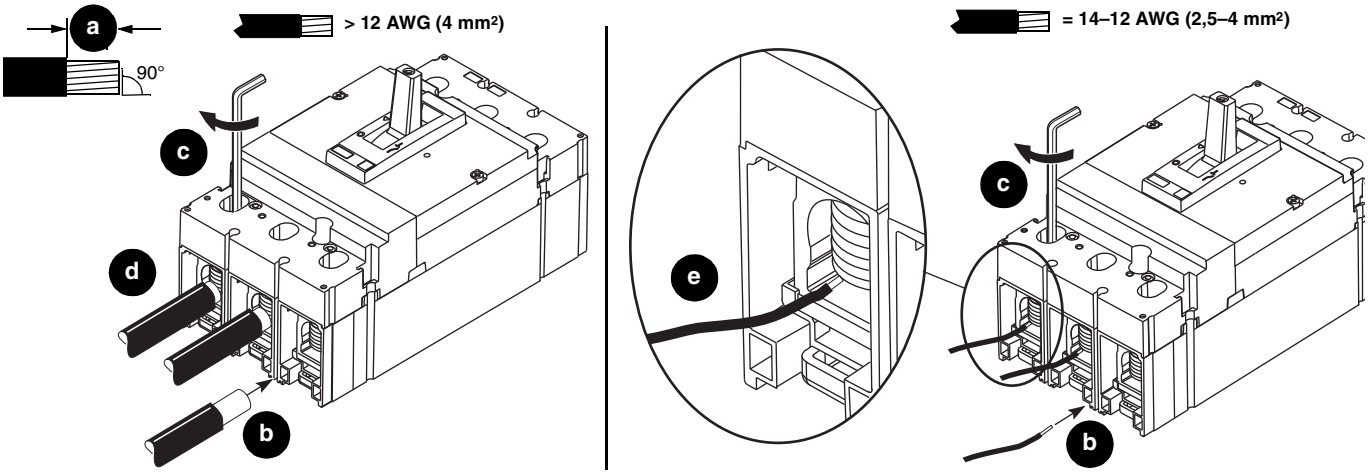
— Install 14–12 AWG wire on the side of channel (e) on all lugs to avoid damage to wire.

— Instale un conductor de 2,5 a 4 mm² (14 a 12 AWG) al costado del canal (e) en todas las zapatas para no dañar el cable.

— Installer un fil de calibre 14 à 12 AWG sur le côté du profilé en U (e) sur toutes les cosses pour éviter d'endommager les fils.

— 将较小尺寸的电线（14 –12 AWG）安装在所有端子线槽的边缘位置，如图 1 所示，避免损坏电线。

Figure / Figura / Figure / 图 5 :



Bus Installation

NOTE: If terminal nut inserts are not installed, install terminal nut inserts as directed in the instructions shipped with the terminal nut kit.

1. Prepare bus connection (Figure 2, a).
2. Install bus, using supplied hardware (b–c).

Instalación en la barra

NOTA: Si los insertos con tuerca de conexión no están instalados, instálelos como se indica en las instrucciones incluidas con el accesorio de tuercas de conexión.

1. Prepare la conexión de la barra (figura 2, a).
2. Instale la barra utilizando los herrajes incluidos (b–c).

Installation des barre-bus

REMARQUE : Si les pièces encastrées d'écrou de raccordement ne sont pas installées, les installer selon les directives d'utilisation expédiées avec le kit d'écrou de raccordement.

1. Préparer le raccordement de la barre-bus (figure 2, a).
2. Installer la barre-bus à l'aide de la quincaillerie fournie (b–c).

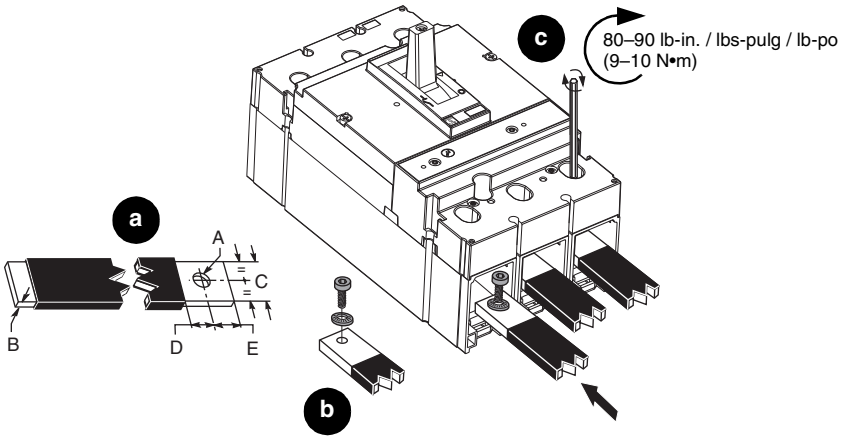
母排连接断路器的安装

注：如果未安装接线端子螺母插入件，根据接线端子螺母套件随附的指南安装接线端子螺母。

1. 准备母线连接（图 2， a）。
2. 使用提供的硬件设备安装母线 （b-c）。

Figure / Figura / Figure / 图 6 :Bus and Bus Insulation Dimensions / Dimensiones de la barra y del aislamiento de la barra / Dimensions de la barre-bus et de son isolation / 母排和母排绝缘尺寸

Dimension / Dimensiones / Dimension / 尺寸	H-frame / Marco H / Châssis H / H 型	J-frame / Marco J / Châssis J / J 型
A	0.250 in. (6.4 mm)	0.250 in. (6.4 mm)
B	0.125–0.375 in. (3.2–9.5 mm)	0.125–0.375 in. (3.2–9.5 mm)
C	0.50 in. (12.7 mm)	0.50–0.75 in. (12.7–19.1 mm)
D	0.3 in. (7.6 mm)	0.625 in. (15.9 mm)
E	0.3 in. (7.6 mm)	0.375 in. (9.5 mm)



Accessory and Control Wiring Installation

1. Remove accessory cover (Figure 7, a).
2. Install undervoltage trip (MN) or shunt trip (MX) (b) into compartment labeled “MN UVR MX SHT”.
3. Install auxiliary switch (OF) (c), alarm switch (SD) (d) or overcurrent trip switch (SDE) (e) into corresponding accessory compartment.

NOTE: Installation of overcurrent trip switch (SDE) requires installation of SDE actuator, not provided.

4. Install control wiring (f) to accessories.

NOTE: All diagrams show circuit breaker in tripped position.

Instalación de los accesorios y cables de control

1. Retire la cubierta (figura 7, a).
2. Instale el disparo por baja tensión (MN) o el disparo en derivación (MX) (b) en el compartimiento con la etiqueta “MN UVR MX SHT”.
3. Instale el contacto auxiliar OF (c), el contacto de alarma SD (d) o el contacto de disparo por sobrecorriente (SDE) (e) en el compartimiento de accesorios correspondiente como se muestra en la figura.

NOTA: Para instalar un contacto de disparo por sobrecorrente (SDE) requiere instalar un accionador del contacto SDE, el cual se vende por separado.

4. Instale los cables de control (f) en los accesorios.

NOTA: Todos los diagramas muestran el interruptor automático en posición de disparado.

Installation des accessoires et du câblage de contrôle

1. Vetirer le couvercle (figure 7, a).
2. Installer le déclencheur sur baisse de tension (MN) ou le déclencheur shunt (MX) (b) dans le compartiment étiquetté «MN UVR MX SHT».
3. Installer l'interrupteur auxiliaire (OF) (c), l'interrupteur d'alarme (SD) (d) ou le déclencheur par surintensité (SDE) (e) dans le compartiment des accessoires correspondant, comme indiqué dans les figures à droite.

REMARQUE : L’installation du déclencheur par surintensité (SDE) nécessite l’installation d’un actionneur SDE, vendu séparément.

4. Installer le câblage de contrôle (f) aux accessoires.

REMARQUE : Tous les schémas indiquent un disjoncteur dans la position déclenché.

附件和控制线路的安装

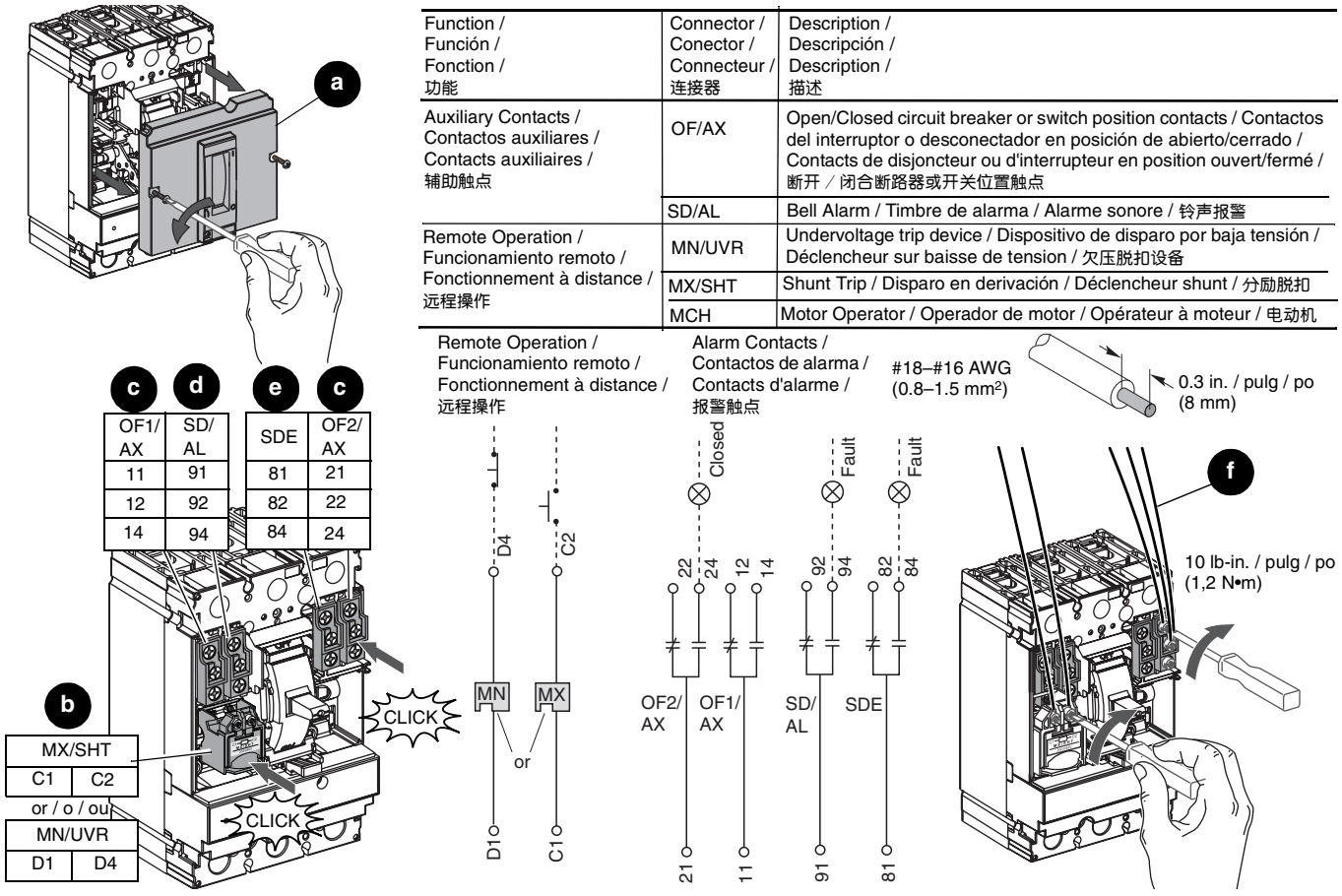
1. 然后拆下辅助端子盖（a）。
2. 将欠压线圈 （MN）或分励脱扣线圈 （MX）（b）安装在带有 “MN UVR MX SHT” 标签的附件室中。
3. 将指示触点（OF)(c）、脱扣指示触点（SD）（d）或故障脱扣指示（SDE）以及（e）安装到相应的附件室中。

注：安装故障脱扣指示（SDE）时，需要安装 SDE 执行器 （未提供）。

4. 将控制线（f）安装至附件。

注：所有的图示均显示断路器处于脱扣状态。

Figure / Figura / Figure / 图 7 :



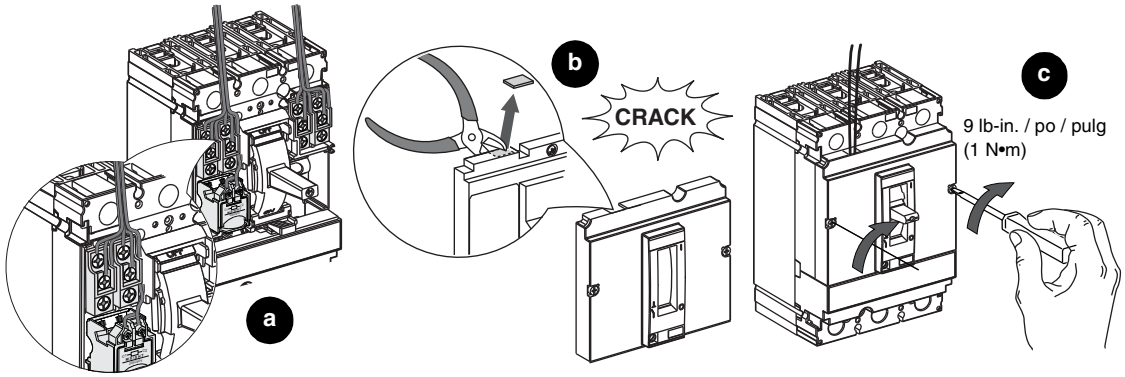
Function / Función / Fonction / 功能	Connector / Conector / Connecteur / 连接器	Description / Descripción / Description / 描述
Auxiliary Contacts / Contactos auxiliares / Contacts auxiliaires / 辅助触点	OF/AX	Open/Closed circuit breaker or switch position contacts / Contactos del interruptor o desconectador en posición de abierto/cerrado / Contacts de disjoncteur ou d'interrupteur en position ouvert/fermé / 断开 / 闭合断路器或开关位置触点
	SD/AL	Bell Alarm / Timbre de alarma / Alarme sonore / 铃声报警
Remote Operation / Funcionamiento remoto / Fonctionnement à distance / 远程操作	MN/UVR	Undervoltage trip device / Dispositivo de disparo por baja tensión / Déclencheur sur baisse de tension / 欠压脱扣设备
	MX/SHT	Shunt Trip / Disparo en derivación / Déclencheur shunt / 分励脱扣
	MCH	Motor Operator / Operador de motor / Opérateur à moteur / 电动机

NOTICE / AVISO / AVIS / 告示

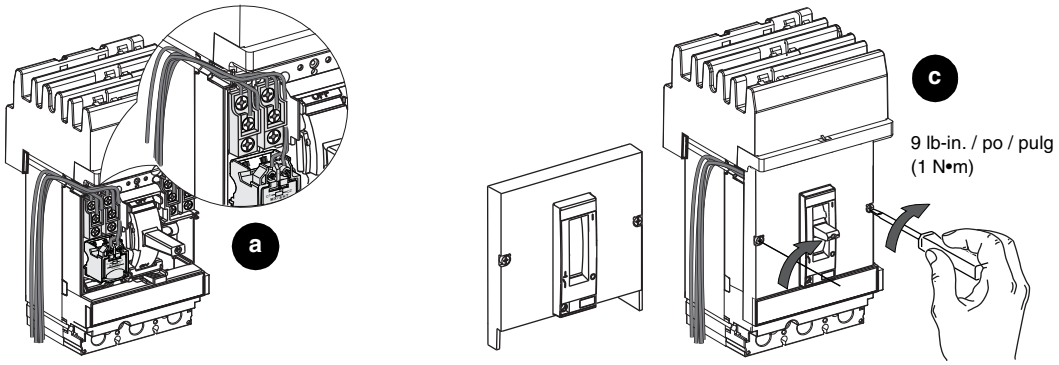
HAZARD OF EQUIPMENT DAMAGE • Tighten all accessory cover screws to stated torque. • Do not overtorque screws. • Do not use power equipment to torque screws. **Failure to follow these instructions can result in equipment damage.**	**PELIGRO DE DAÑO AL EQUIPO** • Apriete los tornillos de la cubierta de accesorios en los valores de par de apriete indicados. • No apriete los tornillos en exceso. • No utilice herramientas eléctricas para esto. **El incumplimiento de estas instrucciones puede causar daño al equipo.**	**RISQUE DES DOMMAGES MATÉRIELS** • Serrez toutes les vis des couvercles d'accessoires au couple de serrage indiqué. • Ne serrez pas à un couple excessif. • N'utilisez pas un outil électrique pour serrer les vis. **Si ces directives ne sont pas respectées, cela peut entraîner des dommages matériels.**	**可能有设备损坏的风险** • 前面盖的所有螺钉必须拧紧至规定转矩。 • 螺钉转矩切勿过大。 • 切勿使用电动设备拧紧螺钉。 **不遵循上述说明可能导致设备损坏。**
5. Route wiring (Figure 8, a). 6. Replace accessory cover, being careful not to pinch wires when installing cover.	5. Dirija los cables (figura 8, a). 6. Vuelva a colocar la cubierta de accesorios, tenga cuidado de no pellizcar los cables al instalarla.	5. Acheminer le câblage (figure 8, a). 6. Remettre le couvercle des accessoires en place, en faisant attention de ne pas pincer des fils lors de son installation.	5. 进行布线 （图 8，a）。 6. 将前面盖装回原位，安装前面盖时应小心操作避免电线缠绕。

Figure / Figura / Figure / 图 8 :

Individually-Mounted Circuit Breakers / Interruptores automáticos de montaje individual / Disjoncteurs montés individuellement / 独立安装式断路器



I-Line Circuit Breakers / Interruptores automáticos I-Line / Disjoncteurs I-Line / I-Line 断路器



Plug-On and Drawout Circuit Breakers / Interruptores enchufables y removibles / Disjoncteurs débrochables et enfichables / 插入式和抽出式断路器

See wiring information provided with plug-in base. If accessories are field installed, follow instructions provided with 9-wire connector. / Consulte la información de alambrado provista con la base enchufable. Si los accesorios fueron instalados en campo, siga las instrucciones provistas co / Consulter les informations de câblage fournies avec le socle embrochable.Si les accessoires ont été installés sur place, suivre les directives fournies avec le connecteur à 9 fils / 参见插入式底座随附的布线说明。如果附件需要现场安装，请遵循 9– 线连接器随附的指南。

NOTE: Confirm that catalog number printed on side accessory label (Figure 9, a) matches catalog number printed on accessory cover (b).

7. Mark on side accessory label (a) which device was installed.

NOTA: Compruebe que el número de catálogo impreso en la etiqueta de accesorios (figura 9, a) lateral sea el mismo número que el de la cubierta de accesorios (b).

7. Marque en la etiqueta de accesorios (a) lateral el dispositivo que fue instalado.

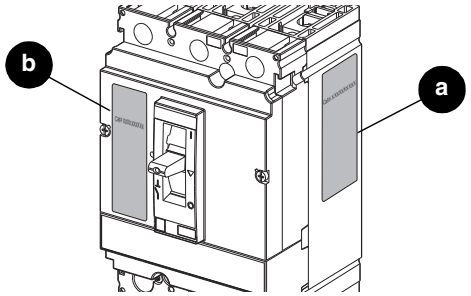
REMARQUE : Vérifier si le numéro de catalogue imprimé sur l'étiquette d'accessoires latérale (figure 9, a) correspond au numéro de catalogue imprimé sur le couvercle des accessoires (b).

7. Marquer sur l'étiquette d'accessoires latérale (a) quel dispositif a été installé.

注：检查侧板附件标签 （a）上的号是否与前面盖附件标签 （b）上的号一致，以确保断路器和前面盖配套。

7. 侧板上的标签 (a) 表明了安装了哪些设备。

Figure / Figura / Figure / 图 9 :



Circuit Breaker Removal

1. Turn off all power supplying this equipment before working on or inside equipment.
2. Remove circuit breaker in reverse order of installation.

Desmontaje del interruptor

1. Desenergice el equipo antes de realizar cualquier trabajo en él.
2. Desmonte el interruptor en el orden inverso al de su instalación.

Démontage du disjoncteur

1. Couper l'alimentation de l'appareil avant d'y travailler.
2. Retirer le disjoncteur dans l'ordre inverse de son installation.

断路器的拆卸

1. 在此设备内部或外部进行操作时，请先断开所有电源。
2. 断路器的拆卸步骤与其安装顺序相反。

Operation

- Press push-to-trip button (Figure 10, a) at installation to check operation.
- Repeat once a year to exercise circuit breaker.

NOTE: Push-to-trip button will not trip circuit breaker if it is in the off (O) position.

Funcionamiento

- Pulse el botón de disparo (figura 10, a) durante la instalación para comprobar el funcionamiento.
- Repita una prueba anual para volver a verificar el interruptor.

NOTA: El botón de disparo no disparará el interruptor automático si se encuentra en la posición de abierto (O).

Fonctionnement

- Appuyer sur le bouton pousser-pour-déclencher (figure 10, a) au moment de l'installation afin de vérifier le fonctionnement.
- Répéter une fois par an simplement pour manœuvrer le disjoncteur.

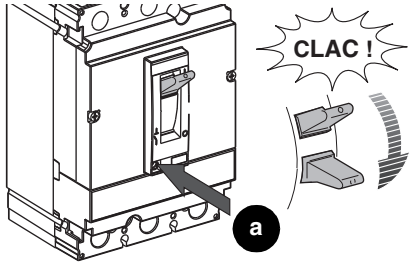
REMARQUE : Le bouton ne provoque pas le déclenchement du disjoncteur si ce dernier est en position d'arrêt (O).

运行

- 按下设备的脱扣按钮检查其运行情况。
- 每年重复一次使用断路器。

注：断路器处于断开 (O) 位置时按下脱扣按钮不能使其脱扣。

Figure / Figura / Figure / 图 10 :



Trip Unit Adjustment

For J-frame circuit breakers only: Adjust instantaneous trip (Im) by turning dial (Figure 11, a).

Ajuste de la unidad de disparo

Para los interruptores automáticos marco J solamente: Ajuste el disparo instantáneo (Im) ajustando el selector (figura 11, a).

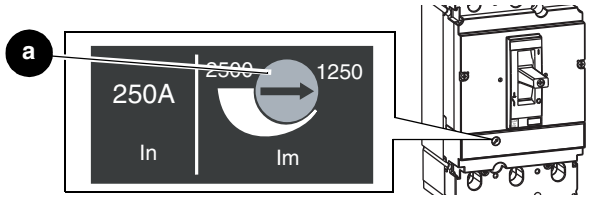
Réglages du déclencheur

Pour les disjoncteurs à châssis J uniquement : régler le déclenchement instantané (Im) en ajustant le commutateur (figure 11, a).

脱扣单元调节

仅适合 J 型断路器：转动刻度盘 （a）调节瞬时脱扣（Im）。

Figure / Figura / Figure / 图 11 :



Troubleshooting

If problems occur during installation, refer to the following guide. If trouble persists, contact the local field office.

Diagnóstico de problemas

Si se presentan problemas durante la instalación, consulte la siguiente guía. Si persiste el problema, póngase en contacto con su distribuidor más cercano.

Dépannage

Si des problèmes surviennent pendant l'installation, se reporter aux consignes suivantes. Si les problèmes persistent, contacter le bureau de service local.

故障处理

如果安装过程中出现问题，请参考以下指南。如果故障仍存在，请联系当地办事处。

⚠ DANGER / PELIGRO / DANGER / 危险

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462, or NOM-029-STPS.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- Qualified persons performing diagnostics or troubleshooting that require electrical conductors to be energized must comply with NFPA 70 E - Standard for Electrical Safety Requirements for Employee Workplaces and OSHA Standards - 29 CFR Part 1910 Subpart S - Electrical.

Failure to follow these instructions will result in death or serious injury.

PELIGRO DE DESCARGA ELÉCTRICA, EXPLOSIÓN O DESTELLO POR ARQUEO

- Utilice equipo de protección personal (EPP) apropiado y siga las prácticas de seguridad en trabajos eléctricos establecidas por su Compañía, consulte la norma 70E de NFPA o Z462 de CSA y NOM-029-STPS.
- Solamente el personal eléctrico especializado deberá instalar y prestar servicio de mantenimiento a este equipo.
- Desenergice el equipo antes de realizar cualquier trabajo en él.
- Siempre utilice un dispositivo detector de tensión nominal adecuado para confirmar la desenergización del equipo.
- Vuelva a colocar todos los dispositivos, las puertas y las cubiertas antes de volver a energizar el equipo.
- El personal calificado a cargo de la realización de diagnóstico de problemas quienes energizarán los conductores eléctricos debe cumplir con la norma 70E del NFPA que trata sobre los requisitos de seguridad eléctrica para el personal en el sitio de trabajo así como la norma 29 CFR Parte 1910, Sub-parte S de OSHA que también trata sobre la seguridad eléctrica.

El incumplimiento de estas instrucciones podrá causar la muerte o lesiones serias.

RISQUE D'ÉLECTROCUTION, D'EXPLOSION OU D'ÉCLAIR D'ARC

- Portez un équipement de protection personnelle (ÉPP) approprié et observez les méthodes de travail électrique sécuritaire. Voir NFPA 70E ou CSA Z462.
- Seul un personnel qualifié doit effectuer l'installation et l'entretien de cet appareil.
- Couper l'alimentation de l'appareil avant d'y travailler.
- Utilisez toujours un dispositif de détection de tension à valeur nominale appropriée pour vous assurer que l'alimentation est coupée.
- Replacez tous les dispositifs, les portes et les couvercles avant de mettre l'appareil sous tension.
- Les personnes qualifiées pour effectuer des diagnostics ou un dépannage qui exigent la mise sous tension de conducteurs électriques doivent se conformer à la norme NFPA 70 E sur les exigences de sécurité électrique pour le lieu de travail des employés et aux normes OSHA relatives à l'électricité, 29 CFR partie 1910 sous-partie S.

Si ces directives ne sont pas respectées, cela entraînera la mort ou des blessures graves.

可能有触电、爆炸或者电弧灼伤的危险

- 穿戴适当的个人防护设备（PPE），遵循安全电气操作惯例。请参见 NFPA 70E。
- 本设备只能由专业电气人员安装和维修。
- 在此设备上或内部进行操作时，请先断开所有电源。
- 用恰当的电压测量装置来确定电压的状况。
- 在对设备通电之前，装回所有的联锁，门和面罩。
- 专业电气人员在对需要通电的电导体执行诊断或故障处理时须遵循 NFPA 70E 《员工工作场所的电气安全要求》和 《职业安全与卫生条例》（OSHA） 29 CFR 部分 1910 子部分 S － 电气的要求。

不遵循上述说明将导致人员伤亡。

Condition / Condición / Condition / 状况	Possible Causes / Causas posibles / Causes possibles / 可能原因	Solution / Solución / Solution / 解决办法
Circuit breaker fails to stay closed. / El interruptor no permanece cerrado. / Le disjoncteur ne reste pas fermé. / 断路器无法保持断开	Short circuit or overload on system. / Cortocircuito o sobrecarga en el sistema. / Un court-circuit ou une surcharge est présent dans le système. / 系统短路或过载	Check system for short circuit or overload. / Revise el sistema para ver si encuentra un cortocircuito o una sobrecarga. / Rechercher un court-circuit ou une surcharge dans le système. / 检查系统是否短路或过载
Circuit beaker trips, but no short circuit or overload is evident. / El interruptor automático se dispara, pero no es evidente un cortocircuito o una sobrecarga. / Le disjoncteur se déclenche, mais aucune évidence de court-circuit ni de surcharge. / 断路器脱扣，但无明显的短路或过载现象	Voltage is below undervoltage trip setting. / La tensión es inferior al valor de ajuste de disparo por baja tensión. / La tension est inférieure au réglage du déclencheur sur baisse de tension. / 电压低于设定的欠压脱扣范围	Check system for low voltage. / Revise el sistema para ver si encuentra tensión baja. / Vérifier si une basse tension est appliquée au système. / 检查系统的低电压
Push-to-trip button will not trip circuit breaker. / El botón de disparo no dispara el interruptor. / Le bouton pousser-pour-déclencher ne déclenche pas le disjoncteur. / 脱扣按钮无法使断路器脱扣	Circuit breaker already tripped. / El interruptor automático ya está disparado. / Le disjoncteur est déjà déclenché. / 断路器已脱扣	Move circuit breaker handle to reset then to on (I). / Coloque la palanca del interruptor en la posición de restablecimiento, luego en la posición de cerrado (I). / Placer la manette du disjoncteur sur la position de réarmement, puis sur marche (I). / 移动断路器手柄将其复位，然后接通 （I）。
Circuit breaker cannot be opened manually. / El interruptor no se puede abrir manualmente. / Le disjoncteur ne peut pas être ouvert manuellement. / 断路器无法手动合闸。	Damage to current path. / Está dañada la ruta de corriente. / Trajet de courant endommagé. / 回路受损	Contact local field office. / Póngase en contacto con su distribuidor más cercano. / Contacter le bureau de service local. / 联系当地办事处

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SURGE PROTECTION DEVICES

Surgelogic™ EMA Series
Surge Protective Devices (SPDs)

Dispositivos de protección contra sobretensiones transitorias (SPD)

Dispositifs de protection contre les surtensions transitoires (SPD)

Instruction Bulletin
Boletín de instrucciones
Directives d'utilisation

8222-0014, Rev. 04, 04/2020

Retain for Future Use. /
Conservar para uso futuro. /
À conserver pour usage ultérieur.

SQUARE D™
by Schneider Electric

Table of Contents

For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.

ENGLISH

Precautions

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462 or NOM-029-STPS.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

Failure to follow these instructions will result in death or serious injury.

⚠ CAUTION

LOSS OF BRANCH CIRCUIT POWER/LOSS OF SURGE SUPPRESSION

- Perform periodic inspection of the SPD status indicator lights as part of the preventative maintenance schedule.
- Promptly service the SPD when an alarm state exists.
- Use dry contacts to signal an alarm state to the central supervisory system for unmanned, inaccessible, or critical installations.
- Use multiple SPDs to achieve redundancy for critical applications.

Failure to follow these instructions can result in injury or equipment damage.

At end-of-life conditions, Surge Protective Devices (SPDs) can lose their ability to block power system voltage and attempt to draw excessive current from the line. This SPD is equipped with overcurrent and overtemperature components that will automatically disconnect the surge suppression elements from the mains should the surge suppression elements reach end of life. Tripping of the branch circuit breaker or fuse feeding the SPD can occur when the surge suppression elements reach end of life.

⚠ CAUTION

LOSS OF SURGE SUPPRESSION

- Do not energize the Surge Protective Device until the electrical system is completely installed, inspected, tested, and all conductors have been connected and functional, including the neutral.
- Verify the voltage rating of the device and system before energizing the Surge Protective Device.
- Perform high-potential insulation testing, or any other tests where SPD components will be subjected to voltages higher than their rated turn-on voltage, with the neutral and SPD disconnected from the power source.

Failure to follow these instructions can result in injury or equipment damage.

ENGLISH

Introduction

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462 or NOM-029-STPS.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

Failure to follow these instructions will result in death or serious injury.

Note: For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.

Proper installation is imperative to maximize the EMA surge protective device's effectiveness and performance. Read the entire instruction bulletin before beginning the installation. These instructions are not intended to replace national or local electrical codes. Check all applicable electrical codes to verify compliance. Installation of modular surge suppressors should only be performed by qualified electrical personnel.

Unpacking and Preliminary Inspection

Inspect the entire shipping container for damage or signs of mishandling before unpacking the device. Remove the packing material and further inspect the device for any obvious shipping damage. If any damage is found and is a result of shipping or handling, immediately file a claim with the shipping company.

Storage

The device should be stored in a clean, dry environment. Storage temperature is -40 °F to +149 °F (-40 °C to +65 °C). All of the packaging materials should be left intact until the device is ready for installation.

Safety Labels

English, Spanish, and French versions of all safety labels (Danger, Warning, and Caution) are provided.

Surge Protective Device (SPD) Location Considerations

Environment

The device is designed to operate in an ambient temperature range of -4 °F to +149 °F (-20 °C to +65 °C) with a relative humidity of 0 to 95% non-condensing. The operating temperature of the LCD on the diagnostic display panel is +14 °F to +140 °F (-10 °C to +60 °C). Refer to the product catalog for further details on enclosures. All EMA devices operate normally without reduction in performance when subjected to shock and vibrations described in IEC 60721-3-3, Class 3M4.

Audible Noise

The device background noise is negligible and does not restrict the location of the installation.

Mounting

The device is designed to be surface or flush mounted. Refer to the device submittal drawings or the product catalog for typical mounting dimensions and weight.

Service Clearance

The service clearance should meet all applicable code requirements.

Equipment Performance

To obtain the maximum system performance, locate the device as close to the circuit being addressed as possible to minimize the interconnecting wiring length. For every foot of wire length, approximately 160 Volts (6 kV / 3 kA, 8/20 microsecond) is added to the suppressed voltage. The Voltage Protection Rating (VPR) is located on the device nameplate and is measured six inches from the enclosure sidewall, according to UL 1449 test standards.

Electrical

Voltage Rating

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Confirm the SPD voltage rating on the module or nameplate label is the same as the operating voltage.

Failure to follow these instructions will result in death or serious injury.

Prior to mounting the SPD, verify that the device has the same voltage rating as the power distribution system in which it is installed. Compare the nameplate voltage or model number on the SPD with the nameplate of the electrical distribution equipment.

The specifier or user of the device must be familiar with the configuration and arrangement of the power distribution system in which any SPD is to be installed. The system configuration of any power distribution system is based strictly on how the secondary windings of the transformer supplying the service entrance main or load are configured. This includes whether or not the transformer windings are referenced to earth via a grounding conductor. The system configuration is not based on how any specific load or equipment is connected to a particular power distribution system. See Table 1 for the service voltage of each SPD.

ENGLISH

Table 1: Voltage Ratings

Service Voltage	Peak Surge Current Rating Per Phase	Catalog Numbers [1]
120/240 V, 1-phase, 3-wire + ground	120 kA	SSP01EMA12
	160 kA	SSP01EMA16
	240 kA	SSP01EMA24
	320kA	SSP01EMA32
	480 kA	SSP01EMA48
208Y/120 V[2], 3-phase, 4-wire + ground Wye	120 kA	SSP02EMA12
	160 kA	SSP02EMA16
	240 kA	SSP02EMA24
	320kA	SSP02EMA32
	480 kA	SSP02EMA48
240/120 V, 3-phase, 4-wire + ground High-leg Delta	120 kA	SSP03EMA12
	160 kA	SSP03EMA16
	240 kA	SSP03EMA24
	320kA	SSP03EMA32
	480 kA	SSP03EMA48
240 V, 3-phase, 3-wire + ground Delta	100 kA	SSP06EMA10
	120 kA	SSP06EMA12
	160 kA	SSP06EMA16
	200 kA	SSP06EMA20
	240 kA	SSP06EMA24
	320kA	SSP06EMA32
	480 kA	SSP06EMA48
480Y/277 V, 3-phase, 4-wire + ground Wye [3]	120 kA	SSP04EMA12
	160 kA	SSP04EMA16
	240 kA	SSP04EMA24
	320kA	SSP04EMA32
	480 kA	SSP04EMA48
480 V, 3-phase, 3-wire + ground Delta [4]	100 kA	SSP05EMA10
	120 kA	SSP05EMA12
	160 kA	SSP05EMA16
	200 kA	SSP05EMA20
	240 kA	SSP05EMA24
	320kA	SSP05EMA32
	480 kA	SSP05EMA48
600Y/347 V, 3-phase, 4-wire + ground Wye	120 kA	SSP08EMA12
	160 kA	SSP08EMA16
	240 kA	SSP08EMA24
	320kA	SSP08EMA32
	480 kA	SSP08EMA48
600 V, 3-phase, 3-wire + ground Delta [5]	100 kA	SSP09EMA10
	120 kA	SSP09EMA12
	160 kA	SSP09EMA16
	180 kA	SSP09EMA18
	200 kA	SSP09EMA20
	240 kA	SSP09EMA24
	320kA	SSP09EMA32

[1] Catalog numbers may require a suffix to indicate the addition of sine wave tracking (F), integrated switch (D) and/or NEMA 4x, stainless steel enclosure (S).

[2] 208Y/120 series also applies to the following voltage: 220Y/127.

[3] 480Y/277 series also applies to the following voltages: 380Y/220, 400Y/230 and 415Y/240.

[4] 480 V Delta series also applies to the following voltages: 480Y/277V HRG.

[5] 600 V Delta series also applies to the following voltages: 600Y/347V HRG.

For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.

Terminals, Wire Size, and Installation Torque

Terminals are provided for phase (line), neutral, and equipment ground connections. The EMA terminals accept a range of 10 AWG to 2 AWG copper wire for the NO switch offer for phase, neutral and ground connectors and 10 AWG to 3/0 AWG copper wire for the switch offer for phase connectors. Torque connections to the following values:

Table 2: Terminal Torque

Power Connection	Torque
AØ, BØ, CØ and N	40 lb-in. (4 N•m)
Ground	
Switch	50 lb-in. (5 N•m)

Branch Circuit Overcurrent Protection

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Use conductors rated for the Overcurrent Protection Device (OCPD) per applicable codes.
- Use conductors rated for the application per applicable codes.

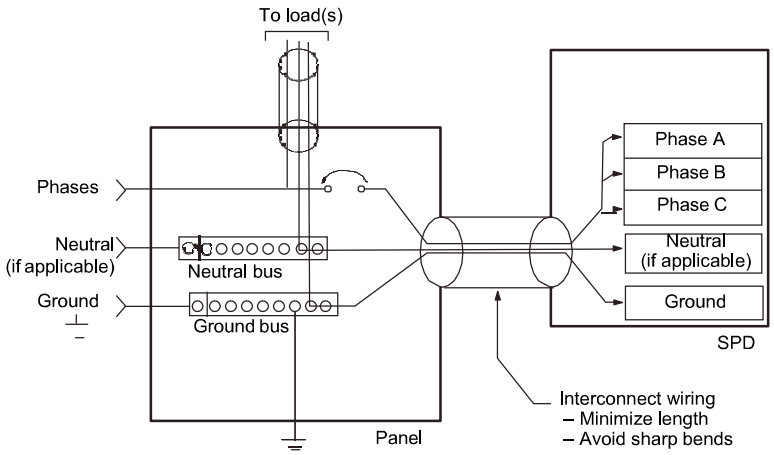
Failure to follow these instructions will result in death or serious injury.

UL 1449 Type 1 SPDs have been designed and approved for line side applications prior to the main service disconnect without supplemental overcurrent protection. Type 1 SPDs may also be installed on the load side of the main Overcurrent Protection Device (OCPD).

Location of Surge Protective Device (SPD)

Locate the SPD as close as possible to the circuit being addressed to minimize the wire length and optimize SPD performance. Avoid long wire runs so that the device will perform as intended. To reduce wire impedance from surge currents, the phase, neutral, and ground conductors must be routed within the same conduit and tightly bundled or twisted together to optimize device performance. Avoid sharp bends in the conductors. See Figure 1.

Figure 1: Surge Protective Device Wiring Practice



For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.

ENGLISH

Grounding

⚠ WARNING

HAZARDOUS TOUCH VOLTAGE

- Connect the Surge Protective Device ground terminal to the building grounding grid structure.
- Use an appropriately sized equipment grounding conductor.
- When using metallic raceway or conduit:
  - Do not use isolated bushings to interrupt the metallic raceway or conduit.
  - Maintain electrical continuity at all raceway and conduit connections using appropriate bonding devices.
- Do not use a separate isolated ground for the EMA Surge Protective Device.
- Verify proper equipment connection to the grounding system.
- Verify ground grid continuity by performing regularly scheduled inspections and testing as part of a comprehensive electrical maintenance program.

Failure to follow these instructions can result in death or serious injury.

General

The EMA has SPD elements connected from phase to ground. It is critical that there be a robust and effective connection to the building grounding structure. The grounding connection must utilize an equipment grounding conductor run with the phase and neutral (if present) connection of the power system.

For best over-voltage suppression by the EMA SPD, use a single-point ground system where the service entrance grounding electrode system is connected to, and bonded to, all other available electrodes, building steel, metal water pipes, driven rods, etc. (for reference, see IEEE 142-2007). The ground impedance measurement of the electrical system should be as low as possible, and in compliance with all applicable codes.

Power System Grounding

In addition to the power system configuration and voltage, the power system grounding method must be considered when selecting the appropriate EMA device. Refer to the following chart for information concerning the suitability of EMA device to specific power system grounding method.

Table 3: Grounding Methods

EMA Device Catalog Number	Power System Grounding Method
SSP01EMA_	Solidly-Grounded
SSP02EMA_	
SSP03EMA_	
SSP04EMA_	
SSP08EMA_	
SSP05EMA_	Ungrounded / HRG
SSP06EMA_	
SSP09EMA_	

Solidly-Grounded Power Systems

⚠ CAUTION

SPD DAMAGE AND POWER SYSTEM OVERVOLTAGE

- Do not connect devices rated for use on solidly-grounded power systems to resistance-grounded (for example, High Resistance Ground) or ungrounded power systems.
- Verify that the service entrance equipment is bonded to ground in accordance with all applicable codes.
- Verify that the neutral terminal of the power system transformer feeding the device is bonded to system ground in accordance with all applicable codes.

Failure to follow these instructions can result in injury or equipment. damage

SPDs rated for use on solidly-grounded power systems must not be connected to resistance-grounded or ungrounded power systems. Such a connection can result in damage to the SPD.

Always verify the power system grounding configuration prior to application of power to the device. Confirm that all ground bonds are installed at both the service entrance equipment and power system transformer prior to application of power.

Delta and Resistance-Grounded Power Systems

⚠ CAUTION

SPD DAMAGE AND POWER SYSTEM OVERVOLTAGE

- Ungrounded power systems are inherently unstable and can produce excessively high line-to-ground voltages during certain fault conditions. During these fault conditions any electrical equipment, including an SPD, may be subjected to voltages which exceed their designed ratings. This information is being provided to the user so that an informed decision can be made before installing any electrical equipment on an ungrounded power system.
- Resistance-grounded power systems must be maintained in an over-damped state to limit voltage overshoot and duration during operation.
- Verification and adjustment of correct power system damping should be done:
  - Periodically as part of normal system maintenance.
  - Following power system modifications.

Failure to follow these instructions can result in injury or equipment damage.

The EMA product is intended for use on resistance-grounded power systems where the power system has been set for, and is maintained in, an over-damped state. For the power system to be over-damped, the current through the grounding resistor during a bolted phase-to-ground fault must be significantly greater than the total charging current of the system.

Periodic engineering evaluation of the power system is required to determine the worst-case charging current of the system and to adjust the grounding resistance accordingly. As the power system is modified, the value of the grounding resistor must be evaluated and adjusted to maintain the system in the over-damped state.

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Installation

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462 or NOM-029-STPS.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

Failure to follow these instructions will result in death or serious injury.

Conduit Location and Recommendations

The recommended conduit entry is at the bottom or either side of the device enclosure. Use a conduit seal that is appropriate for the enclosure rating.

Special Enclosure Considerations

Removing and Reconnecting the RJ45 Diagnostic Cables

The diagnostic cables are marked with matching phase connections. If any of the cables are removed, reconnect the cables as marked.

Optional Sine Wave Tracking (SWT) Module

The addition of a dedicated Sine Wave Tracking (SWT) module and/or molded case switch may necessitate a larger enclosure. Please review page 12 for enclosure size information.

Wiring

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462 or NOM-029-STPS.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.
- Confirm the SPD voltage rating on the module or nameplate label is the same as the operating voltage.
- Do not touch the bottom located terminals which are energized with the switch in either the ON or OFF positions.

Failure to follow these instructions will result in death or serious injury.

Follow the steps listed below when making wiring connections:

1. Turn off all power supplying this equipment before working on or inside any enclosure containing this equipment.
2. Confirm the SPD voltage rating and configuration is the same as the system voltage and power system configuration to which it will be connected.
3. Identify proper location for surge protective device. Locate as close as possible to the panel being addressed so the wires are as short as possible. Mount unit securely.

   Note: The surge protective device must be installed in an accessible location as described in the NEC.
4. Install in accordance with national and local electrical codes for overcurrent protection recommendations and wire ampacity considerations.

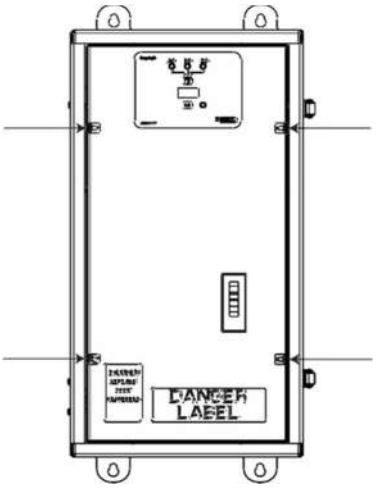
   Note: The neutral connection is not present on three-phase, three-wire WYE solidly ground or two-wire single-phase mid-point ground power systems. For these systems, bond the neutral and ground lugs together in the SPD. For a High Resistance Ground (HRG) or Delta SPD, no neutral connection exists. For installation wiring see Figures 7 through 14.

   Note: See “Terminals, Wire Size, and Installation Torque” and Table 2 on page 7 for acceptable wire size and installation torque.

   Note: On the NEMA 4X offer, before wiring, remove the internal door by loosening the four securing nuts and disconnect the diagnostic cables. See Figure 2.
5. Twist conductors 1/2 turn or more for every twelve inches of length. Do not loop or coil wires. Be sure to maintain adequate wire bending space per NEC.
6. If the remote signaling contacts of the diagnostic display panel are to be used, refer to the section, “Dry Contact”, on page 25 for wiring instructions.
7. On a high-leg delta installation, note the high leg connection per wiring diagram. See Figure 12.
8. Replace all devices, doors, and covers before turning on power to the equipment. If the SPD is properly installed and functioning, the green LED indicators on the display will be lit.

If you have any questions pertaining to the installation of this device, contact the Surgelogic Technical Assistance Group at 1-800-577-7353.

Figure 2: NEMA 4X Enclosures



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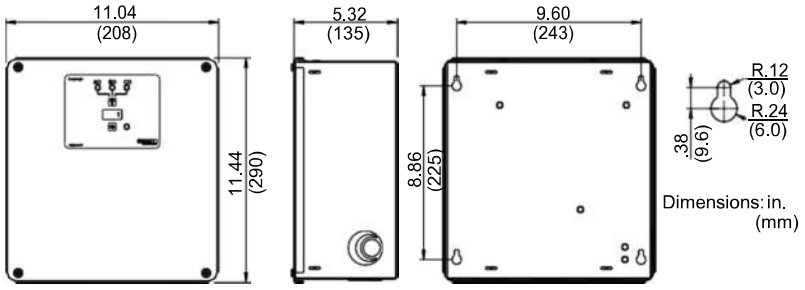
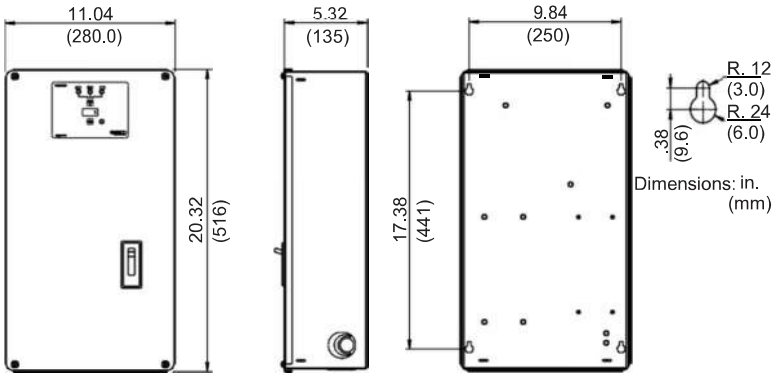
Dimension and Weights EMA Series

Figure 3: 11 x 12 in. NEMA 1 Enclosures



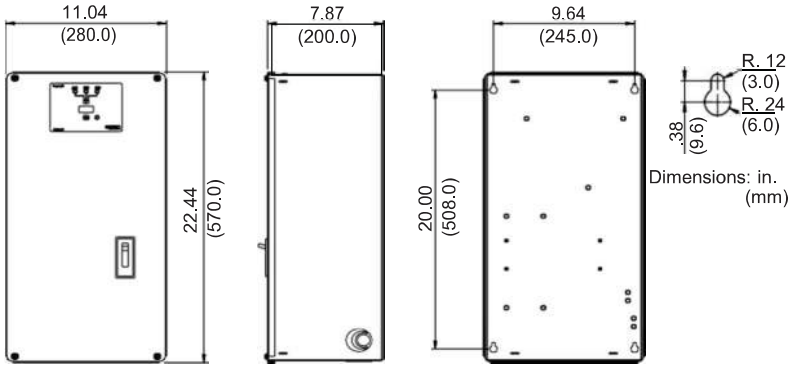
Approximate Weight	23 lbs (10.4 kg)

Figure 4: 11 x 20 in. NEMA 1 Enclosures with Integral Switch/SWT option



Approximate Weight	27 lbs (12.2 kg)

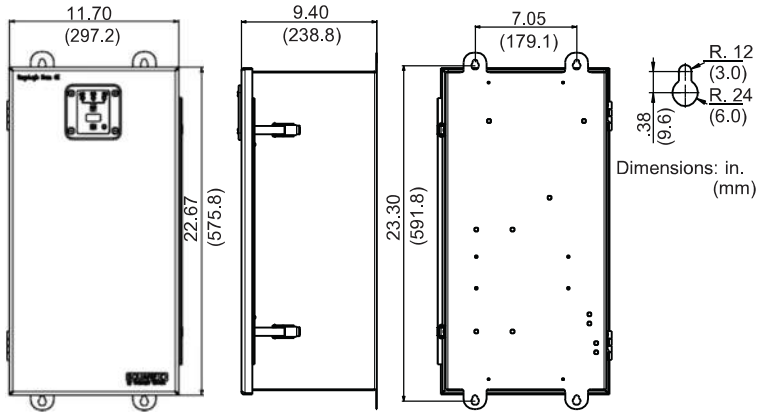
Figure 5: 11 x 22 in. NEMA 1 Enclosures for 320 kA and 480 kA units with or without Integral Switch/SWT option



Approximate Weight	37 lbs (16.8 kg)

For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.

Figure 6: 11 x 23 in. NEMA 4X Enclosures with or without Integral Switch/SWT option



Approximate Weight	45 lbs (20.4 kg)

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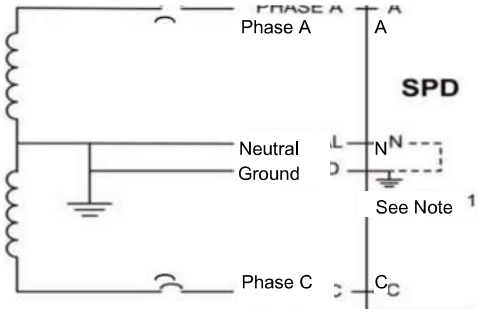
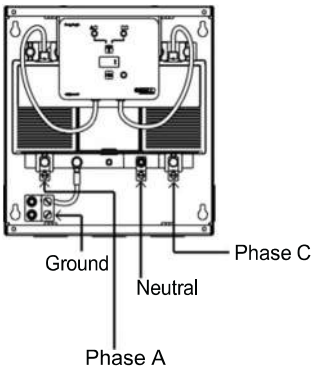
Wiring Diagrams Without Integral Switch

Figure 7: Single-Phase, Three-Wire Grounded Installation

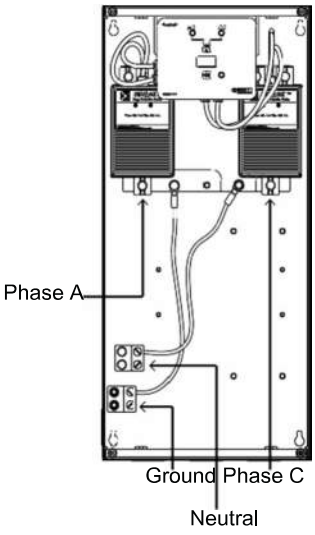
Note: The neutral conductor is not present on two-wire grounded power systems. For these systems, bond the neutral and ground lugs together inside the SPD using 10 AWG wire.



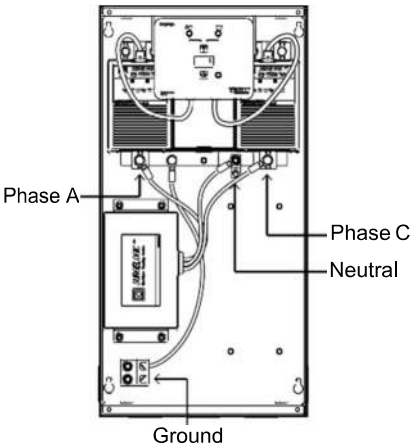
Customer Connections 120—240 kA



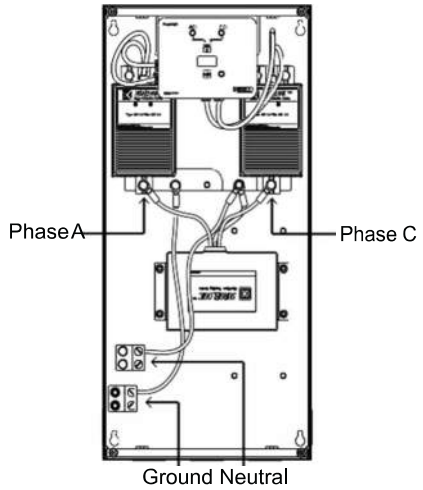
Customer Connections 320—480 kA



Customer Connections 120—240 kA with SWT



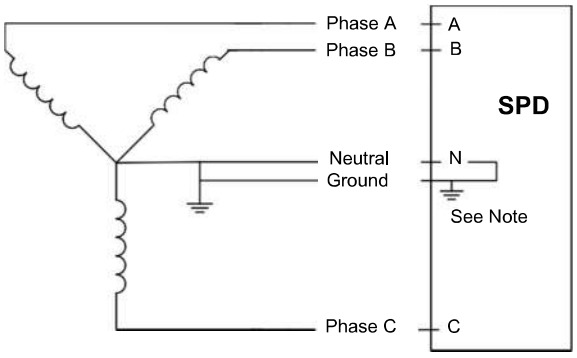
Customer Connections 320—480 kA with SWT



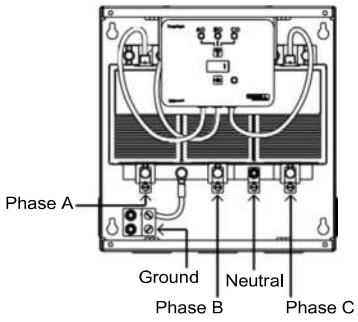
For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.

Figure 8: Three-Phase, Three- or Four-Wire, Grounded Wye Installation

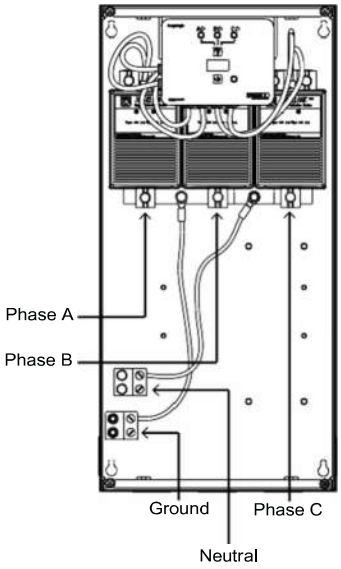
Note: The neutral conductor is not present on three-wire grounded power systems. For these systems, bond the neutral and ground lugs together inside the SPD using 10 AWG wire. Do not use optional Sine Wave Tracking (SWT) module with systems where neutral is not present.



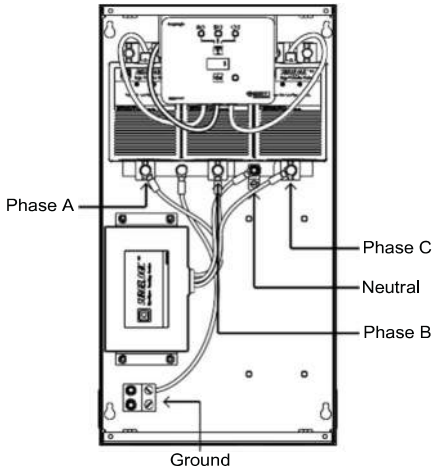
Customer Connections 120—240 kA



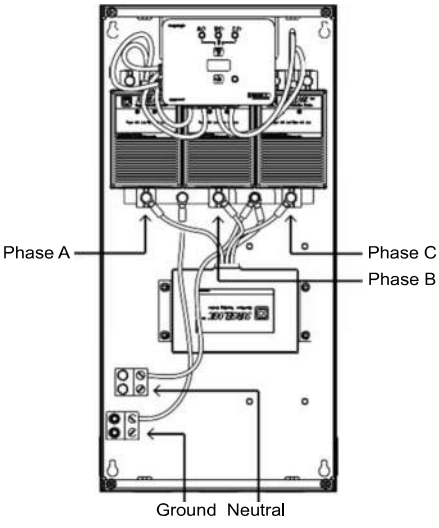
Customer Connections 320—480 kA



Customer Connections 120—240 kA with SWT



Customer Connections 320—480 kA with SWT



For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.

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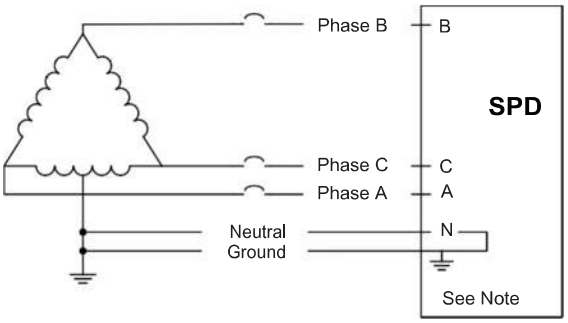
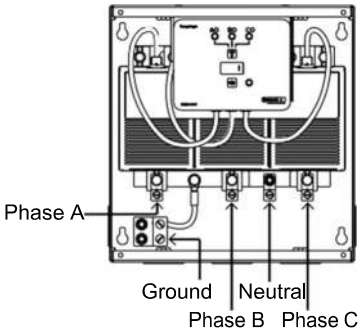
Figure 9: Three-Phase, Three- or Four-Wire, High-Leg Delta Installation

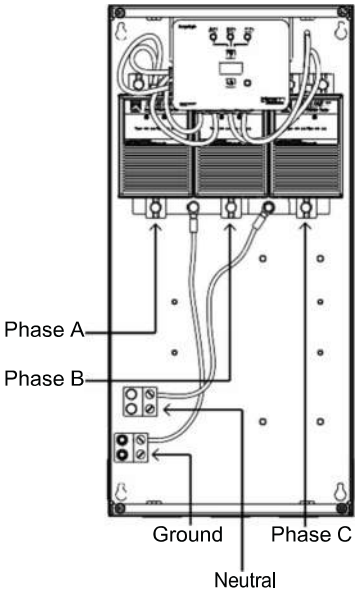
Note: The high-leg of the power system must connect to phase B of the SPD. The neutral conductor is not present on three-wire grounded power systems. For these systems, bond the neutral and ground lugs together inside the SPD using 10 AWG wire. Do not use optional Sine Wave Tracking (SWT) module with systems where neutral is not present.



Customer Connections 120—240 kA



Customer Connections 320—480 kA



For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.

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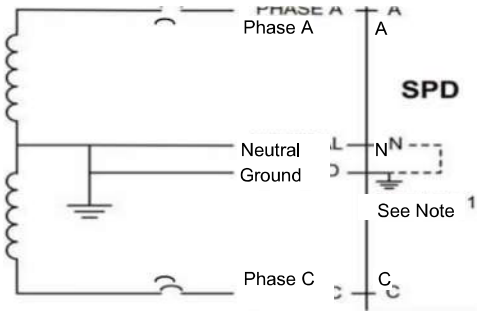
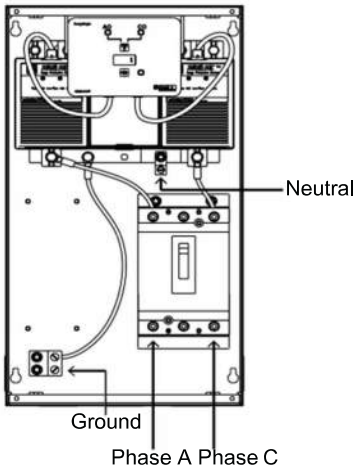
Wiring Diagrams With Integral Switch

Figure 10: Single-Phase, Three-Wire, Grounded Installation Integral Switch

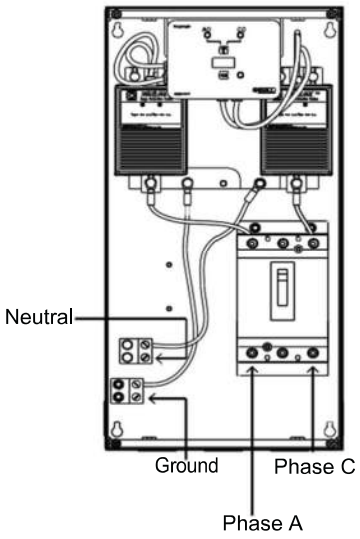
Note: The neutral conductor is not present on two-wire grounded power systems. For these systems, bond the neutral and ground lugs together inside the SPD using 10 AWG wire. Do not use optional Sine Wave Tracking (SWT) module with systems where neutral is not present.



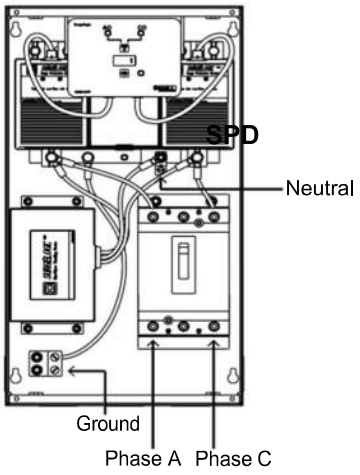
Customer Connections 120—240 kA



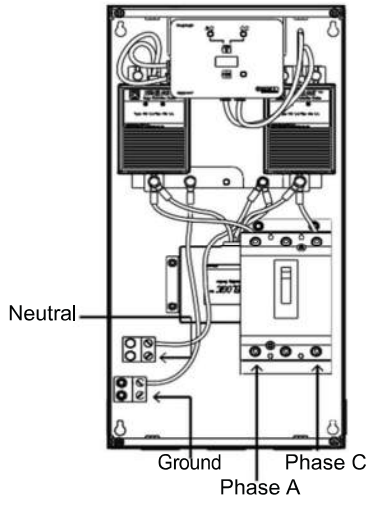
Customer Connections 320—480 kA



Customer Connections 120—240 kA with SWT



Customer Connections 320—480 kA with SWT



For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.

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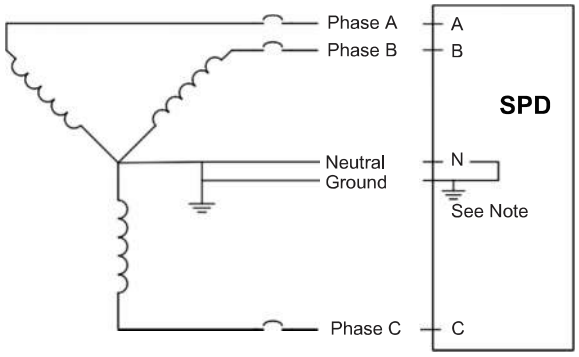
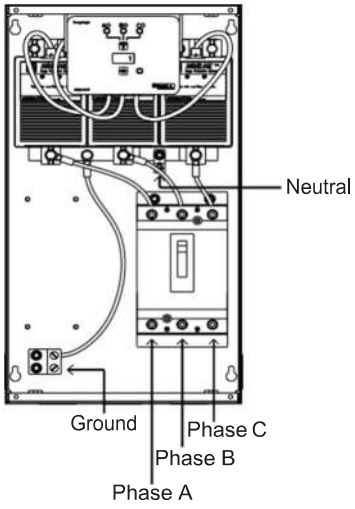
Figure 11: Three-Phase, Three- or Four-Wire, Grounded Wye Installation with Integral Switch

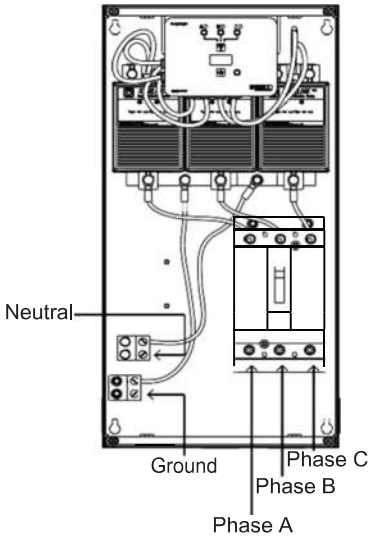
Note: The neutral conductor is not present on three-wire grounded power systems. For these systems, bond the neutral and ground lugs together inside the SPD using 10 AWG wire. Do not use optional Sine Wave Tracking (SWT) module with systems where neutral is not present.



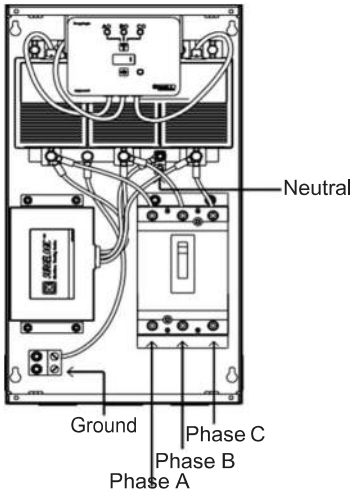
Customer Connections 120—240 kA



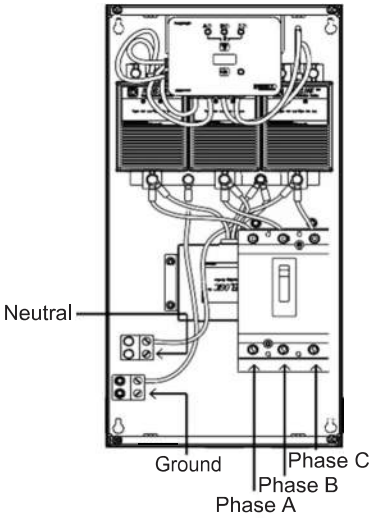
Customer Connections 120—240 kA



Customer Connections 120—240 kA with SWT



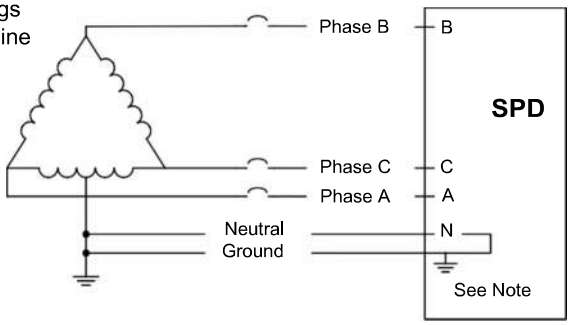
Customer Connections 320—480 kA with SWT



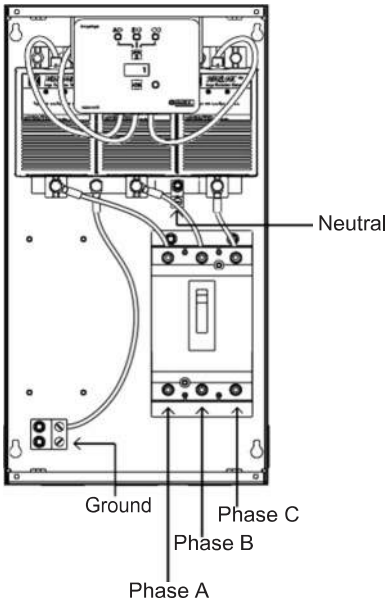
For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.

Figure 12: Three-Phase, Three- or Four-Wire, High-Leg Delta Installation with Integral Switch

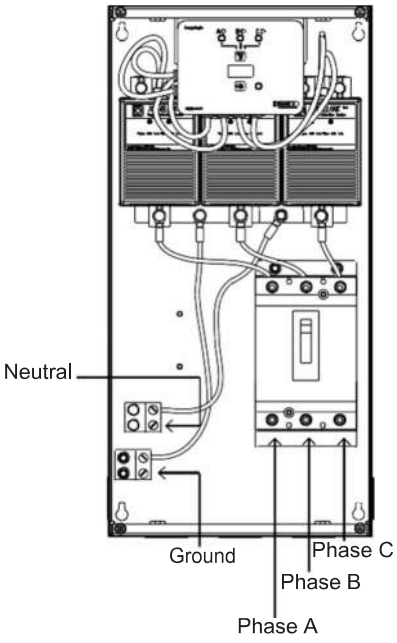
Note: The high-leg of the power system must connect to phase B of the SPD. The neutral conductor is not present on three-wire grounded power systems. For these systems, bond the neutral and ground lugs together inside the SPD using #10 AWG wire. Do not use optional Sine Wave Tracking (SWT) module with systems where neutral is not present.



Customer Connections 120—240 kA



Customer Connections 320—480 kA



For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.

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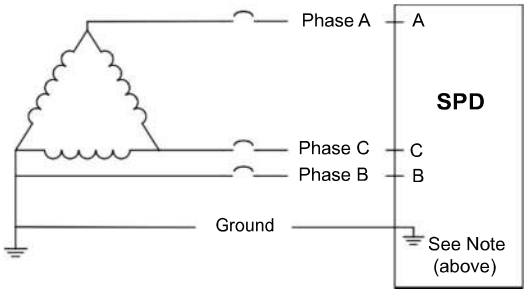
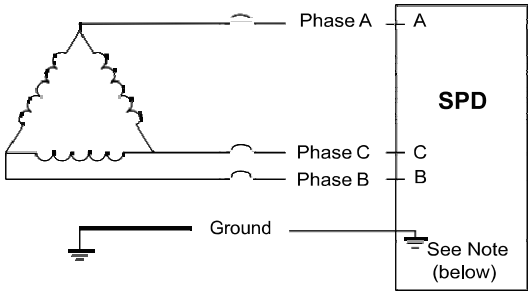
Figure 12: Three-Phase, Three-Wire + Ground, Delta Installation

Note: The ground connection of the Delta SPD shall be connected to the system ground conductor. The neutral conductor is not present on Delta systems.

Corner Grounded Delta

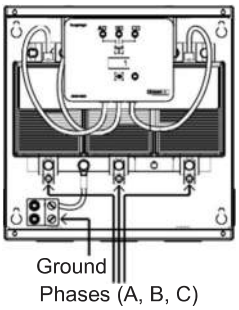


Ungrounded Delta

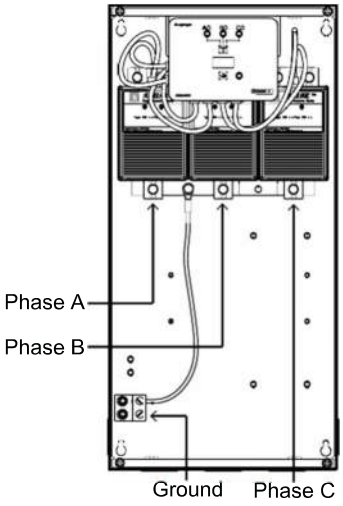


Note: Phase B of the electrical system is typically the grounded phase

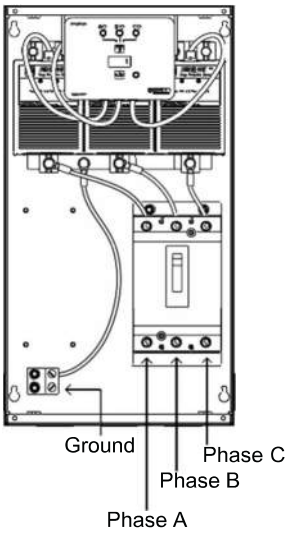
Customer Connections 100—240 kA



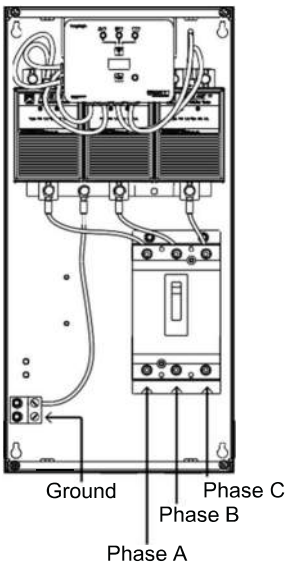
Customer Connections 320—480 kA



Customer Connections 100—240 kA with Integral Switch



Customer Connections 320—480 kA with Integral Switch



For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.

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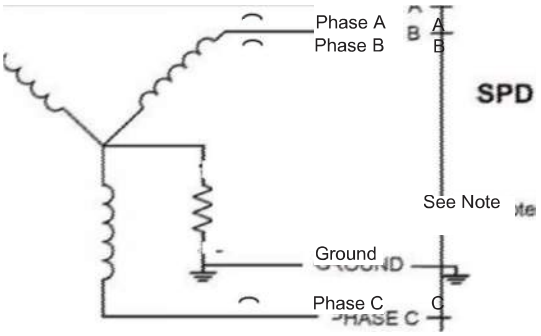
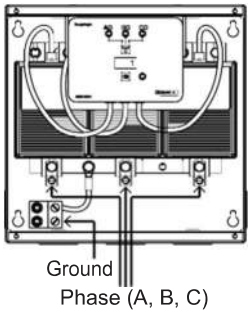
Figure 14: High Resistance Ground HRG Wye Installation

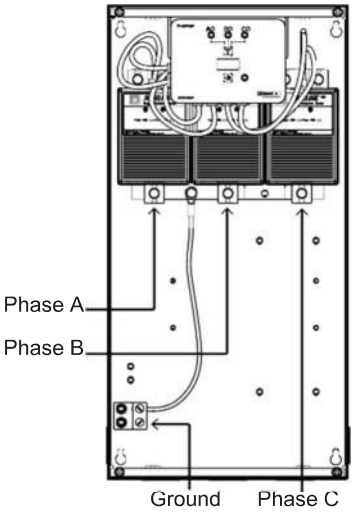
Note: The neutral conductor is not present on HRG WYE grounded power systems.



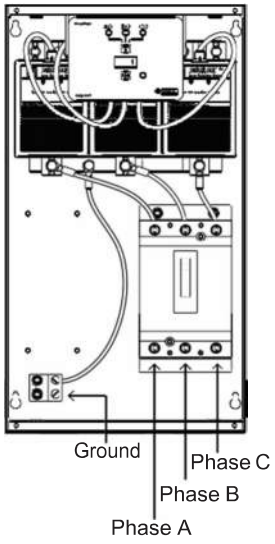
Customer Connections 100—240 kA



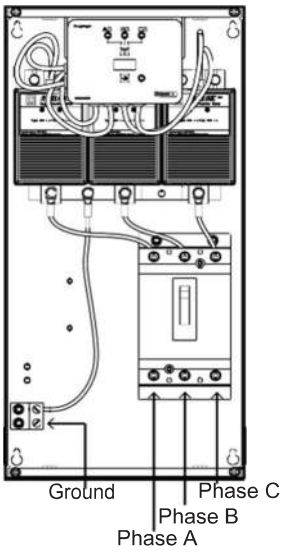
Customer Connections 320—480 kA



Customer Connections 100—240 kA with Integral Switch



Customer Connections 320—480 kA with Integral Switch



For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.

ENGLISH

Operation

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462 or NOM-029-STPS.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

Failure to follow these instructions will result in death or serious injury.

LED Status Indicators

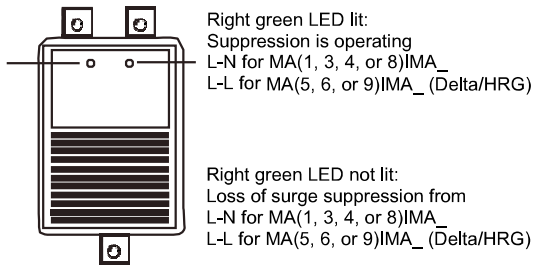
The SPD diagnostic display panel shows the status of each MA module with diagnostically controlled green/red LEDs (see Figure 16). If a unit is operating correctly, all of the phase LEDs will be illuminated green. To test the integrity of the diagnostics for each phase, push the button below the phase LEDs on the diagnostic display panel. The green LED will turn red and the alarm will sound, if the alarm is enabled. Releasing the test button will complete the test; the red LED will turn green and the alarm will shut off.

If an inoperable condition occurs on any phase, the audible alarm sounds and the corresponding phase LED on the diagnostic display panel is illuminated red. This indicates that the device needs service by qualified electrical personnel. The audible alarm can be silenced, until a qualified person is able to evaluate and service the SPD, by pressing the alarm enable/disable button. The alarm will silence and the green alarm LED will not be lit. The red phase LED will continue to be illuminated until the inoperative condition had been cleared.

On an MA module (see Figure 15), if either LED is not lit, the module should be replaced. If both green LEDs are not lit and the diagnostic display panel has power, then power has been lost to that phase or the module should be replaced (refer to Table 1 on page 6). Refer to the final equipment instruction bulletin for MA module disconnection and access instructions.

When power is applied to the SPD and one or more of the diagnostic display panel LEDs are red, and one or more MA module LEDs are out, the appropriate MA module should be replaced. Refer to “Maintenance and Troubleshooting” on page 27 for proper troubleshooting procedures and Table 4 for replacement modules.

Figure 15: MA Module LEDs



For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.

Replacement Modules

Table 4: EMA Replacement Modules

Part Number	Description	Voltage	Peak Surge Current Rating	Catalog Numbers		
				Phase A	Phase B	Phase C
SSP01EMA12_	SPD T1 EMA 120KA 120/240V 1P3W	120/240 V	120 kA	MA1IMA121	N/A	MA1IMA121
SSP01EMA16_	SPD T1 EMA 160KA 120/240V 1P3W	120/240 V	160 kA	MA1IMA161	N/A	MA1IMA161
SSP01EMA24_	SPD T1 EMA 240KA 120/240V 1P3W	120/240 V	240 kA	MA1IMA241	N/A	MA1IMA241
SSP01EMA32_[1]	SPD T1 EMA 320KA 120/240V 1P3W	120/240 V	320 kA	MA1IMA161	N/A	MA1IMA161
SSP01EMA48_[1]	SPD T1 EMA 480KA 120/240V 1P3W	120/240 V	480 kA	MA1IMA241	N/A	MA1IMA241
SSP02EMA12_	SPD T1 EMA 120KA 208Y/120V 3P4W	208Y/120 V	120 kA	MA1IMA121	MA1IMA121	MA1IMA121
SSP02EMA16_	SPD T1 EMA 160KA 208Y/120V 3P4W	208Y/120 V	160 kA	MA1IMA161	MA1IMA161	MA1IMA161
SSP02EMA24_	SPD T1 EMA 240KA 208Y/120V 3P4W	208Y/120 V	240 kA	MA1IMA241	MA1IMA241	MA1IMA241
SSP02EMA32_[1]	SPD T1 EMA 320KA 208Y/120V 3P4W	208Y/120 V	320 kA	MA1IMA161	MA1IMA161	MA1IMA161
SSP02EMA48_[1]	SPD T1 EMA 480KA 208Y/120V 3P4W	240Y/120 V	480 kA	MA1IMA241	MA1IMA241	MA1IMA241
SSP03EMA12_	SPD T1 EMA 120KA 240/120V HLD 3P4W	120/240 V High-Leg Delta	120 kA	MA1IMA121	MA3IMA121	MA1IMA121
SSP03EMA16_	SPD T1 EMA 160KA 240/120V HLD 3P4W	120/240 V High-Leg Delta	160 kA	MA1IMA161	MA3IMA161	MA1IMA161
SSP03EMA24_	SPD T1 EMA 240KA 240/120V HLD 3P4W	120/240 V High-Leg Delta	240 kA	MA1IMA241	MA3IMA241	MA1IMA241
SSP03EMA32_[1]	SPD T1 EMA 320KA 240/120V HLD 3P4W	120/240 V High-Leg Delta	320 kA	MA1IMA161	MA3IMA161	MA1IMA161
SSP03EMA48_[1]	SPD T1 EMA 480KA 240/120V HLD 3P4W	120/240 V High-Leg Delta	480 kA	MA1IMA241	MA3IMA241	MA1IMA241
SSP04EMA12_	SPD T1 EMA 120KA 480Y/277V 3P4W	480Y/277 V	120 kA	MA4IMA121	MA4IMA121	MA4IMA121
SSP04EMA16_	SPD T1 EMA 160KA 480Y/277V 3P4W	480Y/277 V	160 kA	MA4IMA161	MA4IMA161	MA4IMA161
SSP04EMA24_	SPD T1 EMA 240KA 480Y/277V 3P4W	480Y/277 V	240 kA	MA4IMA241	MA4IMA241	MA4IMA241
SSP04EMA32_[1]	SPD T1 EMA 320KA 480Y/277V 3P4W	480Y/277 V	320 kA	MA4IMA161	MA4IMA161	MA4IMA161
SSP04EMA48_[1]	SPD T1 EMA 480KA 480Y/277V 3P4W	480Y/277 V	480 kA	MA4IMA241	MA4IMA241	MA4IMA241
SSP05EMA10_	SPD T1 EMA 100KA 480 DELTA 3P3W	480V Delta/HRG	100 kA	MA5IMA101	MA5IMA101	MA5IMA101
SSP05EMA12_	SPD T1 EMA 120KA 480 DELTA 3P3W	480V Delta/HRG	120 kA	MA5IMA121	MA5IMA121	MA5IMA121
SSP05EMA16_	SPD T1 EMA 160KA 480 DELTA 3P3W	480V Delta/HRG	160 kA	MA5IMA161	MA5IMA161	MA5IMA161
SSP05EMA20_	SPD T1 EMA 200KA 480 DELTA 3P3W	480V Delta/HRG	200 kA	MA5IMA201	MA5IMA201	MA5IMA201
SSP05EMA24_	SPD T1 EMA 240KA 480 DELTA 3P3W	480V Delta/HRG	240 kA	MA5IMA241	MA5IMA241	MA5IMA241

[1] These products include two levels of SPD modules. SSP01EMA will have a total of four modules. All other configurations will have a total of six modules.

—Continued on next page

ENGLISH

Table 4: EMA Replacement Modules

Part Number	Description	Voltage	Peak Surge Current Rating	Catalog Numbers		
				Phase A	Phase B	Phase C
SSP05EMA32_[1]	SPD T1 EMA 320KA 480 DELTA 3P3W	480V Delta/HRG	320 kA	MA5IMA161	MA5IMA161	MA5IMA161
SSP05EMA48_[1]	SPD T1 EMA 480 DELTA 3P3W	480V Delta/HRG	480 kA	MA5IMA241	MA5IMA241	MA5IMA241
SSP06EMA10_	SPD T1 EMA 100kA 240 DELTA 3P3W	240V Delta	100 kA	MA6IMA101	MA6IMA101	MA6IMA101
SSP06EMA12_	SPD T1 EMA 120KA 240 DELTA 3P3W	240V Delta	120 kA	MA6IMA121	MA6IMA121	MA6IMA121
SSP06EMA16_	SPD T1 EMA 160KA 240 DELTA 3P3W	240V Delta	160 kA	MA6IMA161	MA6IMA161	MA6IMA161
SSP06EMA20_	SPD T1 EMA 200KA 240 DELTA 3P3W	240V Delta	200 kA	MA6IMA201	MA6IMA201	MA6IMA201
SSP06EMA24_	SPD T1 EMA 240KA 240 DELTA 3P3W	240V Delta	240 kA	MA6IMA241	MA6IMA241	MA6IMA241
SSP06EMA32_[1]	SPD T1 EMA 320KA 240 DELTA 3P3W	240V Delta	320 kA	MA6IMA161	MA6IMA161	MA6IMA161
SSP06EMA48_[1]	SPD T1 EMA 480KA 240 DELTA 3P3W	240V Delta	480 kA	MA6IMA241	MA6IMA241	MA6IMA241
SSP08EMA12_	SPD T1 EMA 120KA 600Y/347V 3P4W	600Y/347 V	120 kA	MA8IMA121	MA8IMA121	MA8IMA121
SSP08EMA16_	SPD T1 EMA 160KA 600Y/347V 3P4W	600Y/347 V	160 kA	MA8IMA161	MA8IMA161	MA8IMA161
SSP08EMA24_	SPD T1 EMA 240KA 600Y/347V 3P4W	600Y/347 V	240 kA	MA8IMA241	MA8IMA241	MA8IMA241
SSP08EMA32_	SPD T1 EMA 320KA 600Y/347V 3P4W	600Y/347 V	320 kA	MA8IMA161	MA8IMA161	MA8IMA161
SSP08EMA48_[1]	SPD T1 EMA 480KA 600Y/347V 3P4W	600Y/347 V	480 kA	MA8IMA241	MA8IMA241	MA8IMA241
SSP09EMA10_	SPD T1 EMA 100KA 600 DELTA 3P3W	600V Delta/HRG	100 kA	MA9IMA101	MA9IMA101	MA9IMA101
SSP09EMA12_	SPD T1 EMA 120KA 600 DELTA 3P3W	600V Delta/HRG	120 kA	MA9IMA121	MA9IMA121	MA9IMA121
SSP09EMA16_	SPD T1 EMA 160KA 600 DELTA 3P3W	600V Delta/HRG	160 kA	MA9IMA161	MA9IMA161	MA9IMA161
SSP09EMA18_	SPD T1 EMA 180KA 600 DELTA 3P3W	600V Delta/HRG	180 kA	MA9IMA181	MA9IMA181	MA9IMA181
SSP09EMA20_[1]	SPD T1 EMA 200KA 600 DELTA 3P3W	600V Delta/HRG	200 kA	MA9IMA101	MA9IMA101	MA9IMA101
SSP09EMA24_[1]	SPD T1 EMA 240KA 600 DELTA 3P3W	600V Delta/HRG	240 kA	MA9IMA121	MA9IMA121	MA9IMA121
SSP09EMA32_[1]	SPD T1 EMA 320KA 600 DELTA 3P3W	600V Delta/HRG	320 kA	MA9IMA161	MA9IMA161	MA9IMA161

[1] These products include two levels of SPD modules. SSP01EMA will have a total of four modules. All other configurations will have a total of six modules.

For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.

Audible Alarm

Push the alarm enable/disable button to enable or disable the alarm (see Figure 16). If the green alarm LED is lit the alarm is enabled. If the green alarm LED is not lit the alarm is disabled.

Surge Counter

The surge counter displays the number of transient voltage surges since the counter was last reset. The counter is battery powered to retain memory in the event of a power loss to the SSP module. To reset the surge counter, remove all power and press the small switch located inside the unit on the underside of the diagnostic circuit board near the RJ45 connectors (also refer to Figure 17). This will reset the counter to zero.

Dry Contacts

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Use 600 Vac rated dry contact wiring.
- Dry contact wiring must have less than 1/16 in. (1.6 mm) exposed wire from the dry contact block.
- Do not supply more than 24 V dc / 24 V ac and no more than a current of 2 A.

Failure to follow these instructions will result in death or serious injury.

NOTICE

FALSE INDICATION OF SURGE PROTECTION STATUS

Maintain at least 1.0 in. (25 mm) separation between dry contact wiring and the power wiring in the enclosure.

Failure to follow these instructions can result in equipment damage.

The EMA series SPD is provided with dry contacts. The connection for the dry contacts is located on the back of the diagnostic display panel (lower right corner, refer to Figure 17). and will accept # 22–14 AWG stranded or solid wire. The dry contacts are three-position, Form “C” type with Normally Open, Normally Closed, and Common connections.

In the unpowered state the contact is closed between terminals NC and COM. This is also the alarm condition. The opposite state, closed between terminals NO and COM, indicates that power is on to the unit and that no alarm condition exists (See Table 5).

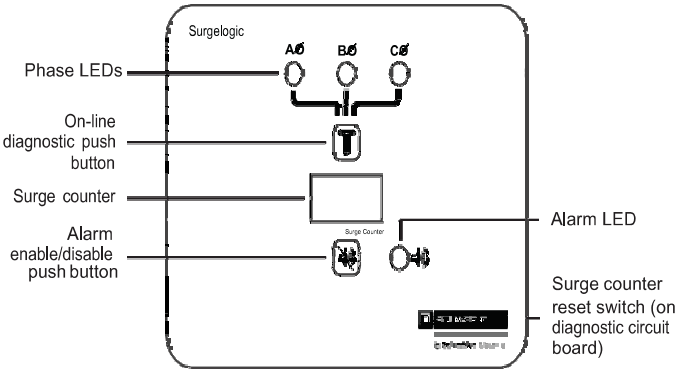
These contacts can be used for remote indication of the SPD’s operating status to a computer interface board or emergency management system. Also, these contacts are designed to work with the SPD remote monitor option described in the next section.

Table 5: Dry Contact Configuration

Alarm Contact Terminals	Contact State with Power Applied
NO to COM	Closed
NC to COM	Open

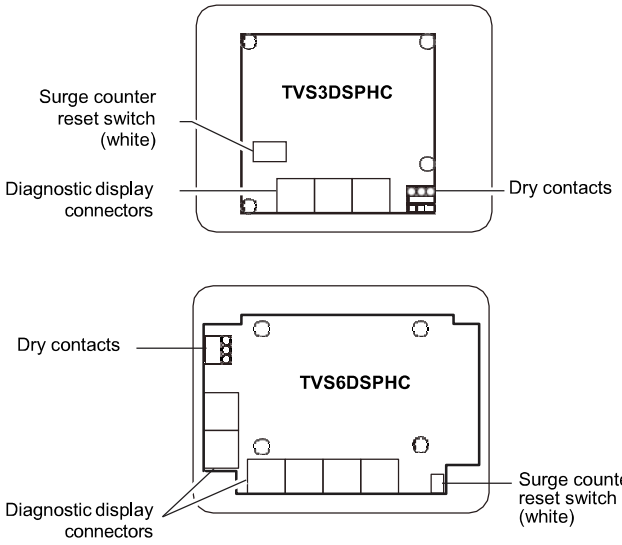
ENGLISH

Figure 16: Three-Phase Diagnostic Display Panel with Surge Counter



Note: Phase B is not present on single phase applications.

Figure 17: Rear of Diagnostic Circuit Board



Care must be taken when installing the dry contact wiring because the terminals are on a moving door. Avoid the door hinge, any switches, and the high voltage areas of the enclosure when routing the wiring. To avoid the door hinge, tie wrap any dry contact wiring to the existing cable harness which crosses the hinge.

Higher energy applications may require additional relay implementation outside the SPD. Damage to the SPD relay caused by use with energy levels in excess of those discussed in this instruction bulletin are not covered by warranty. For application questions, contact the Surgelogic Technical Assistance Group at 1-800-577-7353.

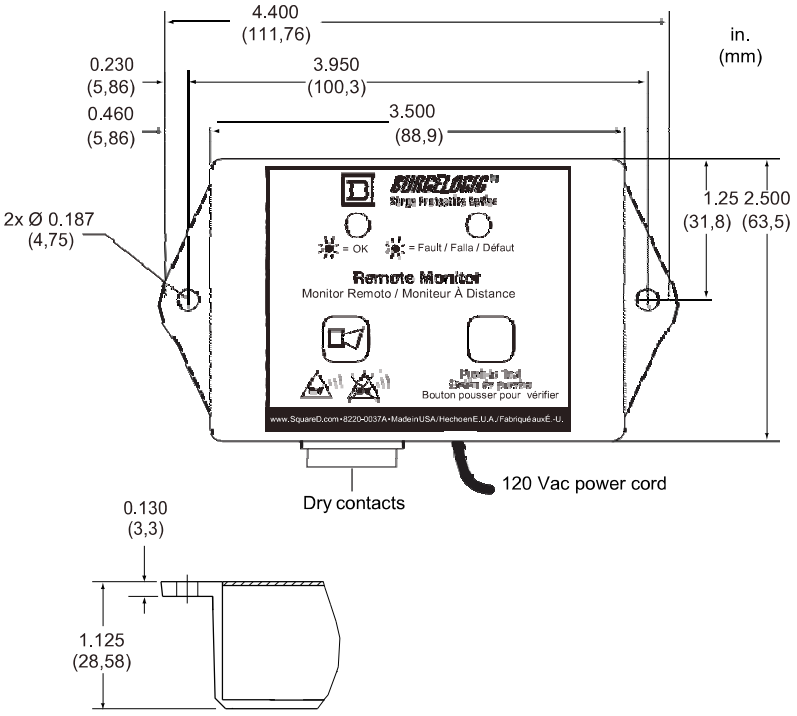
Remote Monitor Option

The remote monitor option has two LEDs, one red and one green, and an audible alarm with an enable/disable switch. Normal status is a lit green LED, and no audible alarm. To test the integrity of the remote monitor, press the push-to-test switch. If the alarm is enabled, the green LED will turn off, the red LED will turn on, and the alarm will sound. Releasing the switch will complete the test; the red LED will turn off, the green LED will turn on and the alarm will shut off.

If suppression on any phase is lost, the green LED will turn off, the red LED will turn on and an alarm will sound. The audible alarm can be silenced by pushing the alarm enable/disable button. The alarm will silence and the green alarm LED will not be lit. The red LED will continue to be illuminated until the inoperative condition has been cleared.

The remote monitor includes a 120 Vac to 12 Vdc adapter with a six-foot power cord. Connections are made to the SPD diagnostic panel with Form “C”, 3-position dry contacts (provided) and the appropriate length of solid or stranded # 22–14 AWG wire up to 1000 ft. (305 m), not provided.

Figure 18: Remote Monitor Option (TVS12RMU)



ENGLISH

Maintenance and Troubleshooting

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462 or NOM-029-STPS.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

Failure to follow these instructions will result in death or serious injury.

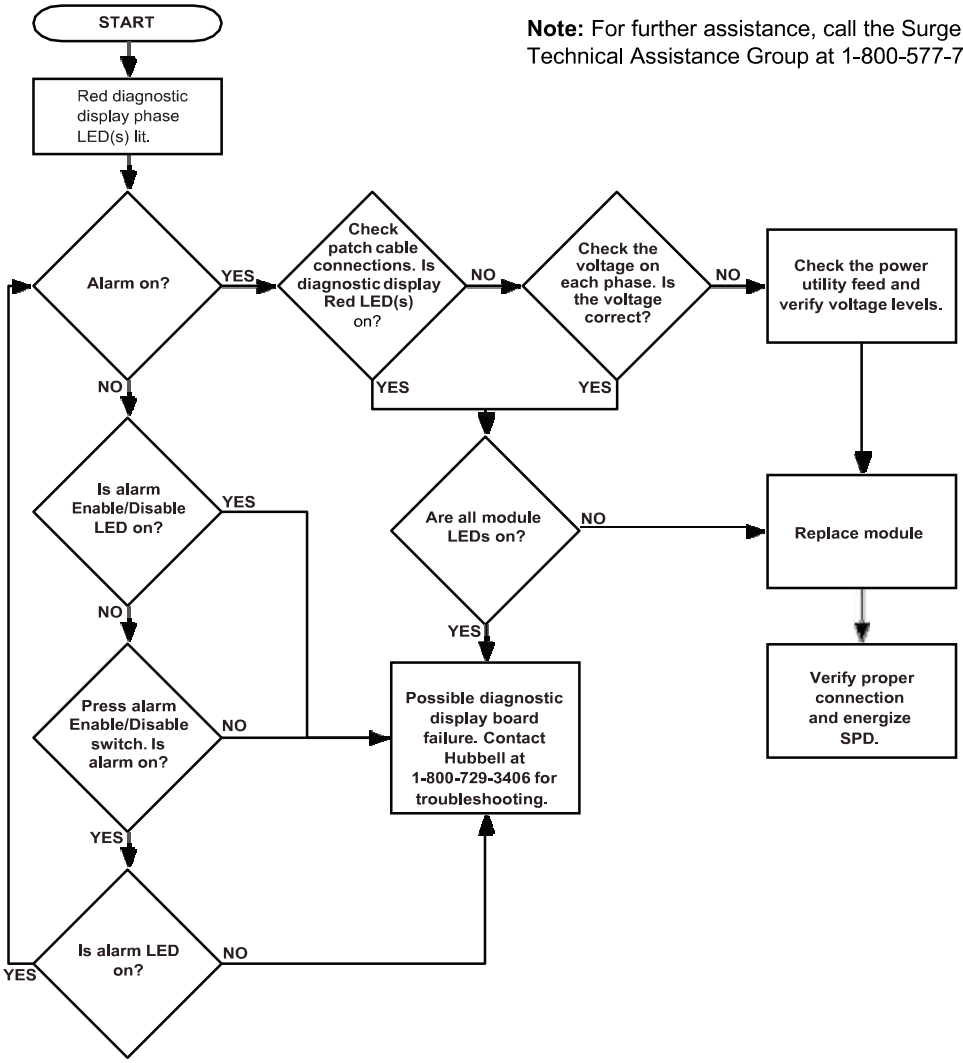
Preventative Maintenance

Inspect the SPD periodically to maintain reliable system performance and continued transient voltage surge suppression. Periodically check the state of the diagnostic display panel LED status indicators. Routinely use the built-in diagnostics to inspect for inoperative modules.

Troubleshooting

If a module shows two green indicator lights and the display panel shows a red phase indicator light, follow the Troubleshooting Flow Chart in Figure 19 below.

Figure 19: Troubleshooting Flow Chart



Note: For further assistance, call the Surgelogic Technical Assistance Group at 1-800-577-7353.

Replacement Parts

The following replacement parts are available. For ordering information please contact your local distributor or refer to the product catalog.

- MA modules. Replacement instructions are included with the replacement parts.
- Diagnostic display panel assemblies. Replacement instructions are included with the replacement parts.

Schneider Electric USA, Inc.
800 Federal Street
Andover, MA 01810 USA
888-778-2733
www.se.us

8222-0014 Rev. 04, 04/2020
Replaces 8222-0014, Rev. 03, 11/2016

VOLTAGE COMBINATION MOTOR CONTROLLER

SQUARE D
by Schneider Electric

Job Name:
Job Location:

Square D Quotation #: 44596636
Quotation Revision #:
Sales Contact:
Sales Contact Location:

Purchaser:
Purchaser PO #:

Customer:
Customer PO #:

User:
User Location:

Architect:
Cons. Engineer:

Drawing Status: RECORD

TABLE OF CONTENTS

SQUARE D FACTORY ORDER NUMBER: 44596636–006

These products are manufactured in a facility which is quality systems registered to ISO 9000

June 01, 2022
Page 1 of 1
Rev: –

REV	DESCRIPTION	BY	DATE
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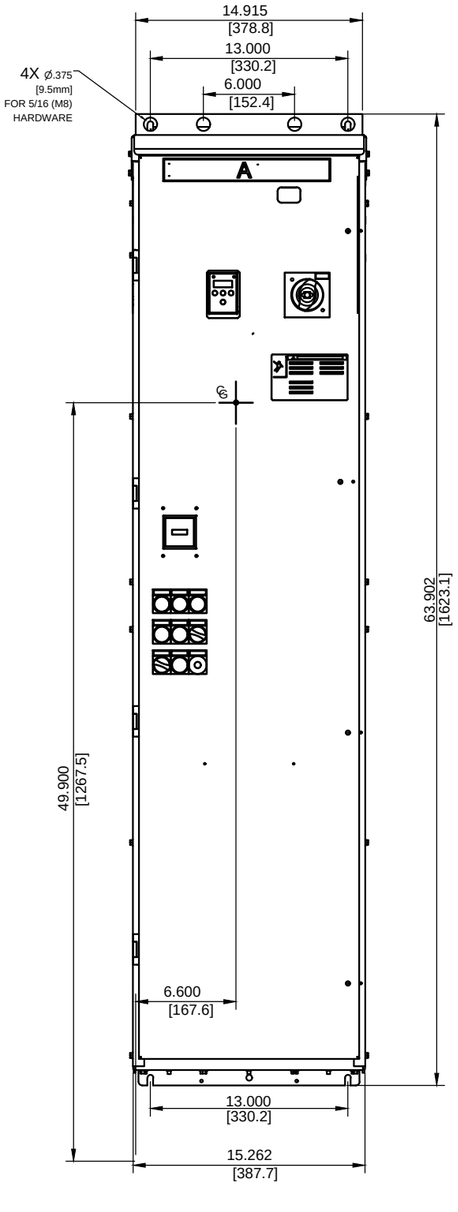
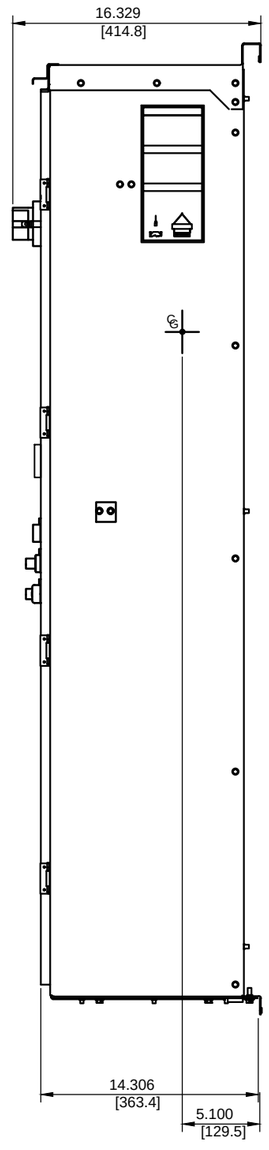
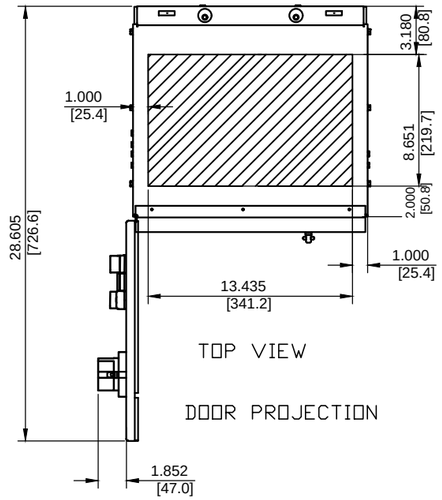
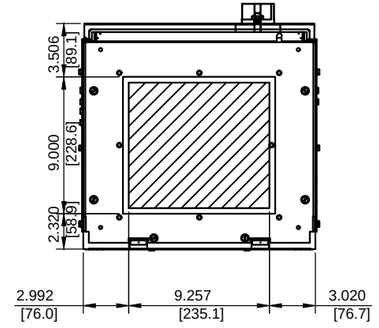






TOP VIEW

DOOR PROJECTION



BOTTOM VIEW

NOTES:

1. REFER TO CONTROLLER NAMEPLATE TO COMPLETE P/N.
2. 1.86"[47.2mm] MAXIMUM PROJECTION OF DOOR-MOUNTED DEVICES.
3. USE FOR ESTIMATING COOLING REQUIREMENTS ONLY. LOSSES SHOWN FOR CONTINUOUS OPERATION IN SHORTING MODE.
4. A MINIMUM OF 12 INCHES (304.8 MM) CLEARANCE IS REQUIRED ABOVE THE ENCLOSURE TO MAINTAIN PROPER COOLING. DURING OPERATION THE TEMPERATURE OF THE AIR SURROUNDING THE ENCLOSURE SHOULD BE MAINTAINED BETWEEN 0°C AND 40°C.

ENCLOSURE OUTLINE & GENERAL ARRANGEMENT FOR CONTROLLER P/N

1 22U N A 4 Y

HORSEPOWER	ENCLOSURE TYPE	VOLTAGE	POWER CIRCUIT TYPE	APPROX. WEIGHT	DISSIPATED WATTS 3 AND RATED CURRENT	
100 HP	TYPE 12	460V	F.V. BYPASS	205 LBS. (93.2 KG)	214.6W	124A

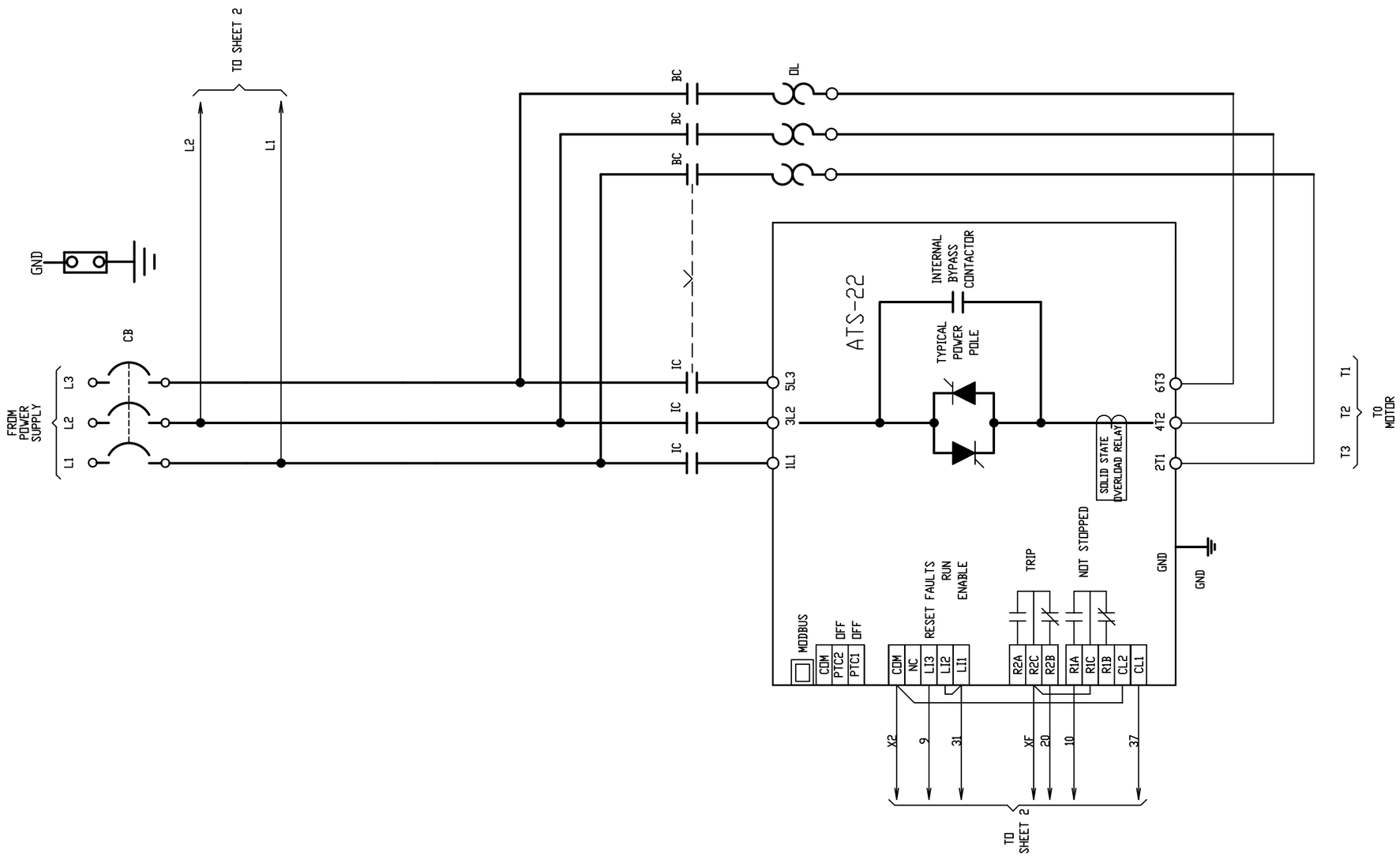
DIMENSIONS IN INCHES (mm)

JOB NAME:	EAST GROVE PUMP STATION	EQUIPMENT DESIGNATION:	SSRVS
JOB LOCATION:	FALL RIVER, MA	EQUIPMENT TYPE:	8639-22UNA4Y
DRAWN BY:	JOSE ANGEL HINOJOSA	DRAWING TYPE:	ELEVATION
ENGR:	JAH		SQUARE D Schneider Electric
DATE:	6/1/2022		
DRAWING STATUS:	Approval	DWG# F44596636-006-01	PG 1 OF 1 REV —

REV	DESCRIPTION	BY	DATE
—	————	——	——/——

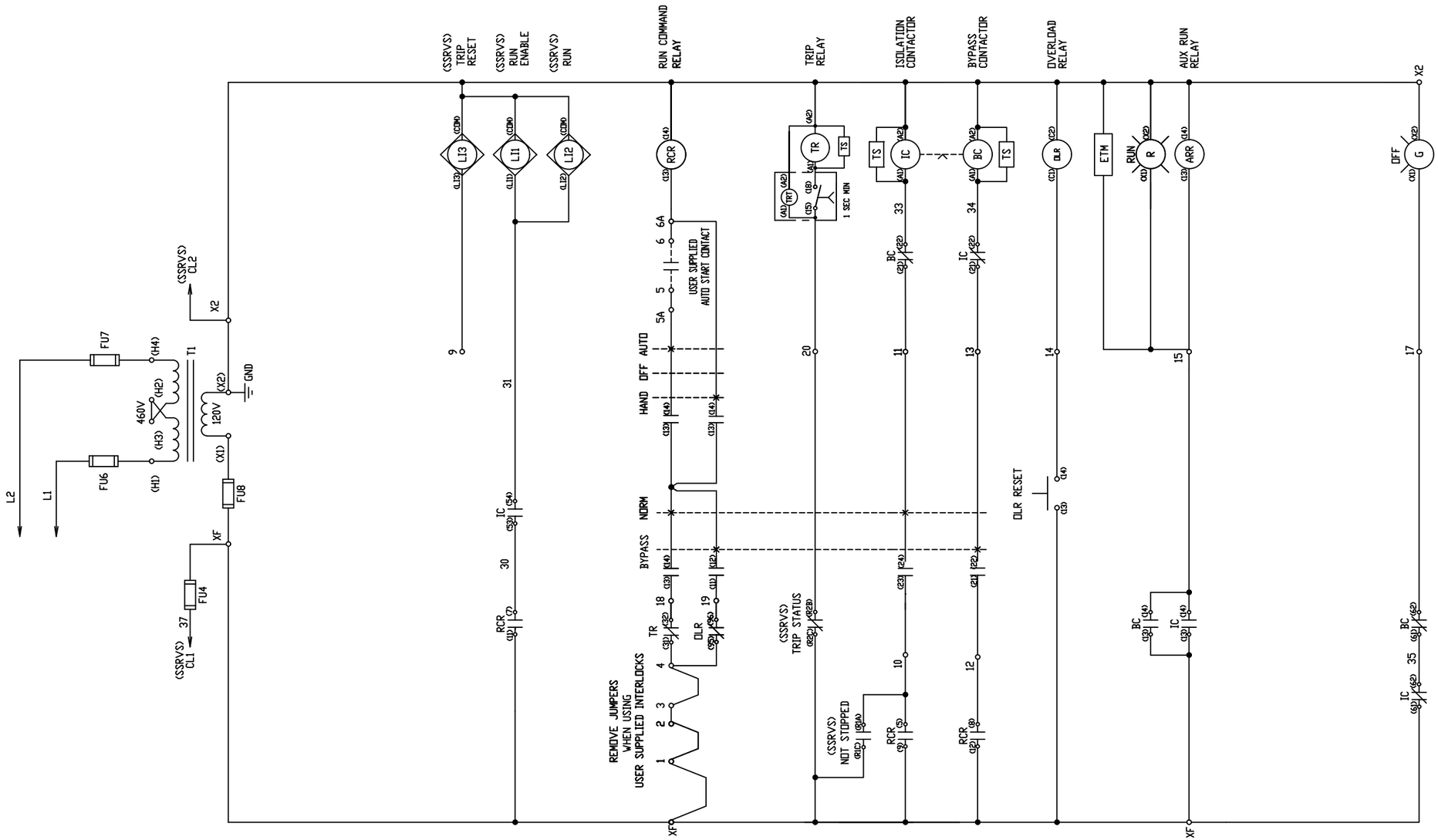
ENCLOSED FACTORY CONFIGURATION
(VARIATIONS FROM ATS-22 FACTORY DEFAULTS)

	FULL VOLTAGE BYPASS			
MENU	PARAMETER	MODBUS	DESCRIPTION	ADJ
TO PROGRAM	CDnF	Un	LINE VOLTAGE	460
	CDnF	In	MOTOR RATED CURRENT	124
	CDnF	LAC	ADVANCED MODE	(NKD)
	SEt	ILt	CURRENT LIMIT	300
	SEt	tHP	MTR THERM PROTECTION	10
	AdJ	Snb	NUMBER OF STARTS	3
	AdJ	SLG	STARTS PERIOD (MIN)	60
AFTER PROGRAMMING	ID	LI2	LOGIC INPUT	r.Unkd)
	CDnF	LAC	ADVANCED MODE	(OFF(d)



JOB NAME:	EAST GROVE PUMP STATION	EQUIPMENT DESIGNATION:	SSRVS
JOB LOCATION:	FALL RIVER, MA	EQUIPMENT TYPE:	8639–22UNA4Y
DRAWN BY:	JOSE ANGEL HINOJOSA	DRAWING TYPE:	ELEMENTARY DIAGRAM
ENGR:	JAH		SQUARE D Schneider Electric
DATE:	6/1/2022		
DRAWING STATUS:	Approval	DWG# E44596636–006–02	PG 1 OF 2 REV —

REV	DESCRIPTION	BY	DATE
—	————	——	——/——



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JOB LOCATION:	FALL RIVER, MA	EQUIPMENT TYPE:	8639-22UNA4Y
DRAWN BY:	JOSE ANGEL HINOJOSA	DRAWING TYPE:	ELEMENTARY DIAGRAM
ENGR:	JAH		SQUARE D Schneider Electric
DATE:	6/1/2022		
DRAWING STATUS:	Approval	DWG# E44596636-006-02	PG 2 OF 2 REV —

REV	DESCRIPTION	BY	DATE
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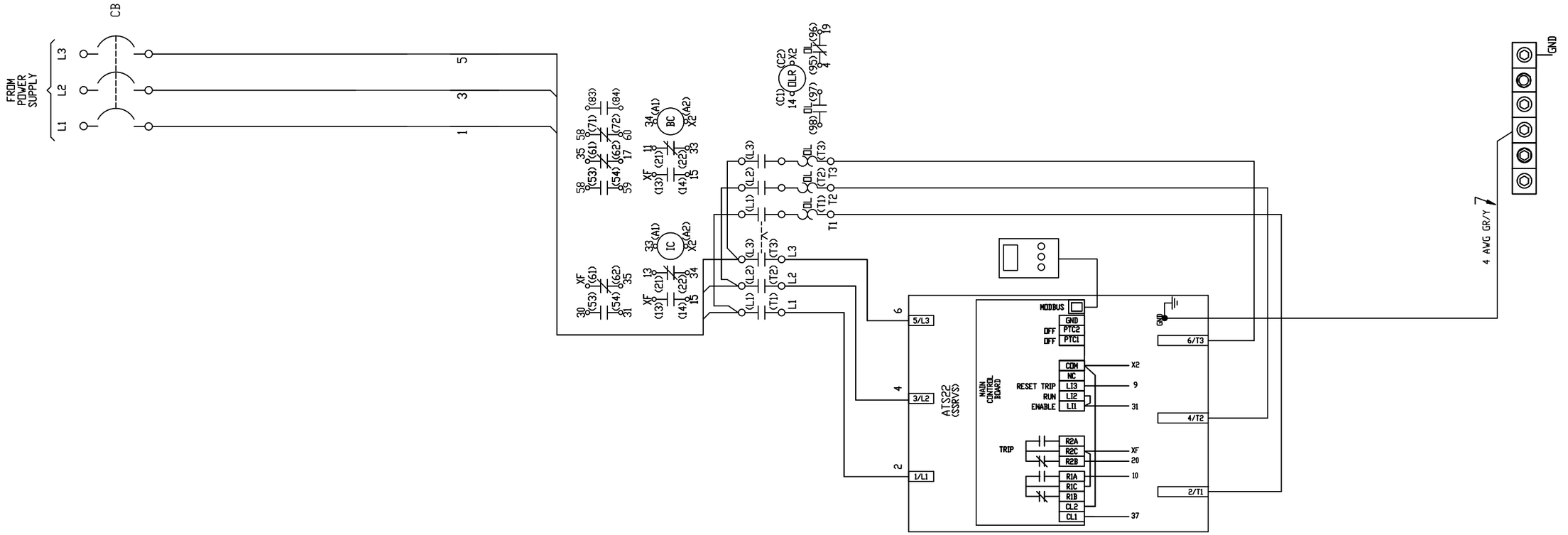
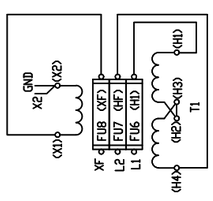
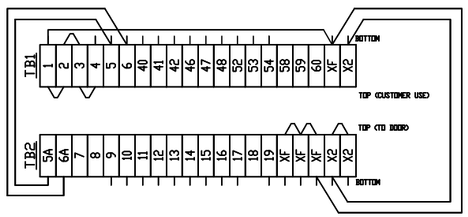
–	----	--	--/--/--
–	----	--	--/--/--
–	----	--	--/--/--

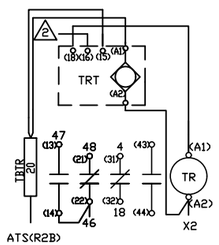
1. ALL POWER WIRE IS 1/0 AWG BLACK UNLESS NOTED OTHERWISE.
2. INSULATE WIRE 16 WITH INCLUDED ISOLATION COVER OR EQUAL.

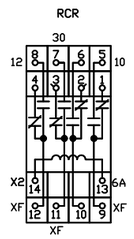


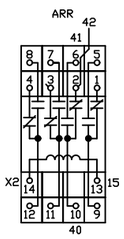
NOTE: FUSE BLOCK IS LOCATED ON TOP OF XFORMER.











JOB NAME:	EAST GROVE PUMP STATION	EQUIPMENT DESIGNATION:	SSRVS
JOB LOCATION:	FALL RIVER, MA	EQUIPMENT TYPE:	8639-22UNA4Y
DRAWN BY:	JOSE ANGEL HINOJOSA	DRAWING TYPE:	WIRING DIAGRAM
ENGR:	JAH		SQUARE D Schneider Electric
DATE:	6/1/2022		
DRAWING STATUS:	Approval	DWG# W44596636-006-03	PG 1 OF 3 REV –

REV	DESCRIPTION	BY	DATE	—	————	——	——/——	—	————	——	——/——
—	————	——	——/——	—	————	——	——/——	—	————	——	——/——

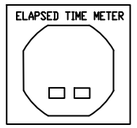
WIRE TABLE

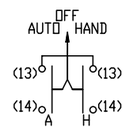
AWG/ COLOR	WIRE NO.	DESTINATION
		115V SEQUENCING
16 RED	XF	FU8(XF),TB2-XF
16 WHT	X2	RCR(9,11,12),FU4 IC(13,61),BC(13),ATSR2C TR(A2),T1(X2),TB2-X2 RCR(14), ARR(14), IC(A2)
16 WHT	X2	ATS(COM),T1(X2),DLR(C2), BC(A2)
16 WHT	X2	
16 WHT	X2	
16 RED	1	
16 RED	4	TR(31),TB1-4,DLR(95)
16 RED	5A	
16 RED	6A	RCR(13),TB2-6A
16 RED	7	
16 RED	8	
16 RED	9	ATS(L13),TB2-9
16 RED	10	RCR(5),ATS(R1A),TB2-10
16 RED	11	BC(21),TB2-11,
16 RED	12	RCR(8),TB2-12
16 RED	13	IC(21),TB2-13,
16 RED	14	DLR(C1),TB2-14
16 RED	15	IC(14),BC(14)TB2-15, ARR(13)
16 RED	16	
16 RED	17	BC(62),TB2-17
16 RED	18	TR(32),TB2-18
16 RED	19	DLR(96),TB2-19
16 RED	20	ATS(R2B),TBTR-20
16 RED	30	IC(53),RCR(7)
16 RED	31	IC(54),ATS(L11)
16 RED	33	BC(22),IC(A1)
16 RED	34	IC(22),BC(A1)
16 RED	35	IC(62),BC(61)
16 RED	37	FU4,ATS(CL1)
16 RED	40	ARR(10),TB1-40
16 RED	41	ARR(6),TB1-41
16 RED	42	ARR(2),TB1-42
16 RED	46	TR(14,22),TB1-46
16 RED	47	TR(13),TB1-47
16 RED	48	TR(21),TB1-48
16 RED	52	
16 RED	53	
16 RED	54	
16 RED	58	BC(53,71),TB1-58
16 RED	59	BC(54),TB1-59
16 RED	60	BC(72),TB1-60
		460VAC SUPPLY
10 BLK	L1	FU6(H1),CB(T1)
10 BLK	L2	FU7(HF),CB(T2)
14 GRN/YEL	GND	T1(X2),GND LUG

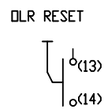
JOB NAME:	EAST GROVE PUMP STATION	EQUIPMENT DESIGNATION:	SSRVS
JOB LOCATION:	FALL RIVER, MA	EQUIPMENT TYPE:	8639-22UNA4Y
DRAWN BY:	JOSE ANGEL HINOJOSA	DRAWING TYPE:	WIRING DIAGRAM
ENGR:	JAH		SQUARE D Schneider Electric
DATE:	6/1/2022		
DRAWING STATUS:	Approval	DWG# W44596636-006-03	PG 2 OF 3 REV —

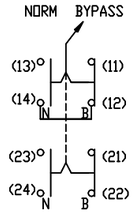
REV	DESCRIPTION	BY	DATE								
—	————	——	——/——	—	————	——	——/——	—	————	——	——/——

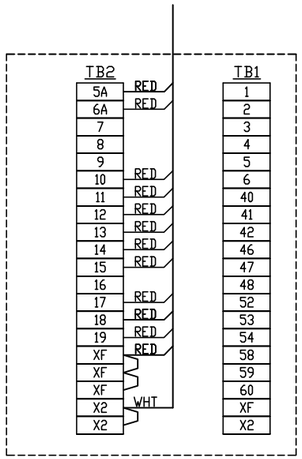
DOOR - REAR VIEW





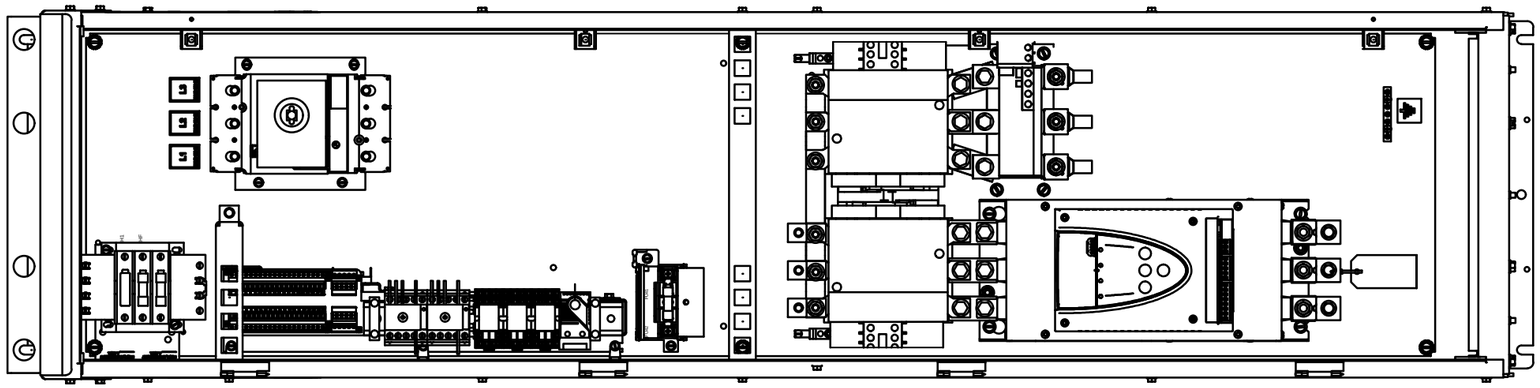


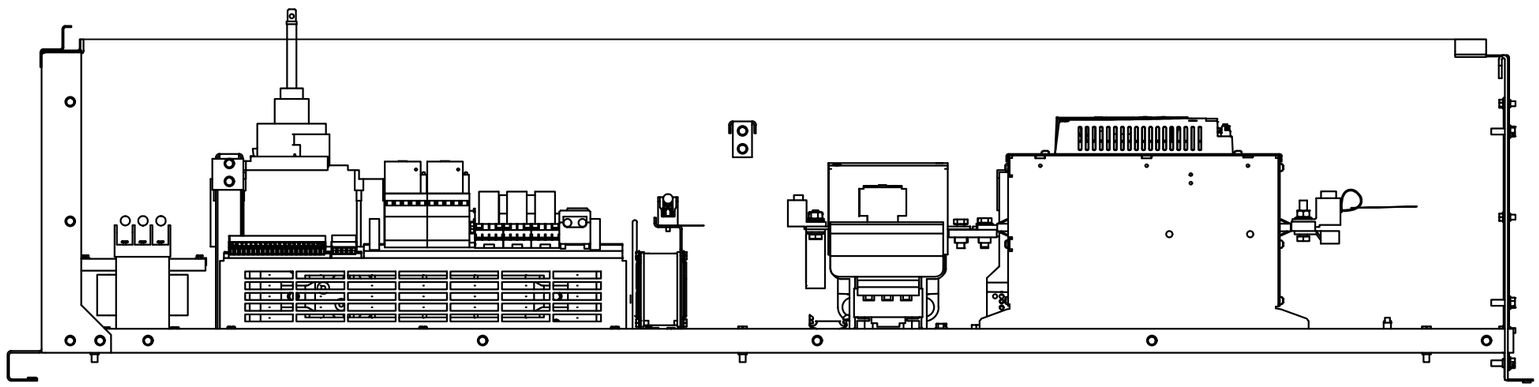




JOB NAME:	EAST GROVE PUMP STATION	EQUIPMENT DESIGNATION:	SSRVS
JOB LOCATION:	FALL RIVER, MA	EQUIPMENT TYPE:	8639—22UNA4Y
DRAWN BY:	JOSE ANGEL HINOJOSA	DRAWING TYPE:	WIRING DIAGRAM
ENGR:	JAH		SQUARE D Schneider Electric
DATE:	6/1/2022		
DRAWING STATUS:	Approval	DWG# W44596636—006—03	PG 3 OF 3 REV —

REV	DESCRIPTION	BY	DATE	–	————	——	——/——	–	————	——	——/——
–	————	——	——/——	–	————	——	——/——	–	————	——	——/——





JOB NAME:	EAST GROVE PUMP STATION	EQUIPMENT DESIGNATION:	SSRVS
JOB LOCATION:	FALL RIVER, MA	EQUIPMENT TYPE:	8639–22UNA4Y
DRAWN BY:	JOSE ANGEL HINOJOSA	DRAWING TYPE:	LAYOUT DRAWING
ENGR:	JAH		SQUARE D Schneider Electric
DATE:	6/1/2022		
DRAWING STATUS:	Approval	DWG# R44596636–006–04	PG 1 OF 1 REV –

Enclosed Altistart™ 22

Solid-State Reduced Voltage Combination Motor Controller

ENGLISH

Instruction Bulletin

30072-453-26

Rev. 03, 12/2012

Retain for future use.

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Hazard Categories and Special Symbols

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **can result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **can result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury. The safety alert symbol is not used with this signal word.

NOTE: Provides additional information to clarify or simplify a procedure.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

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Section 1—Introduction and Technical Characteristics

Product Overview

Enclosed Altistart™ 22 (ATS22) solid-state combination motor controllers are a pre-engineered, integrated solution for reduced voltage starting and soft stopping of standard three-phase asynchronous induction (squirrel cage) motors. The Enclosed 22 controllers consist of a disconnect means, optional power circuit contactors for isolation, bypass, and reversing operations, and an ATS22 soft starter in a stand-alone enclosure. Enclosed 22 controllers integrate the ATS22 soft start technology into a combination package for application requirements up to 500 hp at 575 V.

The Enclosed 22 controller provides the benefits of reduced current inrush (and resulting voltage sag) and reduced mechanical shocks that can result from starting a motor across the line. A six thyristor (SCR) solid-state power configuration provides smooth acceleration and deceleration control of three-phase squirrel cage motors. Control algorithms are integrated to help ensure smooth rotation throughout the starting ramp without mechanical instability at the end of starting. The ATS22 soft starter also features an integral shorting contactor to reduce steady state motor operational losses.

Standard Features

Features standard on the Enclosed 22 controllers are:

- Mid-range enclosed soft starter
- Low cost, space-saving design with integrated shorting contactor
- Easy start-up
- Full starter and motor protection
- Versatile power circuit configurations
- Coordinated short circuit current rating of 100 kA at 208 V, 240 V, and 480 V and 50 kA at 600 V with circuit breakers, and 100 kA at 208 V and 600 V with Class J fuses
- UL Type 1, Type 12/12K, and Type 3R enclosure ratings and UL Listed combination motor controller (UL 508)
- Service entrance option
- Automatic remote starting

About this Document

This document contains installation, start-up, and maintenance instructions for the Enclosed 22 controller. The following documentation is also available from the technical library at www.schneider-electric.us:

- *ATS22 User Manual*, BBV51330
- *ATS22 Quick Start Guide,* S1A10388 and *Annex for UL508 Markets*, S1A14738
- *ATS22 CD-ROM*, VW3A8200
- *Handling, Installation, Operation, and Maintenance of Electrical Control Equipment*, Instruction Bulletin 30072-200-50

To replace documents, contact your local Schneider Electric field office or download them from the Technical Library at www.schneider-electric.us.

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Terminology

The following terminology is used in this instruction bulletin to distinguish between the Enclosed 22 controller and the ATS22 soft starter component:

- Enclosed 22 controller, or controller, refers to the combination of the ATS22 soft starter, enclosure, and the power and control circuits that comprise the Enclosed 22 combination motor controller.
- ATS22 soft starter, or soft starter, refers to the ATS22 solid-state reduced voltage motor controllers used as a component in the Enclosed 22 controller. The ATS22 soft starter is described in the *ATS22 User Manual,* BBV51330.
- Shorting contactor refers to the internal contactor(s) in the ATS22 soft starter. The shorting contactor closes during full speed operation to reduce losses under steady state operation.
- Bypass, or integral bypass starter, refers to the optional, integrated full voltage combination starter in the enclosed ATS22 controller (power circuit option Y05). When provided, the integral bypass starter may be used to start and run the motor in the unlikely event that the ATS22 soft starter becomes inoperable.

Before You Begin

Read and follow these precautions before performing any procedure with this controller.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Read and understand this manual before installing or operating the Enclosed 22 controller. Installation, adjustment, repair, and maintenance must be performed by qualified personnel.
- The user is responsible for compliance with all national and local electrical code requirements with respect to grounding of all equipment.
- Many parts of this controller, including the printed circuit boards, operate at the line voltage. DO NOT TOUCH. Use only electrically insulated tools.
- Some terminals may have voltage when the disconnect is open.
- Before servicing the controller:
  - — Disconnect all power, including external control power that may be present.
  - — Place a “DO NOT TURN ON” label on all power disconnects.
  - — Lock disconnects in the open position.
- Install and close all covers before applying power or starting and stopping the controller.

Failure to follow these instructions will result in death or serious injury.

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⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm that power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of anticipated transmission delays or failures of the link[1].
- Each implementation of an Enclosed 22 controller must be individually and thoroughly tested for proper operation before being placed into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

[1] For additional information, refer to NEMA ICS 1.1 (latest edition), “Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control.”

⚠ CAUTION

INCOMPATIBLE LINE VOLTAGE

Before turning on and configuring the controller, ensure that the line voltage is compatible with the line voltage range specified on the controller nameplate. The controller can be damaged if the line voltage is not compatible.

Failure to follow these instructions can result in injury or equipment damage.

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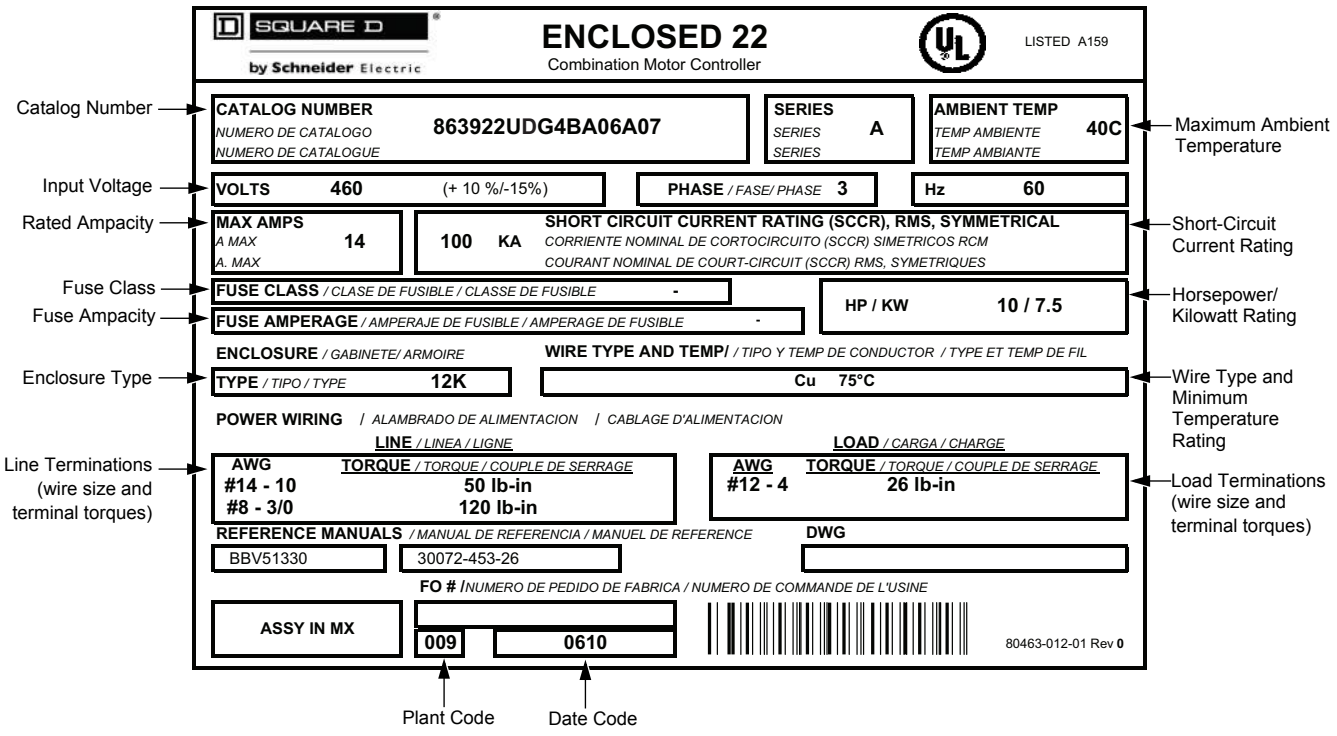
Nameplate Identification

The nameplate for the Enclosed 22 controller is on the inside of the enclosure door. See Figure 1. The nameplate identifies the controller type and modification options. When identifying or describing the Enclosed 22 controller, use the data from this nameplate.

Figure 1: Nameplate Example



Catalog Number Description

The catalog number is on the nameplate attached to the inside of the Enclosed 22 controller door (see Figure 1). The catalog number is coded to describe the configuration of the controller.

Use Table 2 on page 11 to translate the catalog number into a description of the controller. The example in Table 1 translates the catalog number shown on the nameplate.

For descriptions of the options listed in Table 2, refer to Section 4 beginning on page 85.

Table 1: Catalog Number Example: 863922UDG4BA06A07

	Field						
—	1	2	3	4	5	6	7
8639	22U	D	G	4	B	A06	A07
Controller Class	PowerPact™ Thermal-Magnetic Circuit Breaker	10 hp	UL Type 1 General Purpose	460 Vac	Basic Shunt Trip	Start-Stop Pushbutton	Run Light (Red), Off Light (Green)

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Table 2: Catalog Number Description

Field	Digit	Characteristic	Description
—	—	Controller Class	8638 = Fused Disconnect[1] 8639 = Circuit Breaker Disconnect
01	1–3	Controller Style	22F = Altistart 22 with Class J fuse clips and molded case switch[1] 22T = Altistart 22 with PowerPact Motor Circuit Protector 22U = Altistart 22 with PowerPact Thermal-Magnetic Circuit Breaker
02	4	Horsepower	A = 3 hp B = 5 hp C = 7.5 hp D = 10 hp E = 15 hp F = 20 hp G = 25 hp H = 30 hp J = 40 hp K = 50 hp L = 60 hp M = 75 hp N = 100 hp P = 125 hp Q = 150 hp R = 200 hp S = 250 hp T = 300 hp U = 350 hp W = 400 hp X = 500 hp
03	5	Enclosure Type	G = UL Type 1 General Purpose A = UL Type 12/12K Industrial Use, Dust-Tight/Drip-Tight[2] H = UL Type 3R Outdoor Use
04	6	Voltage	2 = 208 Vac 3 = 230 Vac 4 = 460 Vac 5 = 575 Vac
05	7	Power Circuit	B = Basic Shunt Trip S = Full-Featured Shunt Trip N = Non-reversing Isolation R = Reversing Isolation Y = Integral Full-Voltage Bypass
06	8–10	Control Options [3,4]	A06 = Start-Stop Pushbuttons B06 = Forward-Off-Reverse[5] C06 = Hand-Off-Auto (HOA) Selector Switch D06 = Stop-Run Selector Switch E06 = Hand-Auto Selector Switch / Start-Stop Pushbuttons
07	11–13	Pilot Device Options [3,4]	A07 = Run Light (Red), Off Light (Green) B07 = Push-to-Test Run Light (Red), Push-to-Test Off Light (Green) C07 = Run Light (Red), Off Light (Green), Tripped Light/Reset (Yellow)[6] D07 = PTT Run Light (Red), PTT Off Light (Green), Tripped Light/Reset (Yellow)[6]
08	14–16	Metering Options [3]	B08 = Elapsed Run Time Meter

Continued on next page

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Table 2: Catalog Number Description *(continued)*

Field	Digit	Characteristic	Description
09	17–19	Miscellaneous Options [3]	A10 = Floor Mounting Kit[7] B10 = Additional 150 VA[1] C10 = Power-Up On Delay Relay[1,10] D10 = Emergency Stop Pushbutton[1] E10 = cUL Label[8] F10 = Auxiliary Run Mode Contacts G10 = Auxiliary FV Bypass Contacts[1,9] H10 = Auxiliary Auto Mode Contacts[10,11] J10 = Auxiliary Trip Indication Contacts L10 = ID Engraved Nameplate[1] M10 = 10 Spare Terminal Blocks[1] P10 = Permanent Wire Markers[1] R10 = MOV/Surge Arrestor[1] U10 = Omit Door-Mounted Keypad Display[12] X10 = 50 °C (122 °C) Operation Y10 = Seismic Qualified Z10 = Service Entrance Rating[8] 610 = High Interrupting Rating[13] 910 = American Recovery and Reinvestment Act (ARRA) Option

1 This option is not selectable with power circuit option B05.

2 Wall-mounted enclosures include knockouts for conduit connection. Refer to Figures 17–21 beginning on page 40 for knockout location and details.

3 Select only one option.

4 To omit, do not include a selection in the catalog number.

5 Control circuit B06 is required when reversing isolation power circuit (R05) is selected and is not available with other power circuit options.

6 This option is not valid with shunt trip power circuits (B05 or S05).

7 This option is available only for enclosure size D. Refer to Table 12 on page 35 for ratings.

8 Options E10 and Z10 cannot be ordered together.

9 The contacts are available only when power circuit option Y05 is selected.

10 The contacts are not available when power circuit option R05 is selected.

11 This option is valid only with the following control options: C06, D06, or E06.

12 If you select option U10, you must separately order the remote keypad (VW3G22101) and cable (VW3A1104R30) to commission the soft starter. Refer to the *ATS22 User Manual*, BBV51330, for serial communication programming and control capabilities.

13 Enclosed ATS22 controllers sizes E and G with circuit breaker disconnection (22U) are provided as standard with short circuit ratings of 65 kA @ 460 V and 25 kA @ 575 V. Selection of option 610 increases the rating to 100 kA @ 460 V or 50 kA @ 575 V. The option is not valid with controller styles 22T or 22F.

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Technical Characteristics

Table 3: Standard Duty Ratings, UL Type 1 and Type 12/12K

Enclosed 22 Catalog No. [1,2,3]	Input Voltage 60 Hz	Horsepower Rating	Full Load Current	Maximum Total Dissipated Power at Rated Load [4,5]	Altistart 22 Catalog No.
	Vac	hp	A	W	
22◆A●2✖	208	3	10.6	65.7	ATS22D17S6U
22◆B●2✖		5	16.7	71.8	ATS22D32S6U
22◆C●2✖		7.5	24.2	75.0	ATS22D32S6U
22◆D●2✖		10	30.8	81.8	ATS22D47S6U
22◆E●2✖		15	46.2	95.4	ATS22D62S6U
22◆F●2✖		20	59.4	106.7	ATS22D75S6U
22◆G●2✖		25	74.8	112.0	ATS22D88S6U
22◆H●2✖		30	88	149.0	ATS22C11S6U
22◆J●2✖		40	114	182.8	ATS22C14S6U
22◆K●2✖		50	143	221.3	ATS22C17S6U
22◆L●2✖		60	169	252.6	ATS22C21S6U
22◆M●2✖		75	211	307.1	ATS22C25S6U
22◆N●2✖		100	273	418.3	ATS22C32S6U
22◆P●2✖		125	343	533.0	ATS22C41S6U
22◆Q●2✖		150	395	563.0	ATS22C48S6U
22◆B●3✖	230	5	15.2	66.5	ATS22D17S6U
22◆C●3✖		7.5	22	74.2	ATS22D32S6U
22◆D●3✖		10	28	76.5	ATS22D32S6U
22◆E●3✖		15	42	94.0	ATS22D47S6U
22◆F●3✖		20	54	101.4	ATS22D62S6U
22◆G●3✖		25	68	112.8	ATS22D75S6U
22◆H●3✖		30	80	115.6	ATS22D88S6U
22◆J●3✖		40	104	163.7	ATS22C11S6U
22◆K●3✖		50	130	199.9	ATS22C14S6U
22◆L●3✖		60	154	232.9	ATS22C17S6U
22◆M●3✖		75	192	273.1	ATS22C21S6U
22◆N●3✖		100	248	354.4	ATS22C25S6U
22◆P●3✖		125	312	481.6	ATS22C32S6U
22◆Q●3✖		150	360	562.3	ATS22C41S6U
22◆R●3✖		200	480	691.3	ATS22C59S6U

Continued on next page

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Table 3: Standard Duty Ratings, UL Type 1 and Type 12/12K *(continued)*

Enclosed 22 Catalog No. [1,2,3]	Input Voltage 60 Hz Vac	Horsepower Rating hp	Full Load Current A	Maximum Total Dissipated Power at Rated Load [4,5] W	Altistart 22 Catalog No.
22◆D●4✖	460	10	14	81.2	ATS22D17S6U
22◆E●4✖		15	21	88.5	ATS22D32S6U
22◆F●4✖		20	27	91.6	ATS22D32S6U
22◆G●4✖		25	34	98.7	ATS22D47S6U
22◆H●4✖		30	40	107.2	ATS22D47S6U
22◆J●4✖		40	52	121.1	ATS22D62S6U
22◆K●4✖		50	65	132.0	ATS22D75S6U
22◆L●4✖		60	77	134.9	ATS22D88S6U
22◆M●4✖		75	96	176.8	ATS22C11S6U
22◆N●4✖		100	124	214.6	ATS22C14S6U
22◆P●4✖		125	156	256.1	ATS22C17S6U
22◆Q●4✖		150	180	263.6	ATS22C21S6U
22◆R●4✖		200	240	343.5	ATS22C25S6U
22◆S●4✖		250	302	464.5	ATS22C32S6U
22◆T●4✖		300	361	564.1	ATS22C41S6U
22◆U●4✖		350	414	589.6	ATS22C48S6U
22◆V●4✖		400	477	686.6	ATS22C59S6U
22◆E●5✖	575	15	17	82.0	ATS22D17S6U
22◆F●5✖		20	22	88.6	ATS22D32S6U
22◆G●5✖		25	27	90.7	ATS22D32S6U
22◆H●5✖		30	32	96.8	ATS22D47S6U
22◆J●5✖		40	41	106.7	ATS22D47S6U
22◆K●5✖		50	52	119.3	ATS22D62S6U
22◆L●5✖		60	62	127.4	ATS22D75S6U
22◆M●5✖		75	77	134.9	ATS22D88S6U
22◆N●5✖		100	99	179.4	ATS22C11S6U
22◆P●5✖		125	125	215.7	ATS22C14S6U
22◆Q●5✖		150	144	243.3	ATS22C17S6U
22◆R●5✖		200	192	273.1	ATS22C21S6U
22◆S●5✖		250	242	346.2	ATS22C25S6U
22◆T●5✖		300	289	443.2	ATS22C32S6U
22◆W●5✖		400	382	543.1	ATS22C48S6U
22◆X●5✖		500	472	678.8	ATS22C59S6U

1 ◆ may be F, T or U, describing the controller style. See Table 2 on page 11.

2 ● may be G or A, describing the enclosure type. See Table 2 on page 11.

3 ✖ may be B, S, N, R, or Y describing the power circuit configuration. See Table 2 on page 11.

4 Dissipated power does not include losses of the customer-supplied power fuses.

5 For btu/hr, multiply the values by 3.413.

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Table 4: Standard Duty Ratings, UL Type 3R and 50 °C (122 °F) Rated

Enclosed 22 Catalog No. 1,2,3	Input Voltage 60 Hz Vac	Horsepower Rating hp	Full Load Current A	Maximum Total Dissipated Power at Rated Load 4,5 W	Altistart 22 Catalog No.
22◆A●2✖	208	3	10.6	50.4	ATS22D17S6U
22◆B●2✖		5	16.7	53.3	ATS22D32S6U
22◆C●2✖		7.5	24.2	60.1	ATS22D47S6U
22◆D●2✖		10	30.8	70.2	ATS22D47S6U
22◆E●2✖		15	46.2	74.0	ATS22D75S6U
22◆F●2✖		20	59.4	83.2	ATS22D88S6U
22◆G●2✖		25	74.8	118.5	ATS22C11S6U
22◆H●2✖		30	88	140.3	ATS22C14S6U
22◆J●2✖		40	114	164.1	ATS22C17S6U
22◆K●2✖		50	143	197.8	ATS22C21S6U
22◆L●2✖		60	169	236.3	ATS22C25S6U
22◆M●2✖		75	211	297.8	ATS22C32S6U
22◆N●2✖		100	273	376.1	ATS22C41S6U
22◆P●2✖		125	343	434.8	ATS22C48S6U
22◆B●3✖	230	5	15.2	55.1	ATS22D32S6U
22◆C●3✖		7.5	22	57.5	ATS22D32S6U
22◆D●3✖		10	28	68.8	ATS22D47S6U
22◆E●3✖		15	42	69.7	ATS22D62S6U
22◆F●3✖		20	54	85.3	ATS22D75S6U
22◆G●3✖		25	68	89.1	ATS22D88S6U
22◆H●3✖		30	80	127.4	ATS22C11S6U
22◆J●3✖		40	104	145.5	ATS22C14S6U
22◆K●3✖		50	130	181.2	ATS22C17S6U
22◆L●3✖		60	154	213.4	ATS22C21S6U
22◆M●3✖		75	192	250.7	ATS22C25S6U
22◆N●3✖		100	248	338.9	ATS22C32S6U
22◆P●3✖		125	312	438.1	ATS22C41S6U
22◆Q●3✖		150	360	506.6	ATS22C59S6U

Continued on next page

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Table 4: Standard Duty Ratings, UL Type 3R and 50 °C (122 °F) Rated *(continued)*

Enclosed 22 Catalog No. [1,2,3]	Input Voltage 60 Hz Vac	Horsepower Rating hp	Full Load Current A	Maximum Total Dissipated Power at Rated Load [4,5] W	Altistart 22 Catalog No.
22◆D●4✖	460	10	14	60.4	ATS22D32S6U
22◆E●4✖		15	21	63.5	ATS22D32S6U
22◆F●4✖		20	27	75.3	ATS22D47S6U
22◆G●4✖		25	34	83.3	ATS22D47S6U
22◆H●4✖		30	40	95.1	ATS22D62S6U
22◆J●4✖		40	52	96.6	ATS22D75S6U
22◆K●4✖		50	65	101.9	ATS22D88S6U
22◆L●4✖		60	77	139.9	ATS22C11S6U
22◆M●4✖		75	96	155.9	ATS22C14S6U
22◆N●4✖		100	124	170.4	ATS22C17S6U
22◆P●4✖		125	156	208.6	ATS22C21S6U
22◆Q●4✖		150	180	251.3	ATS22C25S6U
22◆R●4✖		200	240	322.8	ATS22C32S6U
22◆S●4✖		250	302	422.9	ATS22C41S6U
22◆T●4✖		300	361	471.4	ATS22C48S6U
22◆U●4✖		350	414	557.3	ATS22C59S6U
22◆E●5✖	575	15	17	68.3	ATS22D32S6U
22◆F●5✖		20	22	70.2	ATS22D32S6U
22◆G●5✖		25	27	77.7	ATS22D47S6U
22◆H●5✖		30	32	84.9	ATS22D47S6U
22◆J●5✖		40	41	89.4	ATS22D62S6U
22◆K●5✖		50	52	96.8	ATS22D75S6U
22◆L●5✖		60	62	104.5	ATS22D88S6U
22◆M●5✖		75	77	135.1	ATS22C11S6U
22◆N●5✖		100	99	155.2	ATS22C14S6U
22◆P●5✖		125	125	173.4	ATS22C17S6U
22◆Q●5✖		150	144	209.5	ATS22C21S6U
22◆R●5✖		200	192	240.9	ATS22C25S6U
22◆S●5✖		250	242	335.0	ATS22C32S6U
22◆T●5✖		300	289	447.7	ATS22C48S6U
22◆W●5✖		400	382	541.8	ATS22C59S6U

1 ◆ may be F, T, or U, describing the controller style. See Table 2 on page 11.

2 ● may be G, A, or H describing the enclosure type. See Table 2 on page 11.

3 ✖ may be B, S, N, R, or Y describing the power circuit configuration. See Table 2 on page 11.

4 Dissipated power does not include losses of the customer-supplied power fuses.

5 For btu/hr, multiply the values by 3.413.

Short-Circuit Ratings

Enclosed 22 controllers featuring PowerPact H, J, D, L, and P frame circuit breakers as the disconnect device have a short-circuit rating of 100 kA @ 208 V, 240 V, and 480 V and 50 kA @ 600 V (RMS symmetrical).[1]

Enclosed 22 controllers featuring PowerPact M frame circuit breakers as the disconnect device have a short-circuit rating of 65 kA @ 208 V, 240 V, and 480 V and 25 kA @ 600 V (RMS symmetrical). This circuit breaker comes standard when ordering thermal-magnetic type disconnect (22U) at the following horsepower and voltage ranges:

- For Type 1/12 rating (40 °C / 104 °F): 150 hp @ 208 V; 200 hp @ 230 V; 350–400 hp @ 460 V; 400–500 hp @ 575 V.
- For Type 3R rating or 50 °C (122 °F) ambient rated Type 1/12: 125 hp @ 208 V; 150 hp @ 230 V; 300–350 hp @ 460 V; 350–400 hp @ 575 V.

Option 610 (22U only) provides a PowerPact P circuit breaker for thermal-magnetic disconnect to increase the rating as described above.

All enclosed 22 controllers with a fusible switch as the disconnect device have a short-circuit rating of 100,000 A (RMS symmetrical) when equipped with UL Class J time-delay fuses. To include fuses with the equipment when shipped, contact the factory.

⚠ WARNING

HEAT OR FIRE DAMAGE

- Protective devices must be properly coordinated.
- Do not connect the controller to a power feeder whose short-circuit capacity exceeds the short-circuit rating listed on the controller nameplate.

Failure to follow these instructions can result in death or serious injury.

[1] Short-circuit rating for power circuits N05, R05, and Y05 with an IEC contactor is 35,000 A @ 600 V for the following horsepower ratings:
350 hp: Type 1 and 12
300 hp: Type 3R or Mod X10

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Technical Specifications

Table 5: Electrical Specifications

Supply Voltage	208 Vac +10%/-15%; 230 Vac +10%/-15%; 460 Vac +10%/-15%; 575 Vac +10%/-15%
Control Voltage	115 Vac +10%/-15% (control power transformer included)
Frequency	50/60 Hz +/- 5%
Rated Current	Full load current (FLA) per NFPA 70 / NEC Table 430-250
Motor Power	Type 1 and Type 12/12K: 3–150 hp @ 208 V 5–200 hp @ 230 V 10–400 hp @ 460 V 15–500 hp @ 575 V
	Type 3R or 50 °C (122 °F) Rated: 3–125 hp @ 208 V 5–150 hp @ 230 V 10–350 hp @ 460 V 15–400 hp @ 575 V
Motor Voltage	208, 230, 460, 575 V
Starting Duty (Standard Duty)	S1: Starting at 350% of In[1] for 40 s from a cold state
	S3: Starting at 300% of In[1] for 20 s, or 200% of In for 40 s, with a load factor of 95% and 3 starts per hour, or an equivalent thermal cycling

[1] In is the controller full load current listed on the nameplate.

Table 6: Environmental Specifications

Storage Temperature	-13 to +158 ºF (-25 to +70 ºC)
Operating Temperature	UL Type 1 and Type 12/12K: +14 to 104 ºF (-10 to 40 ºC)
	UL Type 3R and Mod X10: +14 to 122 ºF (-10 to 50 ºC)
Humidity	95% with no condensation or dripping water, conforming to IEC 60068-2-3
Altitude	1000 m (3280 ft.), derated by 2.2% for each additional 100 m (328 ft.) up to 2000 m (6560 ft.) maximum
Enclosure	UL Type 1: General Purpose
	UL Type 12/12K: Industrial Use, dust-tight/drip-tight
	UL Type 3R: Outdoor Use
Pollution Degree	Pollution degree 2 (UL Type 1 and Type 3R) and pollution degree 3 (UL Type 12/12K) per NEMA ICS-1 and IEC 60664-1
Resistance to Vibration (Soft Starter Only)	According to IEC 60068-2-6: 1.5 mm peak to peak from 3 to 13 Hz 1 gn from 13 to 150 Hz
Resistance to Shocks	According to IEC 60068-2
Codes and Standards	UL Listed per UL 508 under category NKJH
	Conforms to applicable NEMA ICS, NFPA, and IEC standards
	Manufactured under ISO 9001 standards
	Factory modification E10 provides Canadian cUL certification per C22.2 No.14.
	Seismic Certification: • 2003 IBC, NFPA 5000, and ASCE7 • ICC ES AC 156[1]

[1] Acceptance criteria test protocol with an importance factor of 1.5.

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Table 7: Operation

Methods of Starting:	
Torque Ramp	Adjustable from 1 to 60 s by keypad
Current Limitation	Adjustable from 150% to 350% of controller rated current (In) as indicated on nameplate
Booster Start-up Pulse	Pulse start at 80% of full voltage for 0.1 to 1 s (**bSt**) for breaking free high-friction loads or starting 2-pole motors
Methods of Stopping:	
Freewheel	Coast to stop on stop command
Torque Deceleration Ramp	Adjustable from 1 to 60 s by keypad
Status and Diagnostics:	Digital display of motor and controller status, including: Ready/Run Motor Current

Table 8: Protection

Motor:	
Thermal Overload	Solid-state thermal overload relay, integral to the ATS22 soft starter. Overload class is selectable as 10, 20, or 30 by keypad. Range is 40% to 100% of ATS22 soft starter rated current.[1]
Shunt-Trip Disconnect	Removes all power from the controller cabinet when the ATS22 soft starter detects a fault condition.
Controller:	
Short-Circuit Current Ratings	• PowerPact H, J, D, L, or P Circuit Breaker: 100 kA @ 480 V and 50 kA @ 600 V[2] • PowerPact M Circuit Breaker: 65 kA @ 480 V and 25 kA @ 600 V • Fusible Disconnect: 100 kA @ 600 V (requires UL Class J time-delay fuses, not included).
Overcurrent Protection	An overcurrent protection device (OCPD) provides Type 1 coordination to the short-circuit current ratings.
Overtemperature Protection	Protection if heatsink temperature exceeds 85 ºC (185 ºF)
Shorting Contactor	A shorting contactor is integral to the ATS22 soft starter and reduces temperature rise in the enclosure by eliminating the watts loss of the SCRs.
Unbalanced Threshold Current	Programmable, 10% to 100% of soft starter rated current (In)
Ground Fault	Programmable, 10% to 100% of soft starter rated current (In)
Undervoltage/Overvoltage	Programmable, undervoltage trip at 50% to 90% of line voltage (**ULn**), and overvoltage trip at 110% to 125% of line voltage

1 Refer to the *ATS22 User Manual*, BBV51330, for ATS22 soft starter maximum rated current. It may differ from the ratings of the Enclosed ATS22 controller.

2 Short-circuit rating for power circuits N05, R05, and Y05 with an IEC contactor is 35,000 A @ 600 V for the following horsepower ratings:
350 hp: Type 1 and 12
300 hp: Type 3R or Mod X10

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Section 2—Receiving, Handling, and Storing

⚠ WARNING

DAMAGED ENCLOSED 22 CONTROLLER

Do not operate or install any Enclosed 22 controller that appears damaged.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Receiving and Preliminary Inspection

Before shipment from the factory, each Enclosed 22 controller is inspected visually, electrically, and mechanically by professional quality control analysts. Certification of quality control testing is available upon request.

Thoroughly inspect the Enclosed 22 controller before storing or installing it. Upon receipt:

1. Remove the Enclosed 22 controller from its packaging and visually inspect the exterior for shipping damage.
2. Ensure that the catalog number on the Enclosed 22 controller nameplate (see Figure 1 on page 10) matches the catalog number on the packing slip and corresponding purchase order.
3. If you find any shipping damage, notify the carrier and your Schneider Electric sales representative.

Storing the Equipment

NOTICE

STACKING DURING STORAGE OR SHIPPING

- Do not stack Enclosed 22 controllers on top of each other unless they are packed in a wooden crate. Do not stack controllers packed in a wooded crate more than three high.
- Do not place any material on top of the Enclosed 22 controller.
- Store or ship the Enclosed 22 controller in the original packaging.

Failure to follow these instructions can result in equipment damage.

Storing the Enclosed 22 controller in its original packaging until it reaches its final installation site helps protect the equipment and helps prevent damage to its exterior.

- If you plan to store the Enclosed 22 controller after receipt, replace it in its original packaging and store it in a clean, dry area where the ambient temperature is between -13 to +158 °F (-25 to +70 °C).
- If the controller must be shipped to another location, use the original shipping material and carton to help protect it.

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Unpacking the Controller

Wall-Mounted Units

⚠ WARNING

HEAVY EQUIPMENT

- Lifting the Enclosed 22 controller requires the use of a lifting apparatus or two people.
- Always use safe lifting practices.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

- Handle the Enclosed 22 controller carefully to avoid damage to the internal components, frame, and exterior.
- Lift the Enclosed 22 controller out of its shipping carton with two people or a suitable lifting apparatus, and place it on a flat surface.

Floor-Mounted Units

Controllers shipped standing up have a high center of gravity, which may cause them to tilt and fall. Fork trucks provide a convenient method of moving floor-mounted equipment.

⚠ WARNING

UNSTABLE LOAD

- Use extreme care when moving heavy equipment.
- Verify that the moving equipment is rated to handle the weight.
- When removing equipment from a shipping pallet, carefully balance and secure it using a safety strap.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Lifting the Controller

⚠ WARNING

HANDLING AND LIFTING HAZARD

- Keep the area below any equipment being lifted clear of all personnel and property.
- Lifting the Enclosed 22 controller requires the use of a lifting apparatus. Use the lifting method shown in Figures 2 and 3 on page 24.
- Before lifting the controller:
  - Inspect the lifting plates, holes, slots, and eyebolts for any damage.
  - Attach a spreader bar.
  - Keep the lifting force vertical.
  - Limit the sling angle to less than 45°.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

When lifting the controllers:

- Always work with another person. The weight, size, and shape of the controller is such that two people are required to handle it.
- Use cut-resistant gloves.

Wall-Mounted Controllers

When lifting wall-mounted controllers:

- Attach a spreader bar to the two top lifting holes on the controller top plate and hoist the controller with chains or straps. See Figure 2 on page 24 for the proper hoisting method. See Figure 4 on page 24 for the location of the lifting holes.
- Raise the controller from a horizontal position (the back of the controller resting on the pallet) to the vertical, upright position.

NOTE: The bottom of all wall-mounted controllers has a mounting flange which prevents the controller from standing in a vertical position. If the controller is rested on the mounting flange, it may tip over.

Floor-Mounted Controllers

When lifting floor-mounted controllers:

- Handle the controller in the upright position only.
- Select rigging lengths to compensate for any unequal weight distribution.
- Do not exceed the 45° maximum angle between the vertical lifting cables (see Figure 3 on page 24).
- Use only slings with safety hooks or shackles. Do not pass cables through the holes in the lifting angle.

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Figure 2: Proper Use of a Spreader Bar to Lift Wall-Mounted Controllers

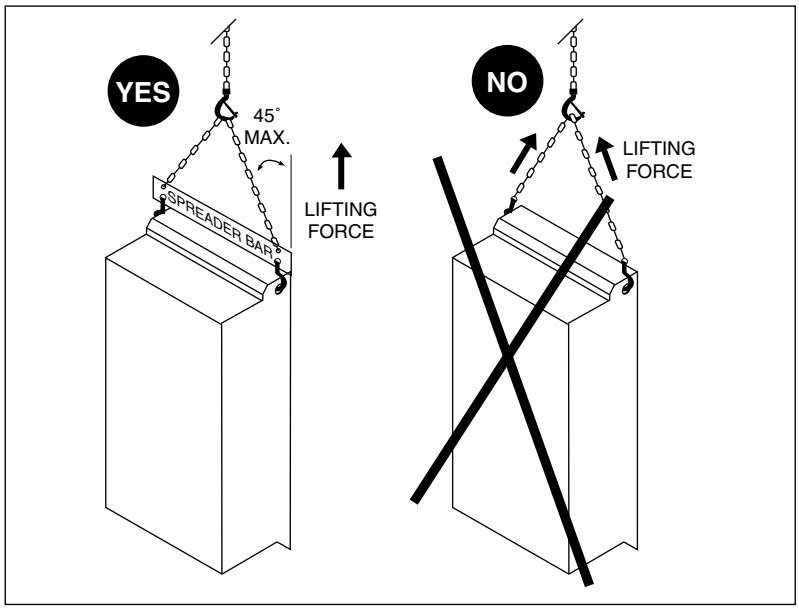


Figure 3: Proper Use of a Sling to Lift Floor-Mounted Controllers

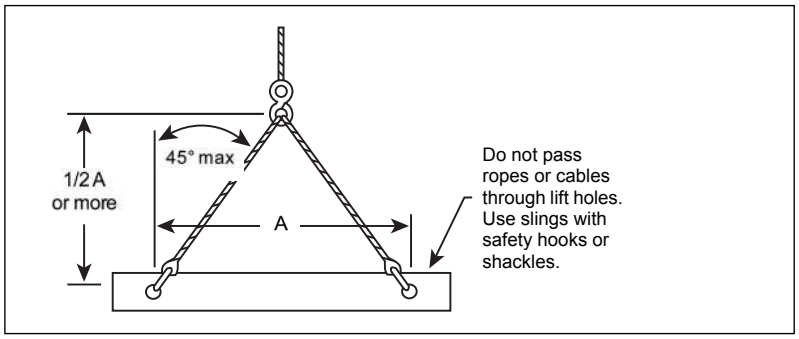
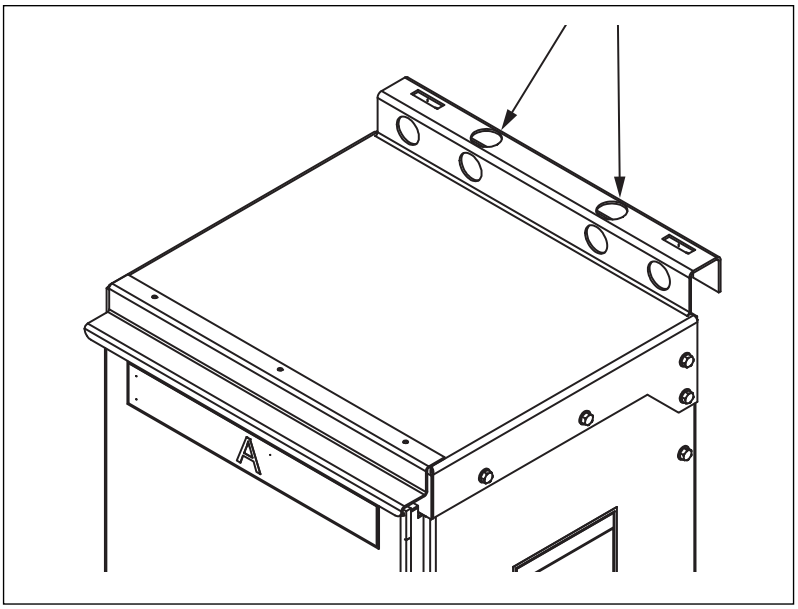


Figure 4: Lifting Holes on Enclosed 22 Controllers

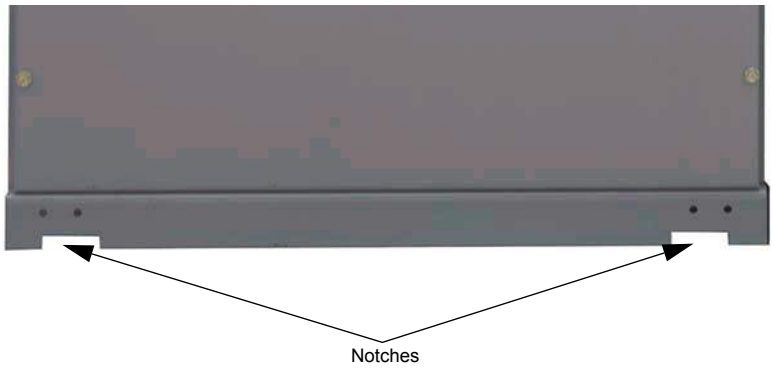


Positioning the Controller

Using the notches in the base channels, carefully move the controller into position with a crowbar.

NOTE: Use extreme care when moving floor-mounted controllers, as they may be unstable. See “Unpacking the Controller” on page 22 before moving any floor-mounted equipment.

Figure 5: Base Channel Notches



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Section 3—Installation and Start-Up

Physical Installation

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Read and understand the precautions in “Before You Begin” starting on page 8 before performing the procedures in this section.

Failure to follow these instructions will result in death or serious injury.

Mounting Requirements

Size A, B, C, and D Enclosures

Observe these requirements when mounting the Enclosed 22 controller:

- Install the controller in a pollution degree 2 (UL Type 1 or Type 3R) or pollution degree 3 (UL Type 12/12K) environment, as defined in NEMA ICS1 and IEC 60664-1.
- Mount the wall-mounted controller on a flat, rigid, noncombustible vertical surface, capable of supporting the controller weight.
- Mount the floor-mounted controller on a flat, solid surface capable of supporting the controller weight.
- If drilling for conduit entry, take care to prevent metal chips from falling on parts and electronic printed wiring boards.
- When cleaning the interior and exterior of the controller, use a vacuum. Do not use compressed air, as it may blow contaminants into other parts of the controller.
- Check the enclosure for damage that might reduce electrical clearances.
- Do not mount the controller in direct sunlight or on hot surfaces.
- When attaching wall-mounted controllers to their mounting surfaces, use fasteners rated for the weight of the controller, the expected shock and vibration of the installation, and the expected environment. See Tables 11 and 12 beginning on page 34 for controller weights.
- Secure all four corners of the controller.
- Use water-tight rated conduit hubs to make connections between the conduit and the UL Type 3R enclosures. Conduit connections through the top of the enclosure are not recommended.
- Provide sufficient cooling for the expected heat load. See Tables 3 and 4 on pages 13 and 15 for dissipated power at rated load.
- Refer to page 30 for EZM mounting instructions.

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⚠ WARNING

IMPROPER MOUNTING

Before removing the lifting mechanism:

- Ensure that all hardware is of sufficient size and type for the controller weight.
- Secure and tighten all hardware.

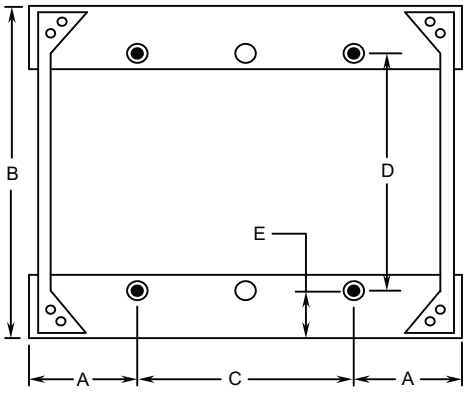
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Size E, F, and G Enclosures

Fasten the controller to the floor using 1/2 in. or 3/4 in. grade 5 or higher bolts and flat washers (customer furnished). The base channel mounting holes [0.88 in. (22 mm) diameter] provide clearance for expansion anchors for 1/2 in. bolts.

NOTE: Although the enclosure is free-standing, fastening it to the floor prevents movement and reduces the chance of conduit connection damage.

Figure 6: Type 1 and Type 12 Base Channel Mounting Dimensions



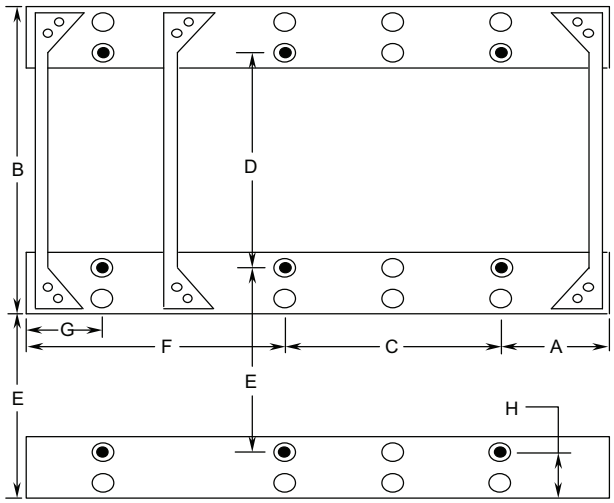
● = Seismic Tie-Down Locations

Table 9: Type 1 and Type 12 Dimensions (See Figure 6 for Letters)

Letter	Section Width in. (mm)	Dimension in. (mm)
A	N/A	5.00 (127)
B	N/A	20.00 (508)
C	20.00 (508)	10.00 (254)
	25.00 (635)	15.00 (381)
	30.00 (762)	20.00 (508)
D	N/A	14.98 (380)
E	N/A	2.50 (64)

N/A = Not applicable

Figure 7: Type 3R Section Dimensions



● = Seismic Tie-Down Locations

Table 10: Type 3R Dimensions (See Figure 7 for Letters)

Letter	Section Width in. (mm)	Dimension in. (mm)
A	N/A	5.00 (127)
B	N/A	20.00 (508)
C	20.00 (508)	10.00 (254)
	25.00 (635)	15.00 (381)
	30.00 (762)	20.00 (508)
D	N/A	14.98 (380)
E	N/A	11.60 (295)
F	N/A	12.50 (318)
G	N/A	5.00 (127)
H	N/A	3.60 (91)

N/A = Not applicable

Spacing Requirements

Observe the following spacing requirements when mounting Enclosed 22 controllers:

- Mount each controller so that the door can be opened at least 90°.
- Wall-mounted equipment:
  - — Allow a minimum of 2.0 in. (50 mm) of clear space at the top and bottom of each controller.
  - — Allow a minimum of 1.0 in. (25 mm) of clear space to the left and right of each controller.
  - — Provide a minimum of 3 ft (914 mm) of free space in front of the controller.
- Floor-mounted equipment:
  - — Provide a minimum of 3 ft (914 mm) of free space in front of the controller.
  - — Provide a minimum of 0.5 in. (13 mm) of space between the back of the controller and the wall. For damp locations, allow a minimum of 6 in. (152 mm).

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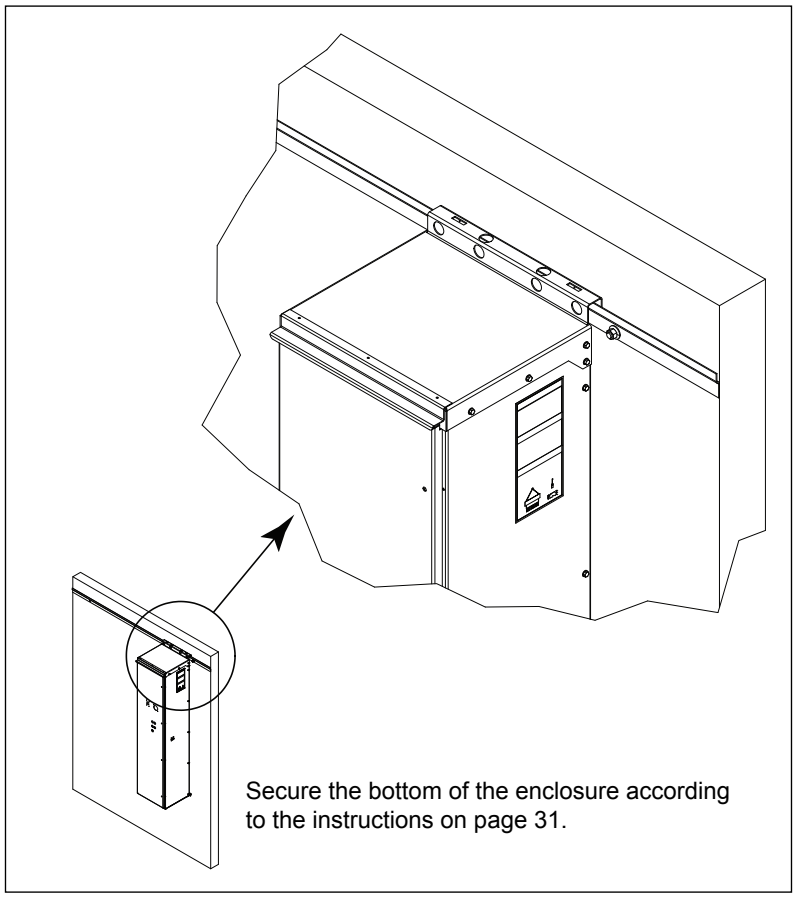
EZM Mounting Channel

An EZM mounting channel can be used to mount a single wall-mounted enclosure or to assist in the alignment of multiple wall-mounted enclosures.

NOTE: EZM mounting cannot meet seismic requirements. Normal mounting methods must be used to meet seismic requirements.

Figure 8: EZM Mounting Channel



Observe the following requirements for EZM mounting:

- Securely fasten the EZM mounting channel to a wall that is rated to support the total weight of the controllers.
- Add additional wall anchor points to the EZM mounting channel as follows, with consideration given to wall construction:

  Shunt Trip (B05)

  — Refer to Table 11 on page 34 for applicable enclosure type, horsepower, and voltage range.

  — **Size A enclosures**: For a 72 in. (1829 mm) long rail with a maximum of eight size A controllers, do not locate the rail anchor points more than 9 in. (229 mm) from each end, and do not allow more than 25 in. (635 mm) between each additional anchor point.

  — **Size B enclosures:** For a 72 in. (1829 mm) long rail with a maximum of six size B controllers, do not locate rail anchor points more than 4 in. (102 mm) from each end, and do not allow more than 15 in. (381 mm) between each additional anchor point.

  — **Size D enclosures**: For a 72 in. (1829 mm) long rail with a maximum of five size D controllers, do not locate rail anchor points more than

4 in. (102 mm) from each end, and do not allow more than 15 in. (381 mm) between each additional anchor point.

Power Options (S05, N05, R05, or Y05)

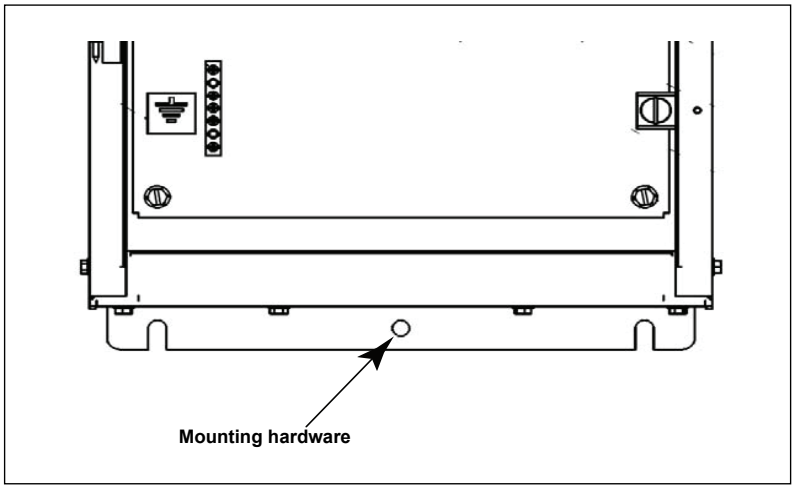
— Refer to Table 12 on page 35 for applicable enclosure type, horsepower, and voltage range.

— **Size B enclosures**: For a 72 in. (1829 mm) long rail with a maximum of six size B controllers, do not locate rail anchor points more than 9 in. (229 mm) from each end, and do not allow more than 25 in. (635 mm) between each additional anchor point.

— **Size C and D enclosures**: For a 72 in. (1829 mm) long rail with a maximum of five size C or D controllers, do not locate rail anchor points more than 4 in. (102 mm) from each end, and do not allow more than 15 in. (381 mm) between each additional anchor point.

- Use grade 5 5/16 in. or better hardware to secure the rail to the wall. Use additional anchor hardware if needed for the material used in the wall construction.
- Add additional 5/16 in. hardware to the bottom flange of the enclosure. See Figure 9.

Figure 9: EZM Mounting Hardware



ENGLISH

Seismic Qualification Mounting Criteria

Seismic qualification (MOD S07) harmonizes the following standards in compliance with ICC ES AC156 acceptance criteria test protocol with an importance factor of 1.5:

- 2003 IBC (International Building Code)
- NFPA 5000 (Building Code–National Fire Protection Agency)
- 2001 CBC (Canadian Building Code)
- 1997 UBC (Uniform Building Code)
- 1999 NBC (BOCA National Building Code)
- 1999 SBC (Standard Building Code)
- ASCE 7 (American Society of Civil Engineers)

For seismic rating installation compliance:

- Follow the anchorage and mounting guidelines on the seismic qualification labels attached to the controller (see Figures 10–12 on pages 33–34).
- Use SAE grade 5 bolts and washers.
- Torque all bolts to applicable SAE standards for grade 5 hardware, considering all plating and lubricant factors.

⚠ WARNING

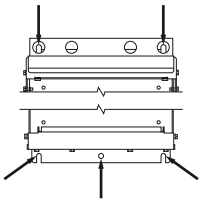
TOPPLING AND CRUSHING HAZARD

- Follow all recommended practices when anchoring and securing seismically rated equipment.
- Replace all covers and secure doors before placing equipment into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

ENGLISH

Figure 10: Seismic Anchorage Requirements for Wall-Mounted Enclosures, Label 80463-017-01



Seismic Anchorage Location
Ubicación de los sujetadores antisísmicos
Emplacement d'ancrage anti-séisme

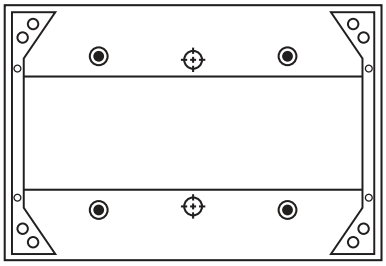
Seismic Anchorage Requirements
Requisitos de los sujetadores antisísmicos
Exigences d'ancrage anti-séisme

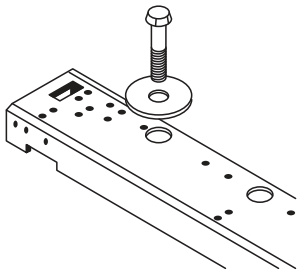
80463-017-01

ENGLISH	SPANISH	FRENCH
• To maintain Seismic Qualification each individual enclosure must be anchored to wall at all five mounting locations shown above. • Refer to the current International Building Code, ASCE/SEI 7, or the National Building Code of Canada for the location-specific values of the 0.2 second spectral value of acceleration (Ss for the U.S. or Sa(0.2) for Canada). • Use 3/8 in. Grade 5 bolts and appropriate washers • In order to develop full strength of the anchor, torque bolts to the value specified by the anchor manufacturer. • Refer to instruction manual for seismic installation instructions.	• Para mantener la calificación sísmica, cada gabinete individual deberá ser sujetado a la pared en las cinco ubicaciones de montaje mostradas en la figura de arriba. • Consulte el código de construcción internacional actual, ASCE/SEI 7, o bien, el código de construcción nacional de Canadá para obtener los valores de la ubicación especifica para la aceleración espectral de 0,2 segundo (Ss para los EUA o Sa(0,2) para Canadá). • Utilice tornillos de 10 mm (3/8 pulg) y rondanas. • Para obtener la máxima resistencia de los herrajes de sujeción, apriételos en los valores especificados por el fabricante. • Consulte el boletín para obtener las instrucciones de instalación antisísmica.	• Pour maintenir la qualification sismique, chaque armoire individuelle doit être ancrée au mur aux cinq emplacements de fixation indiqués ci-dessus. • Se reporter au code de construction international (International Building Code), ASCE/SEI 7 ou au Code national du bâtiment du Canada en vigueur pour la valeur d'accélération spectrale de réponse à 0,2 seconde (Ss aux É-U. ou Sa(0,2) au Canada) applicable à votre site. • Utiliser des boulons grade 5 de 3/8 po et des rondelles appropriées. • Pour développer la résistance totale des ancres, serrer les boulons au couple spécifié par leur fabricant. • Se reporter aux directives d'utilisation pour obtenir les directives d'installation anti-séisme.

Figure 11: Seismic Anchorage Requirements for Floor-Mounted Enclosures, Label 80463-018-01

◉ Seismic Anchorage Location
Ubicación de los sujetadores antisísmicos
Emplacements d'ancrage anti-séisme





Seismic Anchorage Requirements

- To maintain Seismic Qualification each individual section must be anchored at the floor locations shown above.
- For seismic hazard areas with an Ss acceleration value in excess of 2.67g (New Madrid Seismic Hazard Area) each individual section must be laterally braced at the top. Refer to the current International Building Code, ASCE/SEI 7, or the National Building Code of Canada for the location-specific values of the 0.2 second spectral value of acceleration (Ss for the U.S. or Sa(0.2) for Canada).
- Use ½" or ¾" SAE Grade 5 bolts (supplied by others) and the appropriate Belleville Spring washers (supplied with the equipment). In order to develop full strength of the anchor, torque bolts to the value specified by the anchor manufacturer.
- Refer to instruction manual for installation instructions.

Requisitos de los sujetadores antisísmicos

- Para mantener la calificación sísmica, cada sección individuak debe ser sujetada al piso en las ubicaciones que muestra la figura anterior.
- En zonas de riesgo sísmico con un valor de aceleración Ss mayor que 2,67g (zona de riesgo sísmico de Nuevo Madrid), cada sección individual debe ser reforzada por los lados en la parte superior. Consulte el código de construcción internacional actual, ASCE/SEI 7, o bien, el código de construcción nacional de Canadá para obtener los valores de la ubicación específica para la aceleración espectral de 0,2 segundo (Ss para los EUA o Sa(0,2) para Canadá).
- Emplee tornillos de 12 mm (0,5 pulg) o 19 mm (0,75 pulg) SAE grado 5 (provistos por terceros) y roldanas de resorte Belleville apropiadas incluidas con el equipo. Para obtener la máxima resistencia de los herrajes de sujeción, apriételos en los valores especificados por el fabricante.
- Consulte el boletín para obtener las instrucciones de instalación.

Exigences d'ancrage anti-séisme

- Pour maintenir laqualification anti-séisme, chaque section doit être ancrée aux emplacements du sol indiqués ci-dessus.
- Une valeur d'accélération Ss supérieure à 2,67 g (zone sismique de New Madrid), chaque section individuelle doit être ancrée latéralement au haut. Se reporter au code de construction international (International Building Code), ASCE/SEI 7 ou au Code national du bâtiment du Canada en vigueur pour la valeur d'accélération spectrale de réponse à 0,2 seconde (Ss aux É-U. ou Sa(0,2) au Canada), applicable à votre site.
- Utiliser des boulons SAE grade 5 de 12 mm (½ po) ou 19 mm (3/4 po) (fournis par des tiers) et les rondelles de sûreté Belleville appropriées fournies avec l'appareil. Pour exploiter la résistance totale des ancres, serrer les boulons au couple spécifié par leur fabricant.
- Se reporter aux directives d'utilisation pour obtenir les directives d'installation

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ENGLISH

Figure 12: Lateral Bracing Requirements for Floor-Mounted Enclosures, Label 80463-019-01

◉ Seismic Anchorage Location
Ubicación de los sujetadores antisísmicos
Emplacements d'ancrage anti-séisme

Seismic Anchorage Requirements

- For seismic hazard areas with an Ss acceleration value in excess of 2.67g (New Madrid Seismic Hazard Area) each individual section must be laterally braced at the top and connected to the building load bearing structural system. Refer to the current International Building Code, ASCE/SEI 7, or the National Building Code of Canada for the location-specific values of the 0.2 second spectral value of acceleration (Ss for the U.S. or Sa(0.2) for Canada).
- Remove lifting bracket, after the section enclosure has been installed, and attach lateral brace (supplied by others), re-using bolt and lock washer or user supplied hardware.
- Each section must also be anchored at the base (as shown on the instruction label located on the inside of the bottom located horizontal wire-way cover plate).
- Refer to instruction manual for installation instructions.

Requisitos de los sujetadores antisísmicos

- En zonas de riesgo sísmico con un valor de aceleración Ss mayor que 2,67g (zona de riesgo sísmico de Nuevo Madrid), cada sección individual debe ser reforzada por los lados en la parte superior y conectada al sistema estructural de soporte de carga del edificio. Consulte el código de construcción internacional actual, ASCE/SEI 7, o bien, el código de construcción nacional de Canadá para obtener los valores de la ubicación específica para la aceleración espectral de 0,2 segundo (Ss para los EUA o Sa(0,2) para Canadá).
- Retire el soporte de levantamiento después de haber instalado el gabinete de la sección y conecte el soporte lateral (provisto por terceros); vuelva a usar el tornillo y la roldana de sujeción, o bien, los herrajes provistos por el usuario.
- Cada sección debe también ser sujetada a la base como se ilustra en la etiqueta de instrucciones, situada en el interior, en la placa protectora de la canalización de cables horizontal inferior.
- Consulte el boletín para obtener las instrucciones de instalación.

Exigences d'ancrage anti-séisme

- Pour les régions avec risque de séisme ayant une valeur d'accélération Ss supérieure à 2,67 g (zone sismique de New Madrid), chaque section individuelle doit être ancrée latéralement au haut et raccordée au système structural portant la charge de l'immeuble. Se reporter au code de construction international (International Building Code), ASCE/SEI 7 ou au Code national du bâtiment du Canada en vigueur pour la valeur d'accélération spectrale de réponse à 0,2 seconde (Ss aux É-U. ou Sa(0,2) au Canada), applicable à votre site.
- Enlever le support de levage après avoir installé l'armoire de la section et attacher l'ancre latérale (fournie par des tiers) réutilisant le boulon et la rondelle de sûreté ou à l'aide de la quincaillerie fournie par l'utilisateur.
- Chaque section doit être également ancrée à la base (comme indiqué sur l'étiquette de directives placée à l'intérieur de la plaque de recouvrement de la goulotte guide-fils verticale inférieure).
- Se reporter aux directives d'utilisation pour obtenir les directives d'installation

80463-019-01 REV -

Weights

Table 11: Enclosed 22 Controller Ratings and Weights (B05)

Controller Rating			Weight	Enclosure Size Reference
40 °C (104 °F) hp	UL Type 3R or 50 °C (122 °F) hp	V	lb (kg)	
3–10	3–10	208	63 (28)	A
5–15	5–10	230		
10–30	10–25	460		
15–40	15–30	575		
15–25	10–20	208	68 (30)	
20–30	15–25	230		
40–60	30–50	460		
50–75	40–60	575		
30–50	25–40	208	98 (44)	B
40–60	30–50	230		
75–125	60–100	460		
100–150	75–125	575		

ENGLISH

Table 11: Enclosed 22 Controller Ratings and Weights (B05)

Controller Rating			Weight	Enclosure Size Reference
40 °C (104 °F) hp	UL Type 3R or 50 °C (122 °F) hp	V	lb (kg)	
60–125	50–100	208	200 (91)	D
75–150	60–125	230		
150–300	125–250	460		
200–300	150–300	575		
150	125	208	492 (223)	E
200	150	230		
350–400	300–350	460		
400–500	350–400	575		

Table 12: Enclosed 22 Controller Ratings and Weights[1] (S05, N05, R05, Y05)

Controller Rating			Weight	Enclosure Size Reference
40 °C (104 °F) hp	UL Type 3R or 50 °C (122 °F) hp	V	lb (kg)	
3–10	3–10	208	125 (57)	B
5–15	5–10	230		
10–30	10–25	460		
15–40	15–30	575		
15–25	15–20	208	160 (73)	C
20–30	15–25	230		
40–60	30–50	460		
50–75	40–60	575		
30–50	25–40	208	205 (93)	D
40–60	30–50	230		
75–125	60–100	460		
100–150	75–125	575		
60–125	50–100	208	830 (376)	F
75–150	60–125	230		
150–300	125–250	460		
200–300	150–300	575		
150	125	208	976 (443)	G
200	150	230		
350–400	300–350	460		
400–500	350–400	575		

[1] The weight is supplied for power circuit Y05 (integral bypass) and may differ for different power options and miscellaneous options selected.

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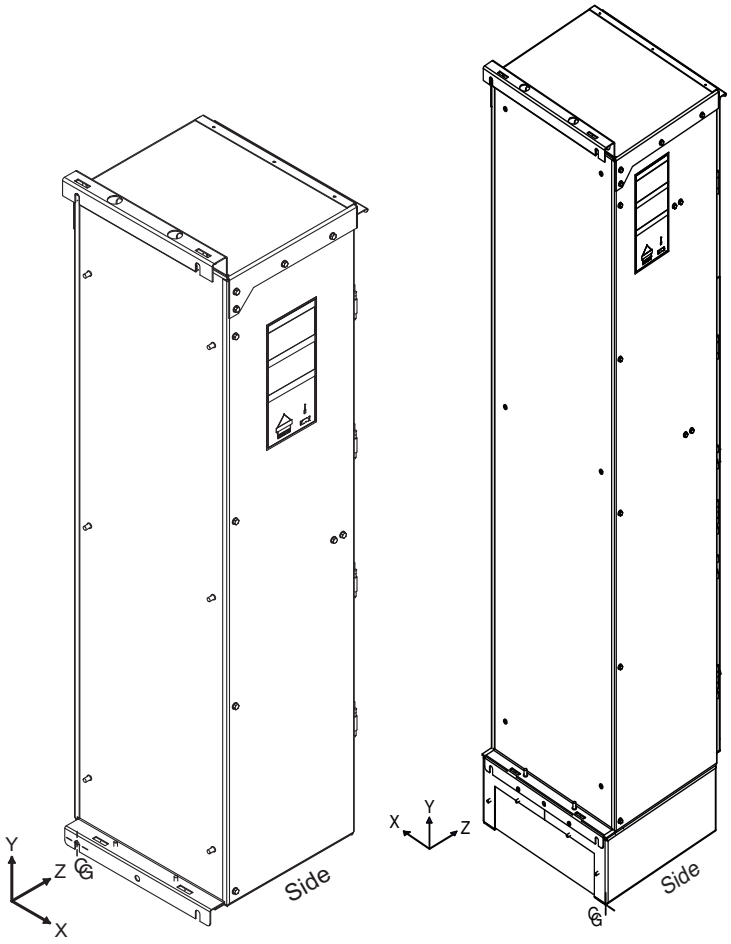
Center of Gravity

Center of gravity information is provided for reference in mounting and for consideration in structural analysis. The information is provided with reference to the lower left-hand (wall-mounted) or right-hand (floor-mounted) corner of the controllers. See Figure 13.

Figure 13: Center of Gravity



Wall-Mounted Floor-Mounted

Table 13: Center of Gravity (B05)

Controller Rating			X in. (mm)	Y in. (mm)	Z in. (mm)	Enclosure Size Reference
40 °C (104 °F) hp	UL Type 3R or 50 °C (122 °F) hp	V				
3–25	15–20	208	4.6 (116.8)	15.4 (391.2)	6.7 (170.2)	A
5–30	15–25	230				
10–60	30–50	460				
15–75	40–60	575				
30–50	25–40	208	4.9 (124.5)	26.6 (675.6).	7.8 (177.8)	B
40–60	30–50	230				
75–125	60–100	460				
100–150	75–125	575				
60–125	50–100	208	5.9 (149.9)	35.0 (889.0)	8.1 (205.7)	D
75–150	60–125	230				
150–300	125–250	460				
200–300	150–300	575				
150	125	208	10.8 (274.3)	54.8 (1391.9)	9.8 (228.6)	E
200	150	230				
350–400	300–350	460				
400–500	350–400	575				

Table 14: Center of Gravity[1] (S05, N05, R05, Y05)

Controller Rating			X in. (mm)	Y in. (mm)	Z in. (mm)	Enclosure Size Reference
40 °C (104 °F) hp	UL Type 3R or 50 °C (122 °F) hp	V				
3–10	3–10	208	5.6 (142.2)	24.6 (624.8)	7.6 (193.0)	B
5–15	5–10	230				
10–30	10–25	460				
15–40	15–30	575				
15–25	15–20	208	5.8 (147.3)	26.7 (678.2)	7.2 (182.9)	C
20–30	15–25	230				
40–60	30–50	460				
50–75	40–60	575				
30–50	25–40	208	6.5 (165.1)	33.3 (845.8)	8.0 (203.2)	D
40–60	30–50	230				
75–125	60–100	460				
100–150	75–125	575				
60–125	50–100	208	13.4 (340.4)	53.8 (1366.5)	8.9 (226.1)	F
75–150	60–125	230				
150–300	125–250	460				
200–300	150–300	575				
150	125	208	15.9 (403.9)	52.7 (1338.6)	10.2 (259.1)	G
200	150	230				
350–400	300–350	460				
400–500	350–400	575				

[1] The center of gravity measurements are provided for power circuit Y05 (integral bypass) and may differ for different power options and miscellaneous options selected.

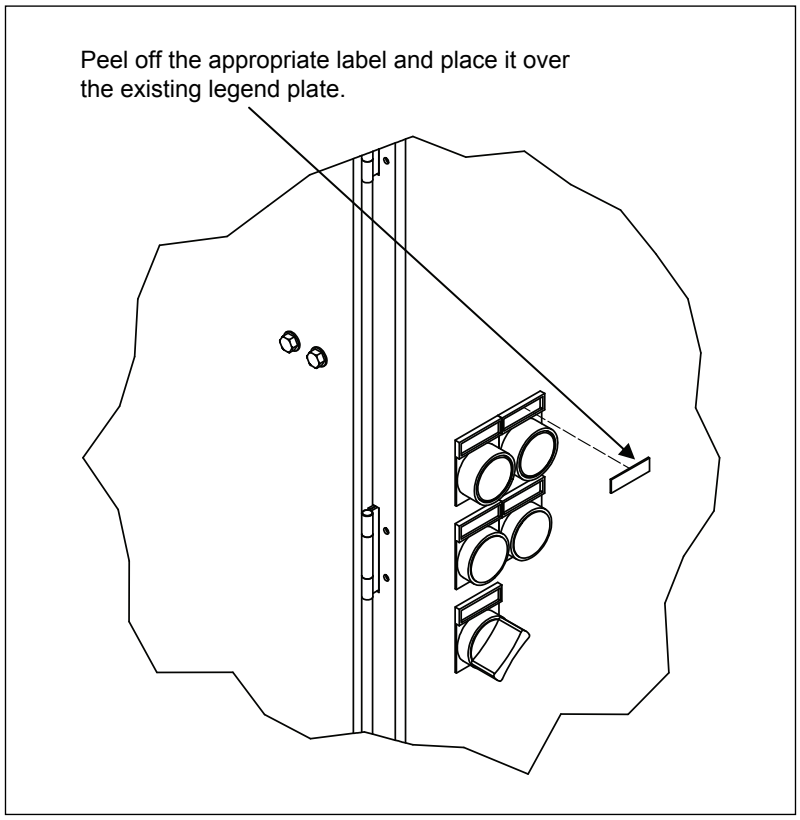
ENGLISH

Trilingual Legend Plate Kit

A trilingual legend plate kit is included in the Enclosed 22 instruction package. The kit is for applications that require operator and light legend plates displayed in Spanish or French.

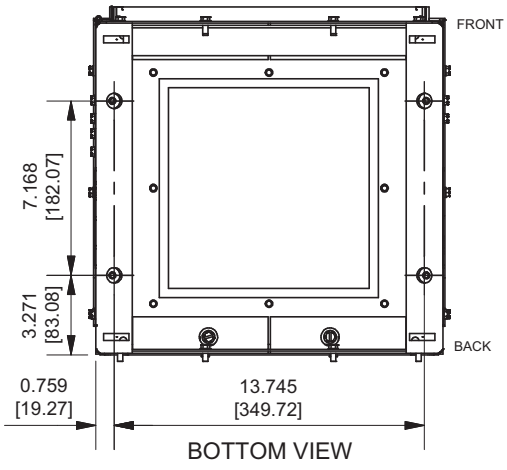
Select the appropriate label from the kit and place it over the existing legend plate as illustrated in Figure 14.

Figure 14: Label Installation



Installing the Optional Floor-Mounting Kit (MOD A10)

Figure 15: Anchor Mounting Holes for Floor-Mounting Kit (in. [mm])



The optional floor-mounting kit is available for all power options in size D enclosures. Refer to Tables 11 and 12 on pages 34 and 35 for applicable power circuit, enclosure type, and horsepower range.

⚠ WARNING

TOPPLING AND CRUSHING HAZARD

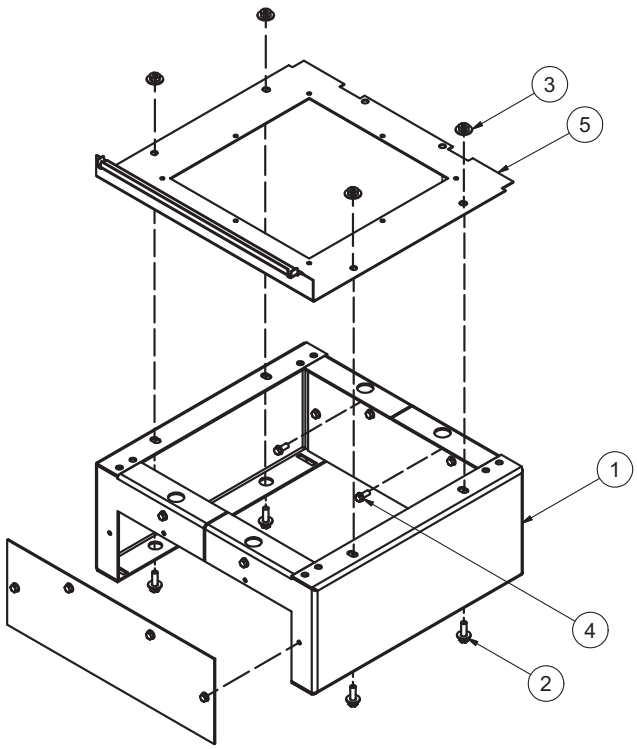
- Follow all recommended practices when anchoring and securing seismically rated equipment.
- Replace all covers and secure doors before placing equipment into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The kit comes with the Enclosed 22 controller in a separate package and includes the hardware required for mounting the assembly. To install the kit (refer to Figure 16 for numbered items):

1. Remove the lag screws securing the enclosure to the shipping pallet before attaching the floor-mounting kit.
2. Remove the four screws (**2**) attached to the enclosure bottom plate (**5**).
3. Using the supplied nuts (**3**), attach the floor kit (**1**) to the enclosure bottom plate (**5**). Open the enclosure door and tighten the bolted assembly to 60–72 lb-in (6.8–8.1 N•m).
4. Attach two screws (**4**) to the bottom flange of the enclosure. Tighten the screws to 40–48 lb-in (4.5–5.4 N•m).
5. Close the enclosure door. The floor-mounting kit is installed and the Enclosed 22 controller is ready for installation.

Figure 16: Floor-Mounting Kit



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Dimensions

Figure 17: Size A Enclosure

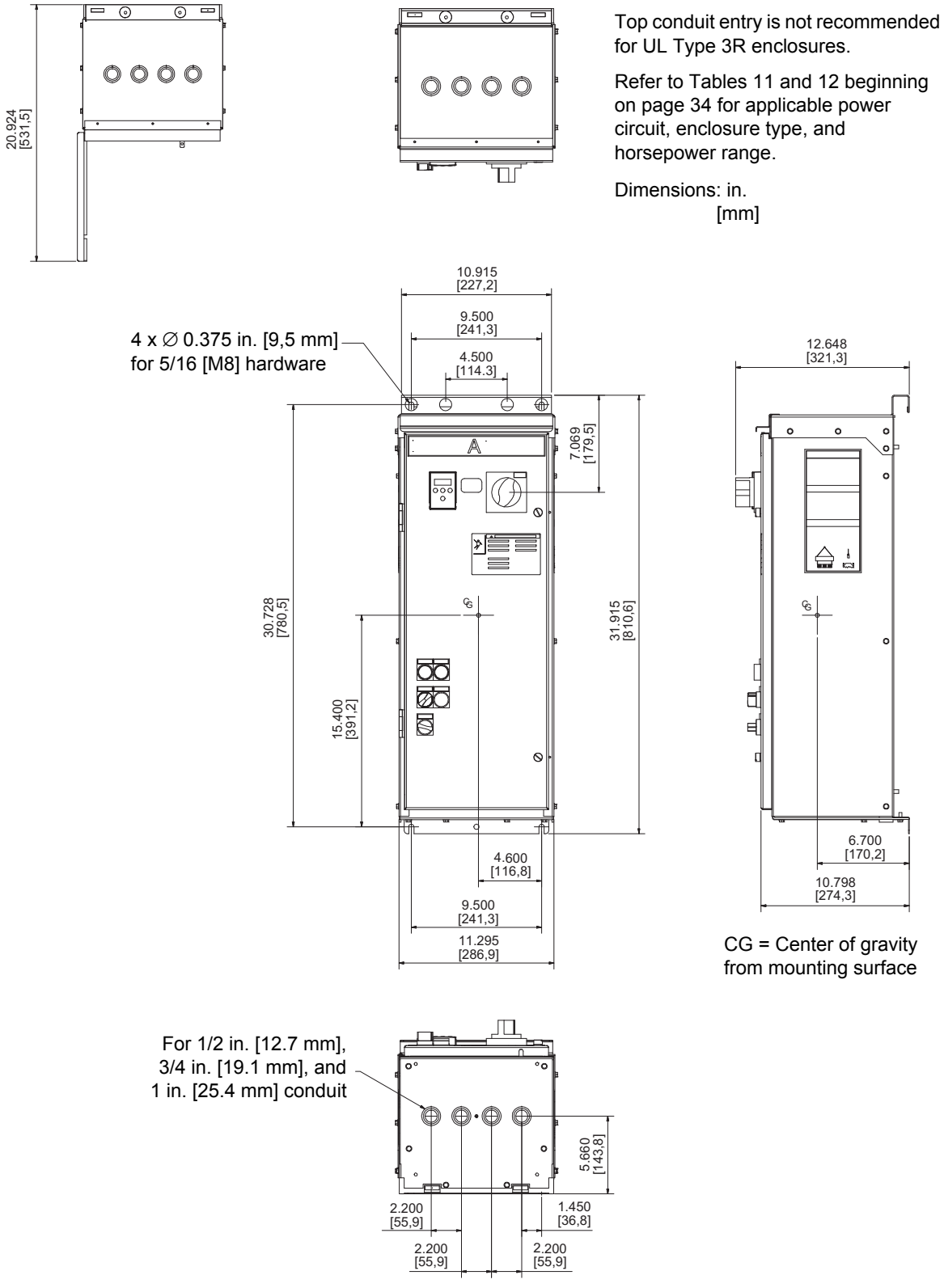

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Figure 18: Size B Enclosure

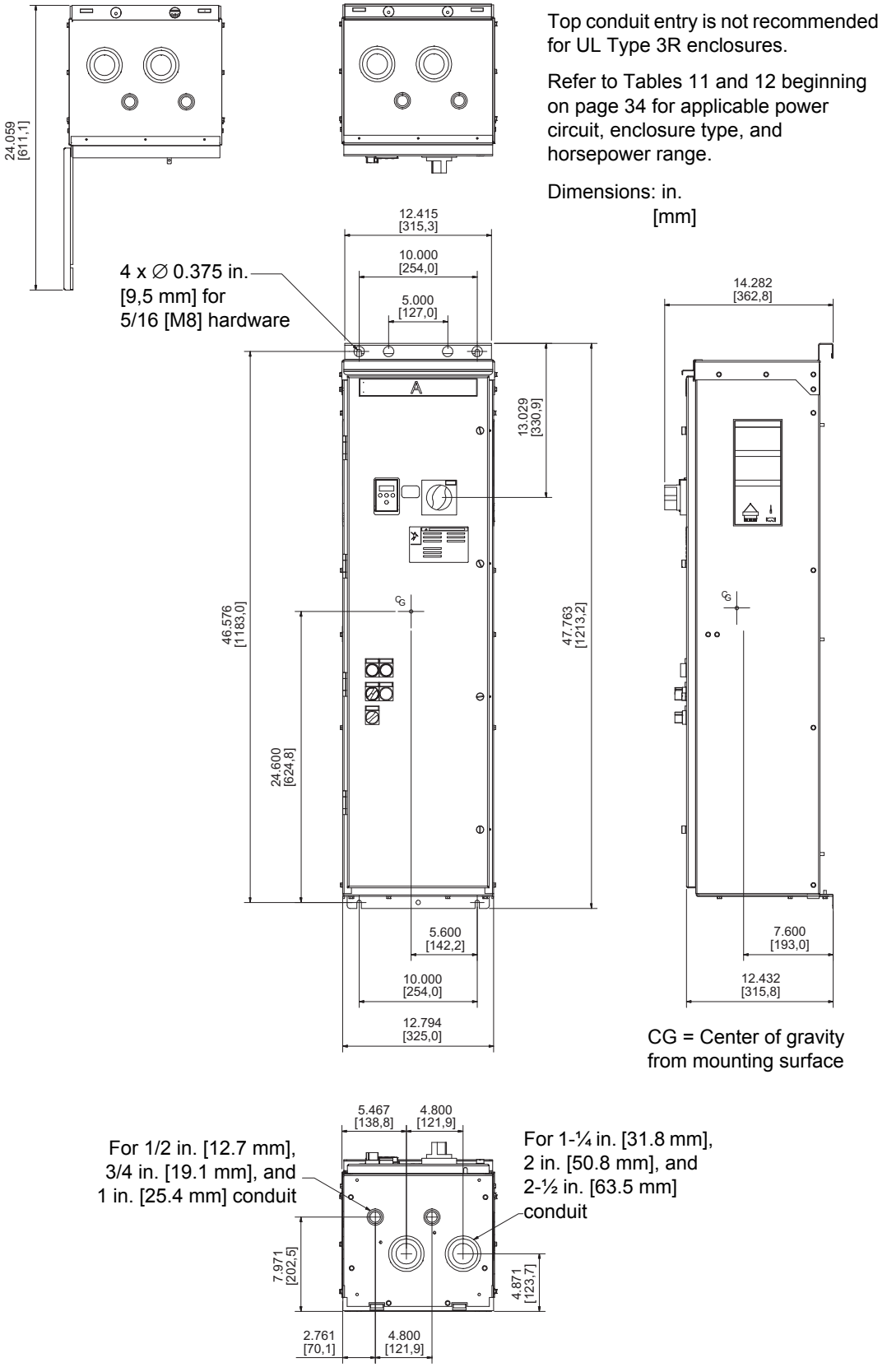

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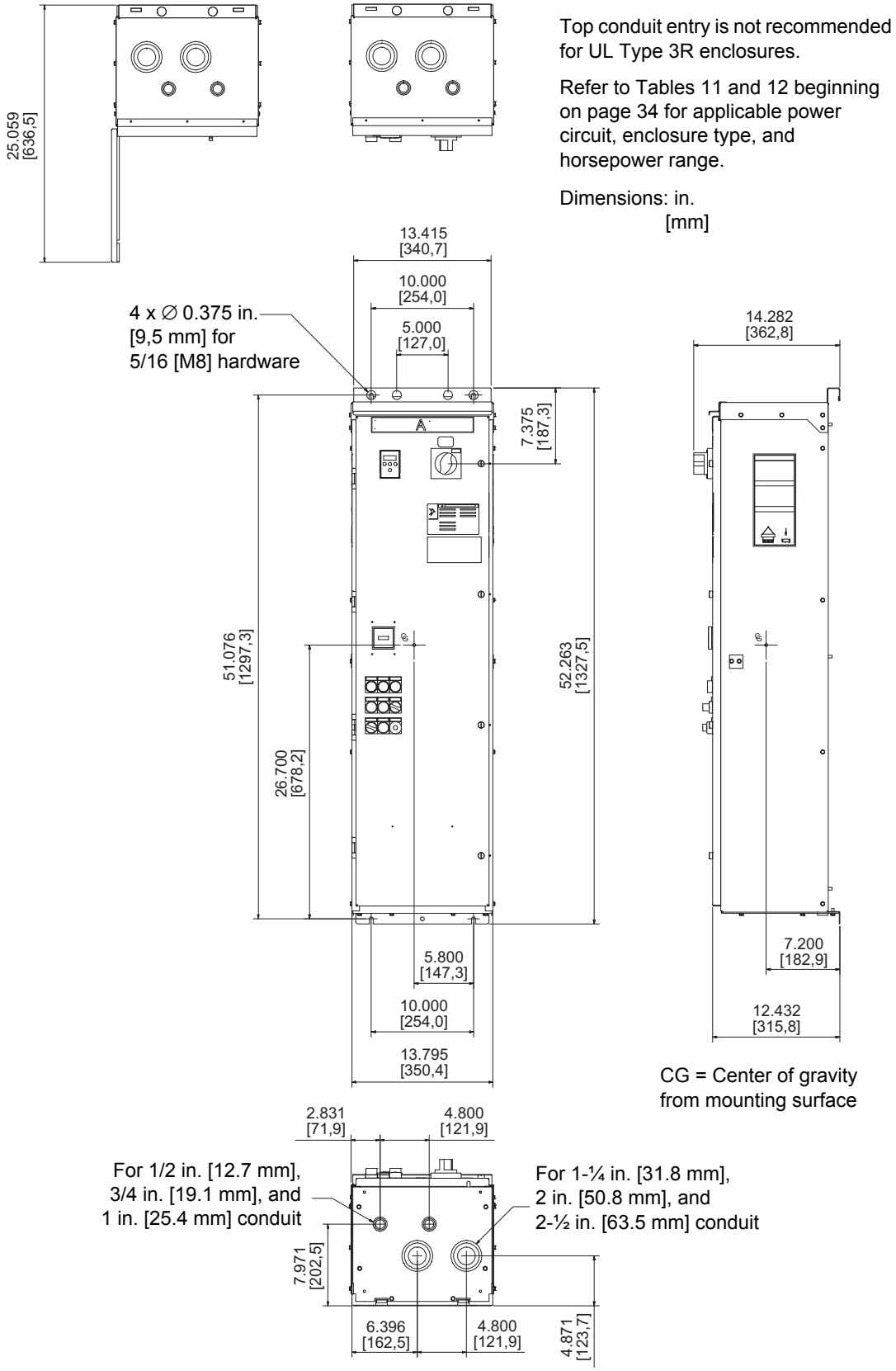
Figure 19: Size C Enclosure



ENGLISH

Figure 20: Size D Enclosure

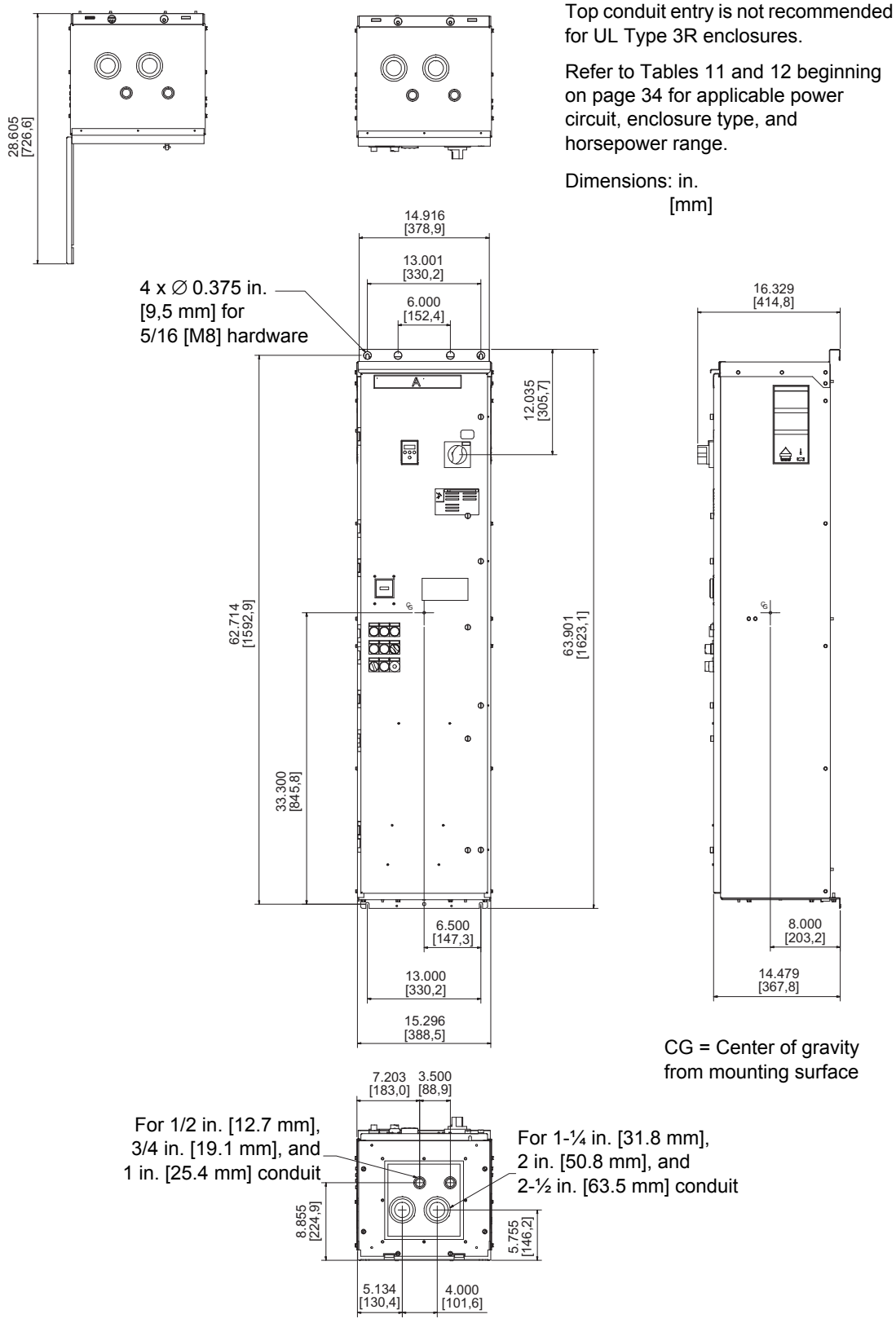


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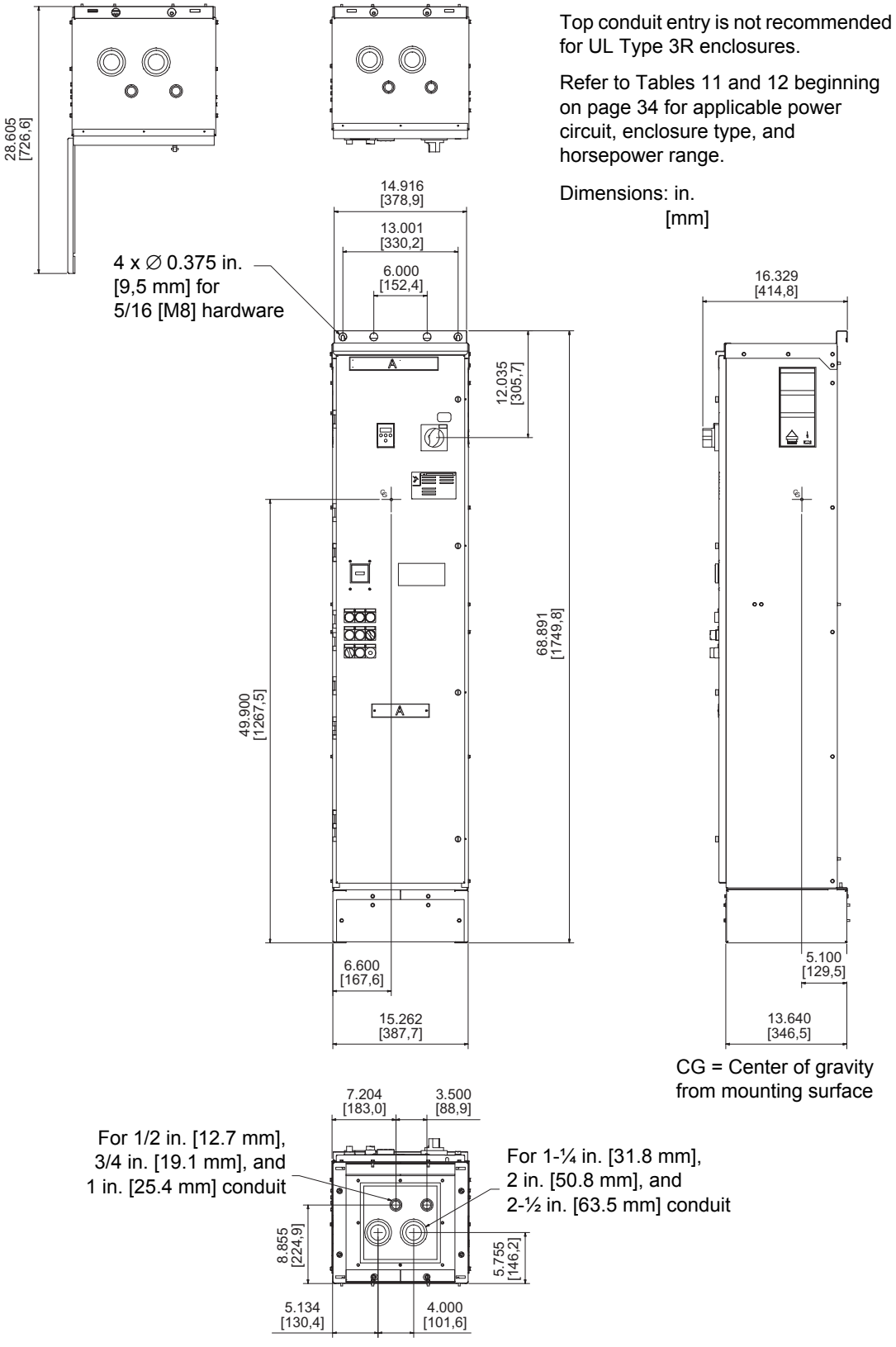
Figure 21: Size D Enclosure with Floor-Mounting Kit



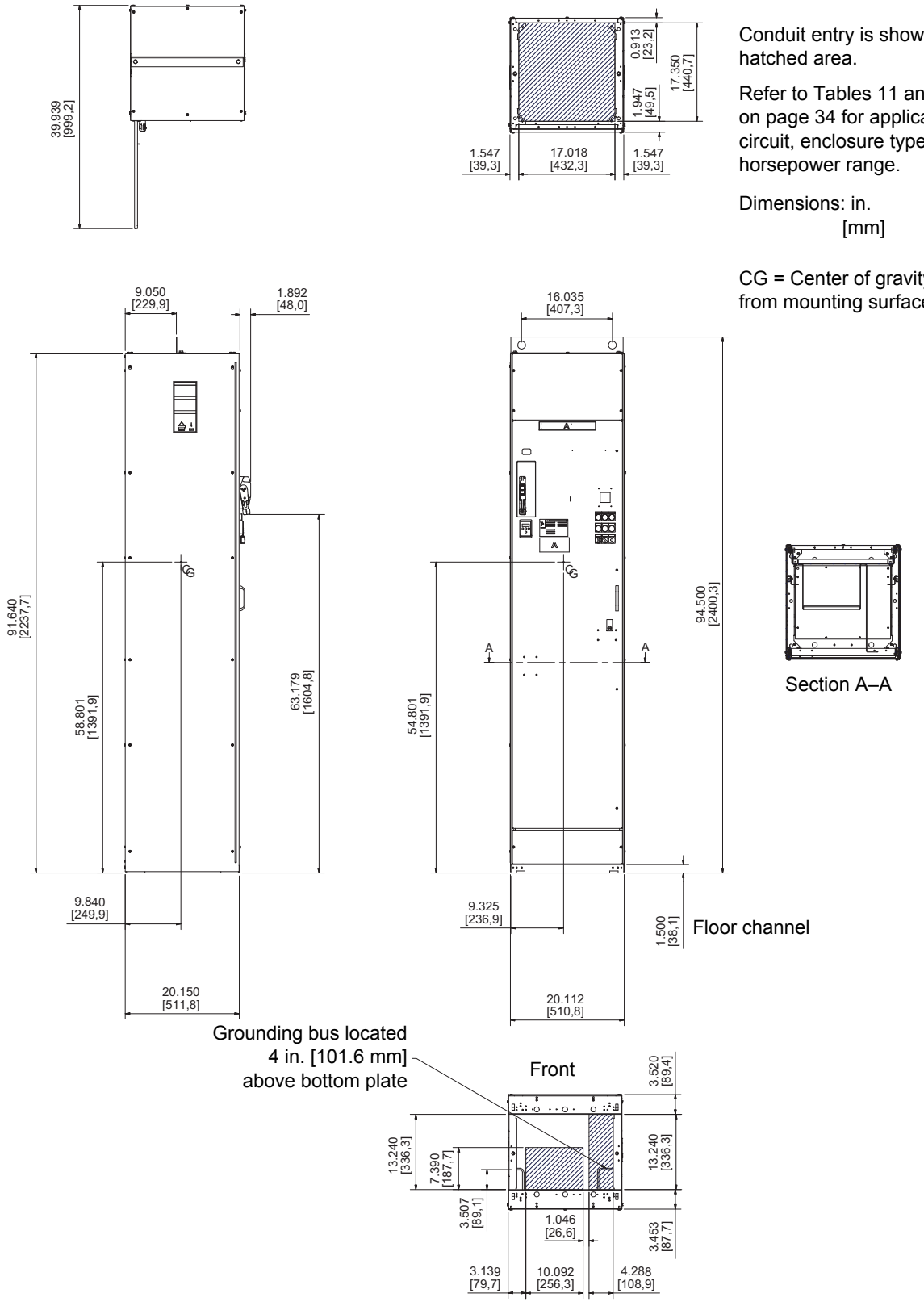
Top conduit entry is not recommended for UL Type 3R enclosures.

Refer to Tables 11 and 12 beginning on page 34 for applicable power circuit, enclosure type, and horsepower range.

Dimensions: in.
[mm]

ENGLISH

Figure 22: Size E Enclosure, Type 1 and 12



Conduit entry is shown as cross-hatched area.

Refer to Tables 11 and 12 beginning on page 34 for applicable power circuit, enclosure type, and horsepower range.

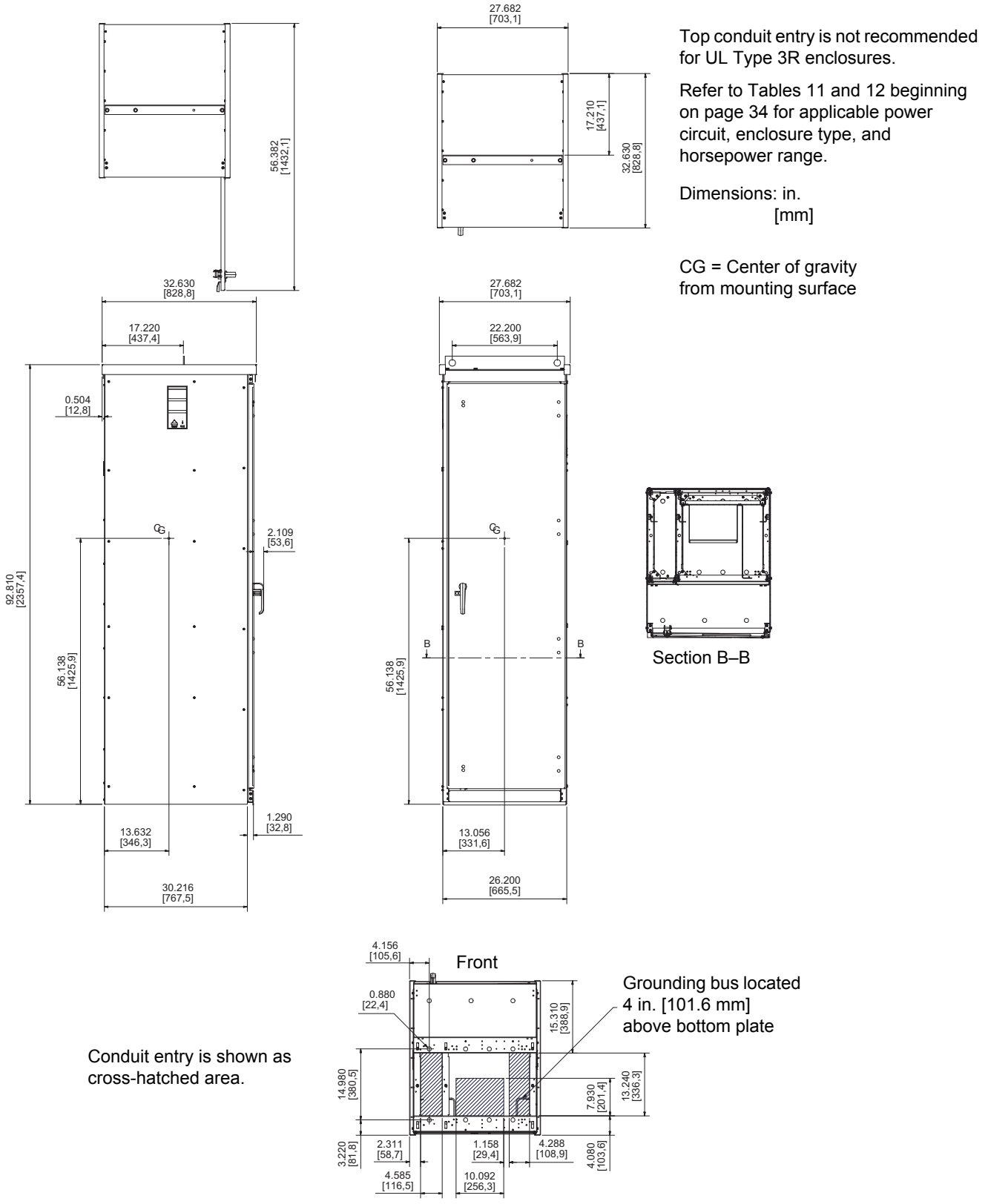
Dimensions: in.
[mm]

CG = Center of gravity from mounting surface

Section A–A

ENGLISH

Figure 23: Size E Enclosure, Type 3R



Top conduit entry is not recommended for UL Type 3R enclosures.

Refer to Tables 11 and 12 beginning on page 34 for applicable power circuit, enclosure type, and horsepower range.

Dimensions: in.
[mm]

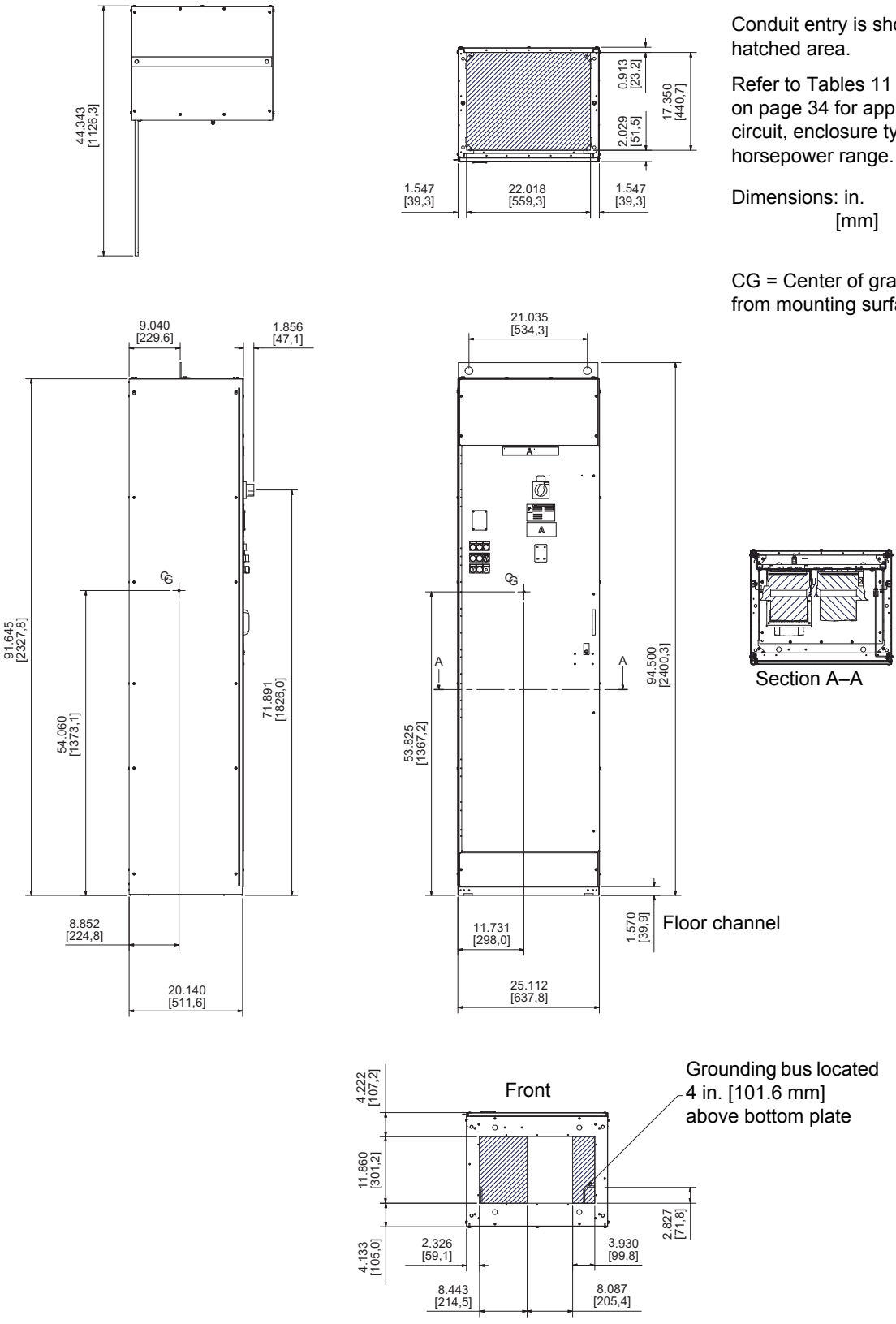
CG = Center of gravity from mounting surface

Grounding bus located 4 in. [101.6 mm] above bottom plate

Conduit entry is shown as cross-hatched area.

ENGLISH

Figure 24: Size F Enclosure, Type 1 and 12



Conduit entry is shown as cross-hatched area.

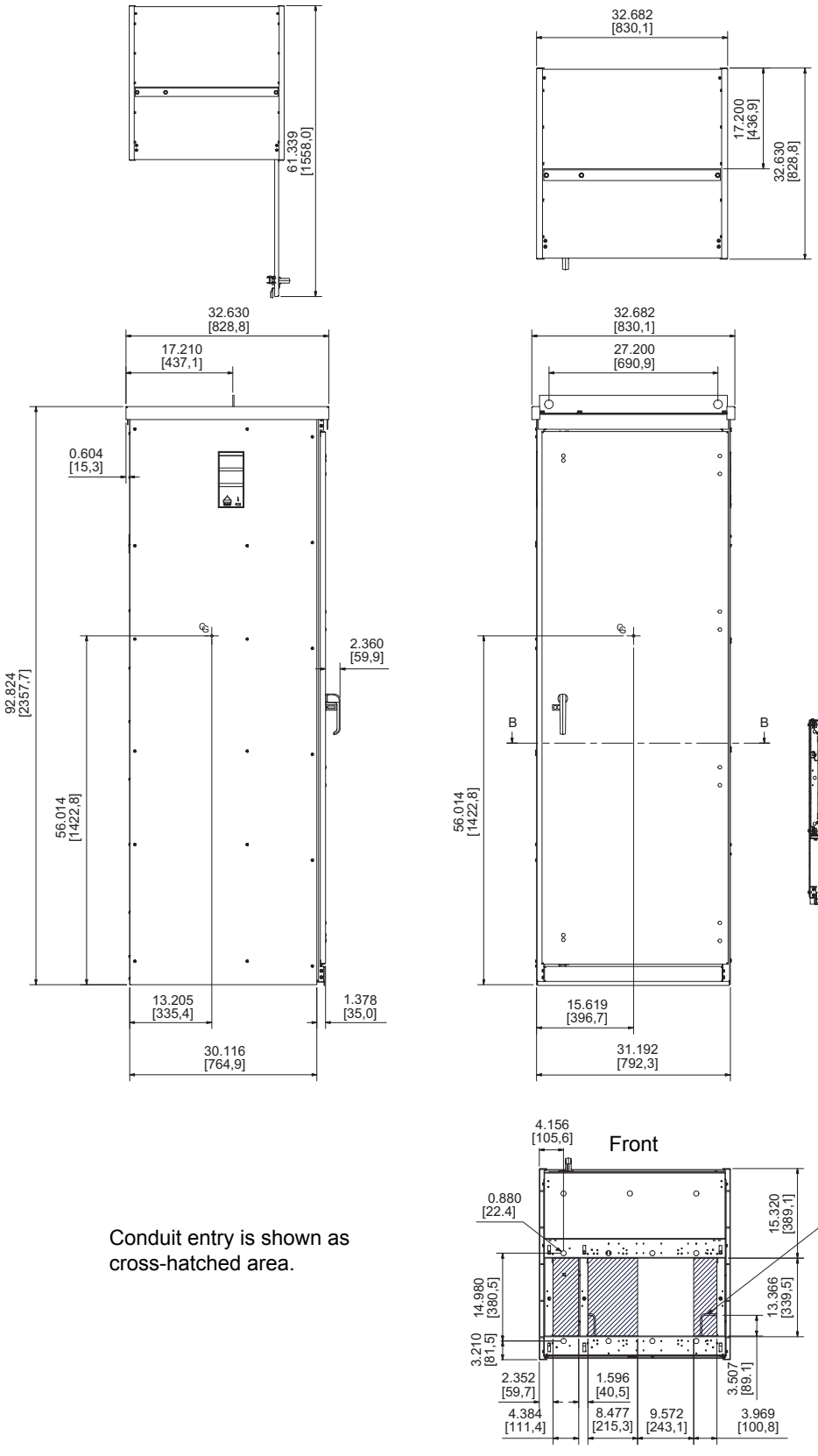
Refer to Tables 11 and 12 beginning on page 34 for applicable power circuit, enclosure type, and horsepower range.

Dimensions: in.
[mm]

CG = Center of gravity from mounting surface

ENGLISH

Figure 25: Size F Enclosure, Type 3R



Top conduit entry is not recommended for UL Type 3R enclosures.

Refer to Tables 11 and 12 beginning on page 34 for applicable power circuit, enclosure type, and horsepower range.

Dimensions: in.
[mm]

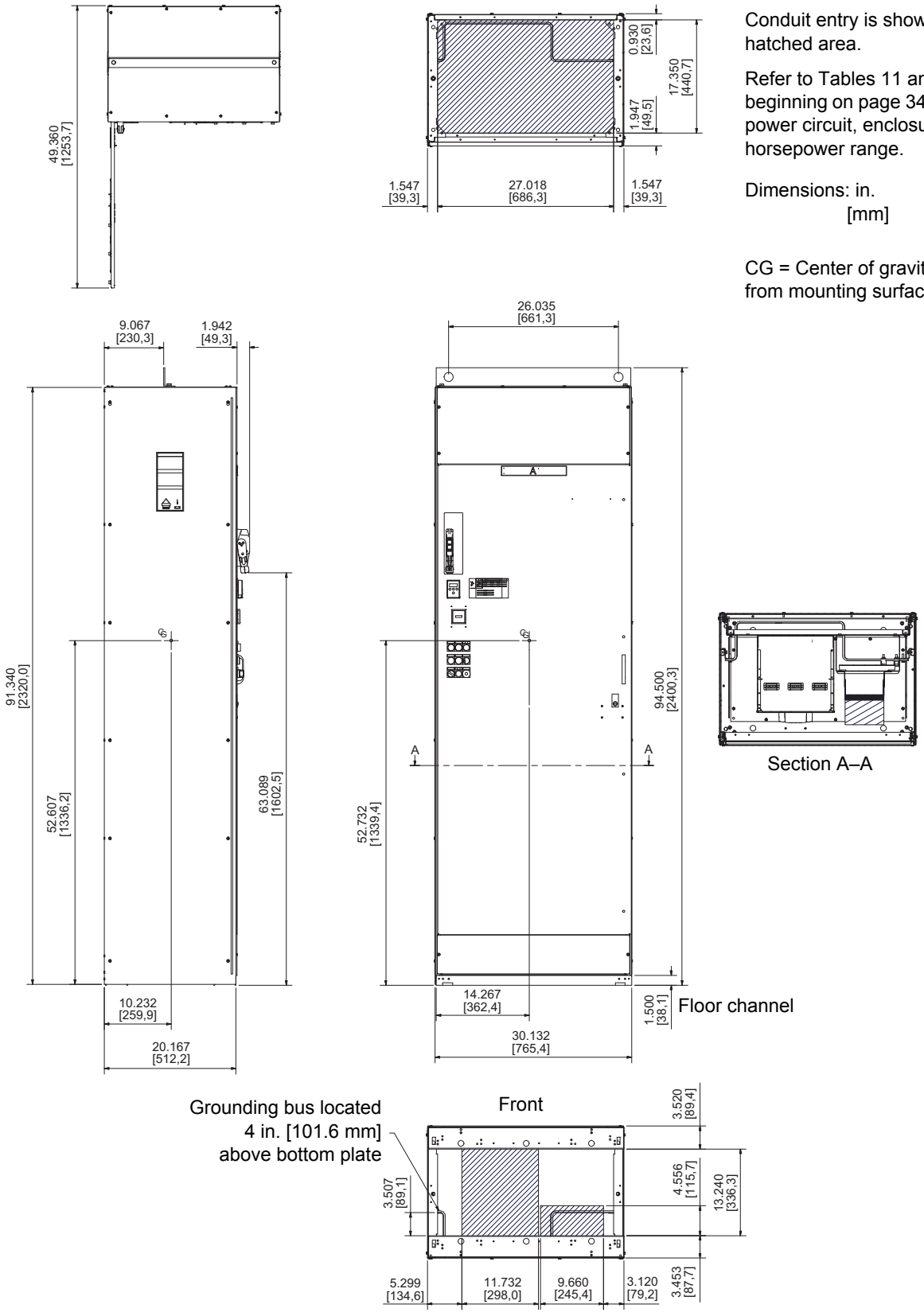
CG = Center of gravity from mounting surface

Conduit entry is shown as cross-hatched area.

Grounding bus located 4 in. [101.6 mm] above bottom plate

ENGLISH

Figure 26: Size G Enclosure, Type 1 and 12



Conduit entry is shown as cross-hatched area.

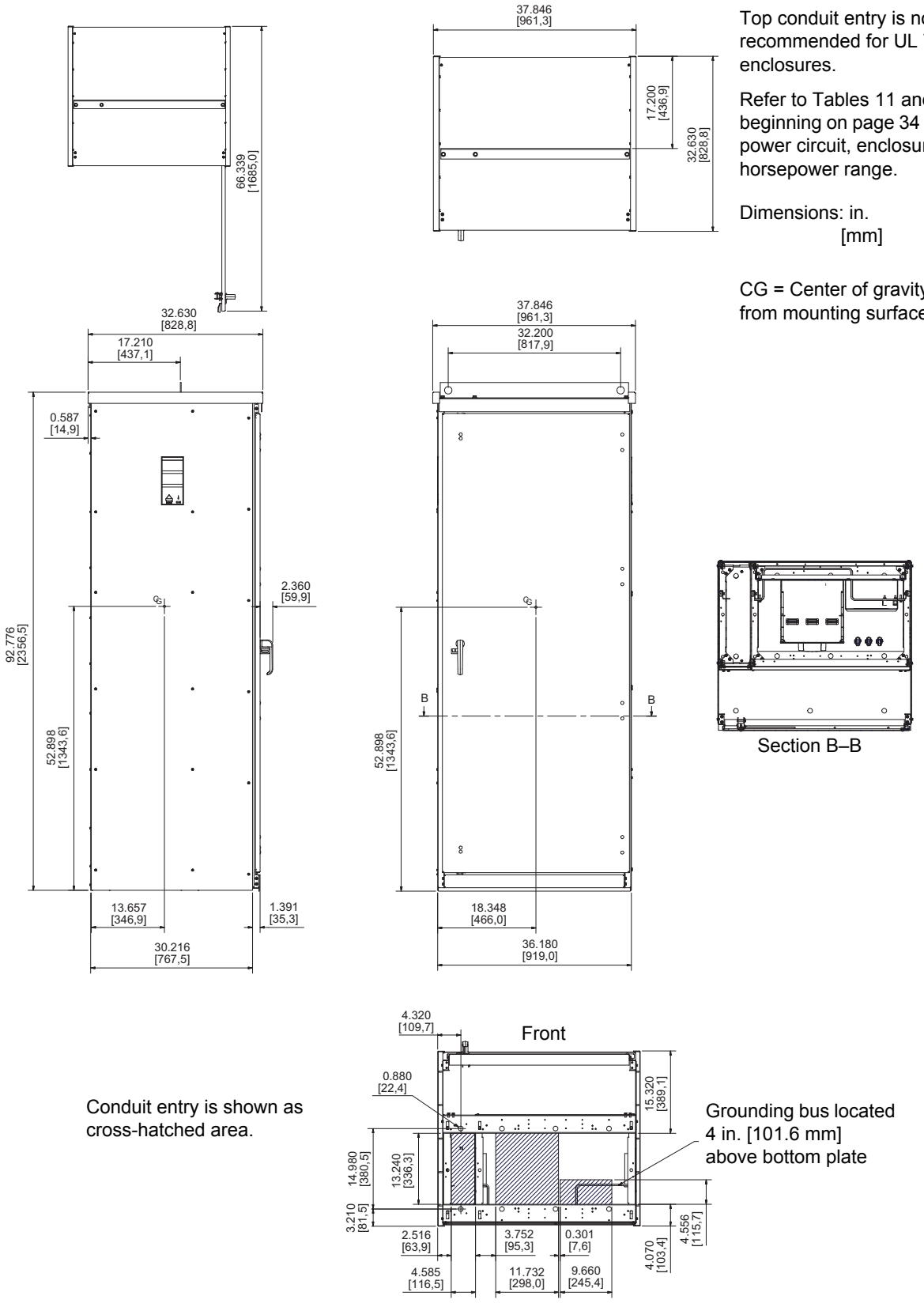
Refer to Tables 11 and 12 beginning on page 34 for applicable power circuit, enclosure type, and horsepower range.

Dimensions: in.
[mm]

CG = Center of gravity from mounting surface

ENGLISH

Figure 27: Size G Enclosure, Type 3R



Top conduit entry is not recommended for UL Type 3R enclosures.

Refer to Tables 11 and 12 beginning on page 34 for applicable power circuit, enclosure type, and horsepower range.

Dimensions: in.
[mm]

CG = Center of gravity from mounting surface

Conduit entry is shown as cross-hatched area.

Grounding bus located 4 in. [101.6 mm] above bottom plate

Electrical Installation

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Turn off all power (main and remote) before installing the equipment.
- Read and understand the precautions in “Before You Begin” on page 8 before performing the procedures in this section.

Failure to follow these instructions will result in death or serious injury.

General Wiring Practices

Good wiring practice requires the separation of control circuit wiring from all power wiring. **Do not run power and/or control or multiple power wiring in the same conduit**. This separation reduces the possibility of coupling electrical transients from power circuits into control circuits or from motor power wiring into other power circuits.

⚠ CAUTION

IMPROPER WIRING HAZARD

Follow the wiring practices described in this document in addition to those already required by the National Electrical Code and local codes.

Failure to follow these instructions can result in injury or equipment damage.

When wiring the Enclosed 22 controller:

- Use the knockouts identified in Figures 17–21, or punch conduit holes in the locations specified in Figures 22–27 for control and power wiring.
- Use metallic conduit for all controller wiring. Do not run control and power wiring in the same conduit.
- Separate metallic conduits carrying power wiring or low-level control wiring by at least 3 inches (76 mm).
- Separate existing, non-metallic conduits or cable trays used to carry power wiring from metallic conduit carrying low-level control wiring by at least 12 inches (305 mm).
- Whenever power and control wiring cross, the metallic conduits and non-metallic conduits or trays must cross at right angles.
- Use water-tight rated conduit hubs to make connections between the conduit and the UL Type 3R enclosures. Conduit connections through the top of the enclosure are not recommended.

Input Wiring

Size the ampacity of the input power conductors according to the National Electrical Code (U.S. and Mexico) or the Canadian Electrical Code (Canada) and applicable local codes based on the motor full load current.

Connect the mains power conductors to terminals L1, L2, and L3 at the top of the circuit breaker.

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Grounding

Ground the Enclosed 22 controller according to the National Electrical Code (NEC) or Canadian Electrical Code (CEC) and all local codes. To ground the controller:

- Connect a copper wire from the grounding bar terminal to the power system ground.
- Verify that the resistance to ground is 1 Ω or less. Improper grounding causes intermittent and unreliable operation.

⚠ DANGER

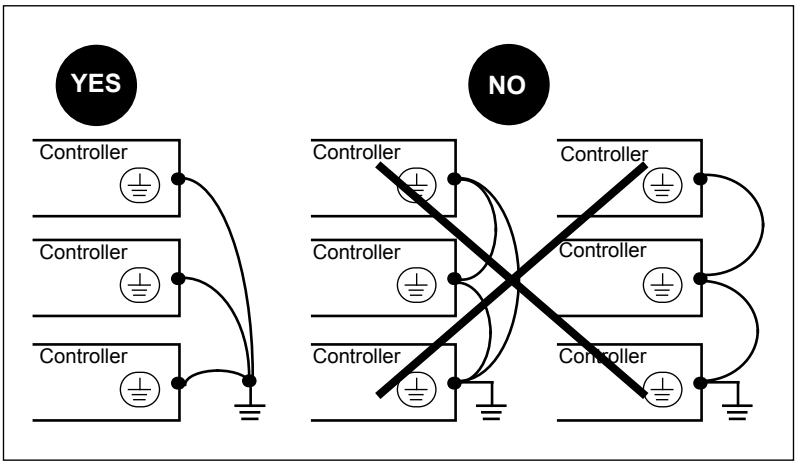
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Ground equipment using the provided grounding connection point as shown in Figures 33 to 37 (pages 59 to 63). The controller panel must be properly grounded before power is applied.
- Do not use metallic conduit as a grounding conductor.

Failure to follow these instructions will result in death or serious injury.

Ground multiple controllers as shown in Figure 28. Use one grounding conductor per device. Do not loop grounding conductors or install them in series.

Figure 28: Grounding Multiple Controllers



Output Wiring

Size the ampacity of motor power conductors according to the motor full load current, NEC or CEC, and applicable local codes.

- Depending on the control circuit selected, connect the motor conductors to terminals T1, T2, and T3 at the bottom of the soft starter, overload relay, or distribution block.
- Connect the motor ground to the grounding bar provided. See Figures 33 to 37 (pages 59 to 63).
- Do not use the Enclosed 22 controller in applications where extremely long output cables are required. Maximum output cable length for standard duty motors is 1300 ft. (400 m). For applications exceeding this cable length, consult the your local Schneider Electric field sales representative.

Wire Routing and Interconnection

Wire Class

The Wire Class describes the compatibility of the field wiring terminal with the conductor material and insulation system. When used in conjunction with the required conductor current rating and the controller ambient temperature rating, the Wire Class forms the basis for selecting a conductor size that limits the temperature on the conductor insulation at the field wiring terminal to acceptable limits. Conductors with operating temperatures exceeding those given by the Wire Class can be used, but the conductor size must be selected based on the Wire Class limits.

EMI Class

The EMI (electromagnetic interference) Class categorizes the electromagnetic properties of the voltages and currents present. The six EMI Class categories determine proper wiring methods and physical segregation. See Figures 29–32 on pages 54–57 and Table 15 on page 58.

Quiet Wiring 1 (QW1)

High-susceptibility analog and digital control signals. Signals falling under the classification of QW1 include digital communication/network circuits, controller analog I/O and analog process signals.

Quiet Wiring 2 (QW2)

Medium-susceptibility analog and digital control signals. Signals falling under the classification of QW2 include 24 Vdc and 24 Vac control circuits.

Standard Wiring 1 (SW1)

Low-Susceptibility control or power circuits rated less than 600 Vac (250 Vdc) and less than 15 A (voltage and current spectra are generally contained within 0.05–9 kHz). Signals falling under the classification of SW1 include 120 Vac control circuits.

Standard Wiring 2 (SW2)

Power circuits rated greater than 15 A (voltage and current spectra are generally contained with 0.05–9 kHz). Signals falling under the classification of SW2 include line power to controllers.

Standard Wiring 3 (SW3)

Reserved.

Pulse Wiring 1 (PW1)

Control or power circuits whose voltage or current spectra significantly exceed 9 kHz. Signals falling under the classification of PW1 include motor and dynamic braking circuits fed from PWM (pulse width modulation) power converters.

Voltage Class

The Voltage Class groups the voltages present into recognized conductor insulation categories (30,150, 300, and 600 V) for selection of conductor insulation voltage rating and physical segregation.

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Figure 29: Power Circuit B05 Wire Routing: EMI Class Groups

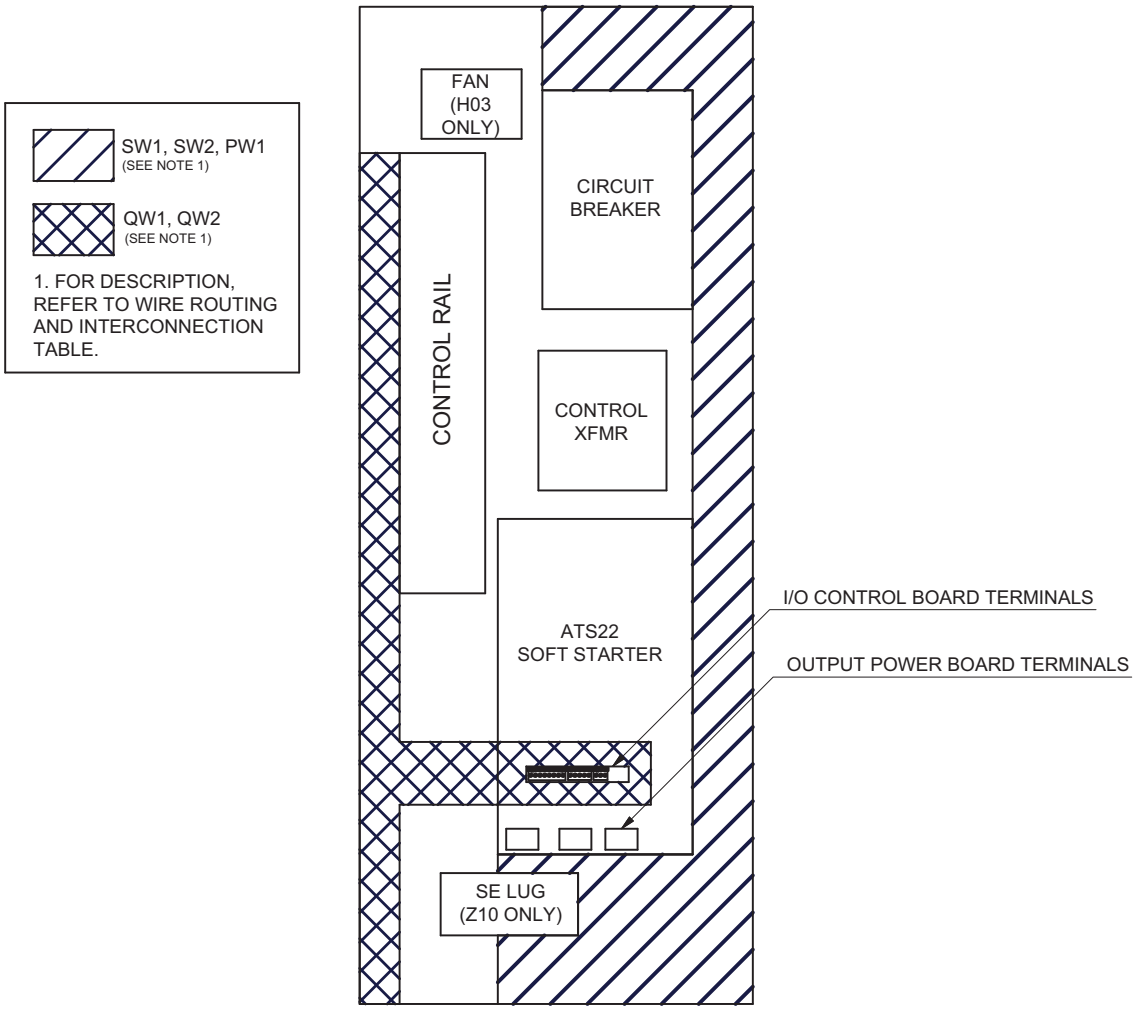

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Figure 30: Power Circuit B05 Wire Routing: EMI Class Groups

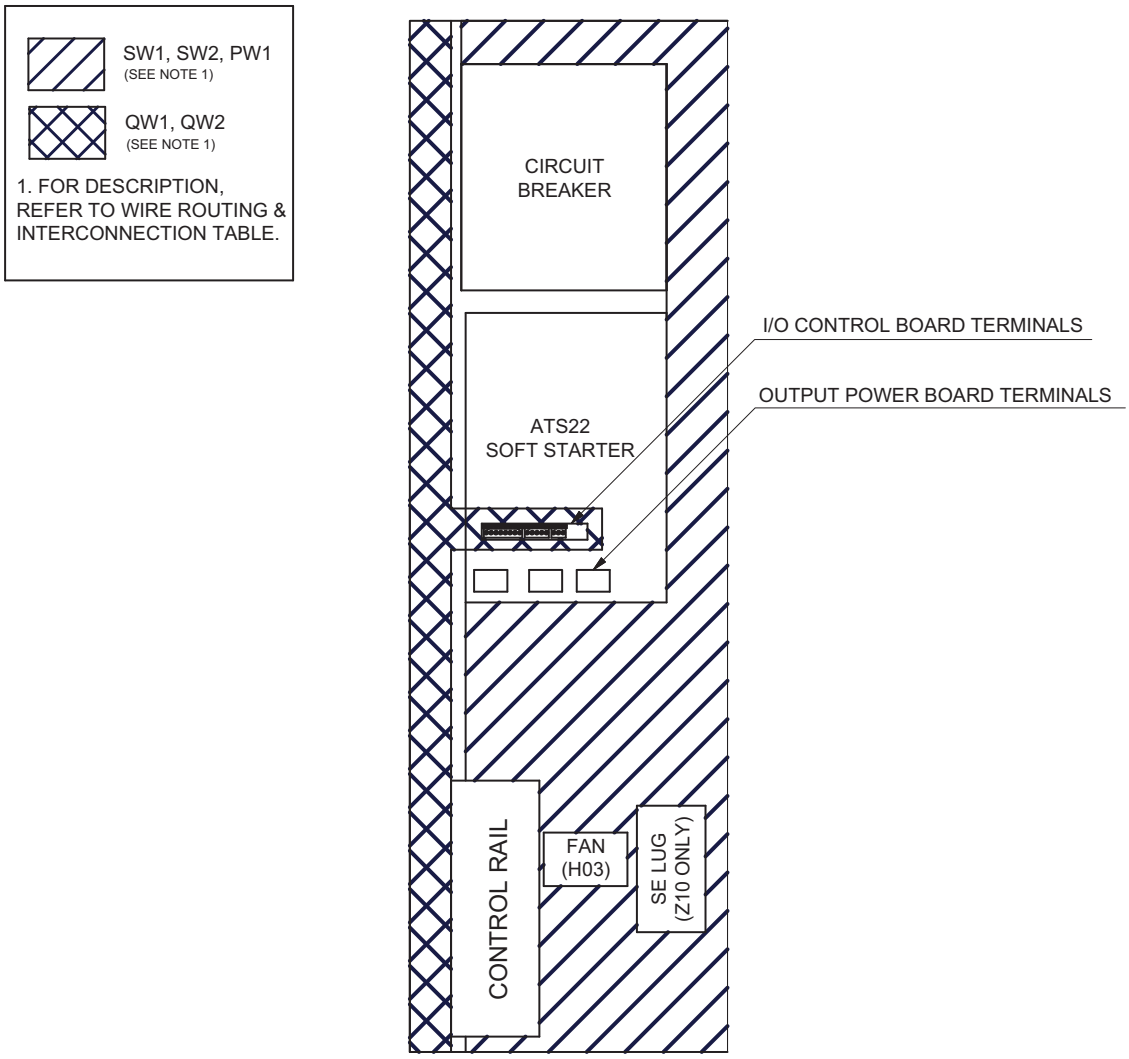

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Figure 31: Power Circuit S05, N05, R05 and Y05 Wire Routing: EMI Class Groups

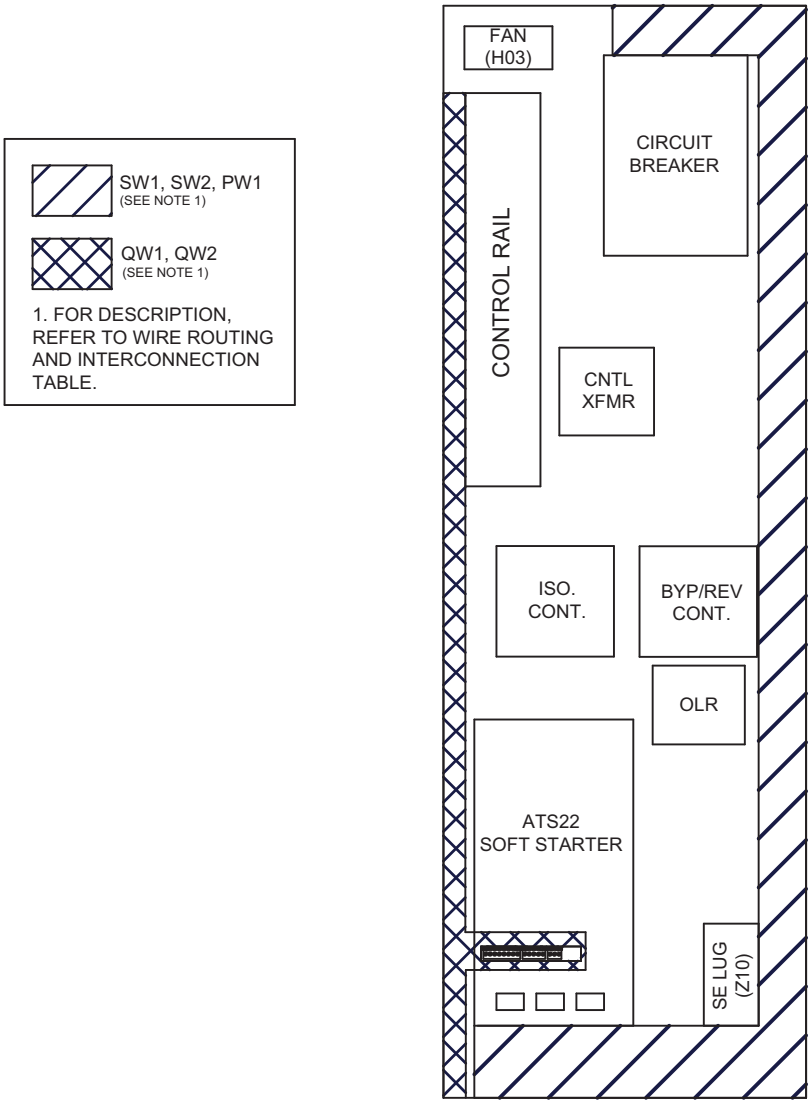

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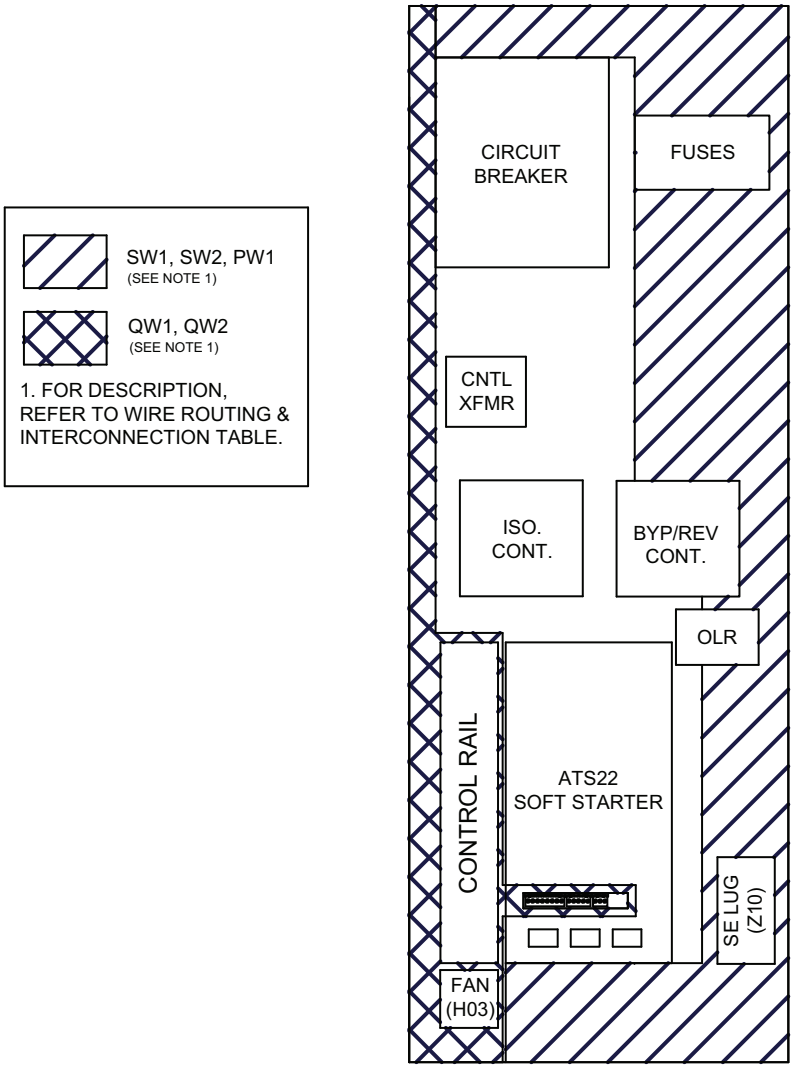
Figure 32: Power Circuit S05, N05, R05 and Y05 Wire Routing: EMI Class Groups



Wiring Methods

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Route and secure all conductors to prevent damage to insulation when installing them under or near sharp edges.
- When possible, use jacketed conductors.

Failure to follow these instructions will result in death or serious injury.

Based on the EMI Class and Voltage Class of the conductors, apply the wiring methods described in Table 15 on page 58.

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Table 15: Wire Routing and Interconnection

Wiring Methods and Considerations	EMI Class of Conductors[1]				
	QW1	QW2	SW1	SW2	PW1
Conductor Grouping in Wireways and Conduits					
1. Bundle all conductors of 1- or 3-phase AC power circuits to minimize stray magnetic fields.			X	X	X
2. Bundle all conductors of a DC power circuit to minimize stray magnetic fields.			X	X	X
3. When parallel conductors must be run in separate wireways or conduit, bundle the conductors into groups to minimize stray magnetic fields.				X	X
4. Maintain conductor runs that are as short and direct as possible.	X	X	X	X	X
Separation of Circuits					
1. Do not run different EMI Class conductors in the same conduit.	X	X	X	X	X
2. Do not run different Voltage Class conductors in the same conduit unless all conductors are insulated for the maximum Voltage Class present.	X	X	X	X	X
3. Separate all conductors by EMI Class. Use the following circuit separation when conductors run parallel for more than 12 in. (305 mm).					
• Metallic conduit: 3 in. (76 mm) from QW to SW or PW	X	X	X	X	X
• Metallic tray: 3 in. (76 mm) from SW to PW			X	X	X
• Metallic tray: 6 in. (152 mm) from QW to SW or PW	X	X	X	X	X
• Against continuous metal surface: 3 in. (76 mm) from SW to PW			X	X	X
• Against continuous metal surface: 6 in. (152 mm) from QW to SW or PW	X	X	X	X	X
• Metallic conduit housing QW: 12 in. (305 mm) to non-metallic conduit SW or PW	X	X	X	X	X
• Non-metallic conduit: 3 in. (76 mm) from SW to PW			X	X	X
• Non-metallic conduit: 23 in. (584 mm) from QW to SW or PW	X	X	X	X	X
4. All PW conductor groups must be individually separated using metallic conduit.					X
5. If QW and SW1 wiring must cross SW2 or PW1 wiring, cross the bundles at right angles.	X	X	X	X	X
Common Mode Noise Issues					
1. Provide adjacent signal returns using twisted pair cable.	X	X			
2. Galvanically isolate the signal and the associated signal return path when possible.	X	X			
Shielding					
1. Use metallic conduit for all power and control circuits external to the controller enclosure.	X	X	X	X	X
2. Use shields that are continuous and equipped with a drain wire.	X	X	X		
3. Do not group different EMI Class conductors within the same shield.	X	X	X	X	X
4. Minimize the non-shielded portion of the conductor at the end of the shielded cable.	X	X	X	X	X
5. When shielding AC or DC power conductors, group the conductors to minimize the magnetic field in the shield.			X	X	X
Grounding					
1. Ground shields only at the controller end.	X	X	X	X	X
2. Use a separate grounding wire for each shield ground.	X	X	X	X	X
3. Provide a grounding wire with all conductor groups, whether in tray or conduit.			X	X	X
4. When multiple grounds must be made to a shielded power cable, the shield must have the same short-circuit withstand capability as the grounding conductor in the power cable.			X	X	X
5. Terminate all power grounds and power shield grounds to the controller grounding point or bar.			X	X	X
6. Terminate all signal shield grounds to the terminals provided.	X	X			
7. Always supply a separate equipment grounding conductor with the controller power feed. Do not depend on metallic conduit for the grounding connection.			X	X	X

[1] "X" indicates applicability to the specified EMI Class.

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Component Locations

See Figures 33–37 for Enclosed 22 component identification and terminal block locations for the power circuit configuration specified.

See Tables 19–23 on pages 67–71 for wire sizes and terminal torque requirements.

Figure 33: Power Circuit B05

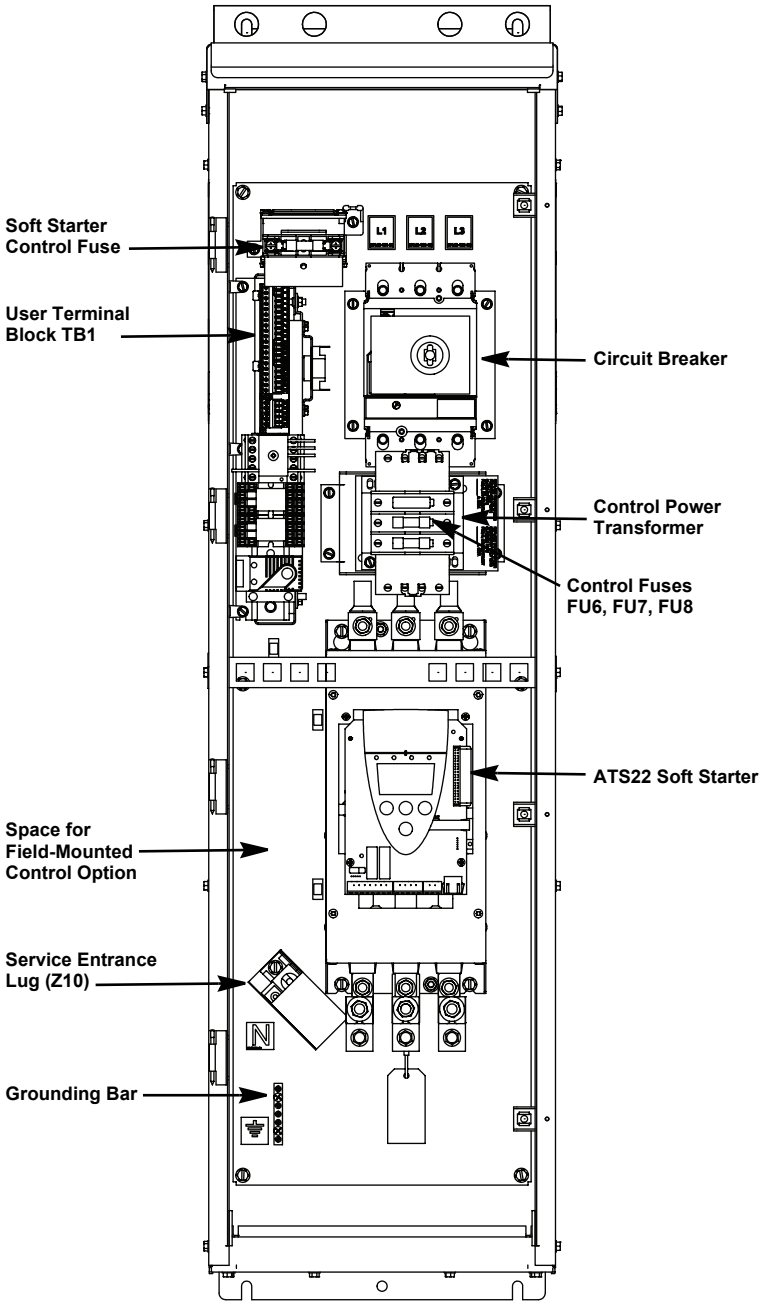

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Figure 34: Power Circuit S05

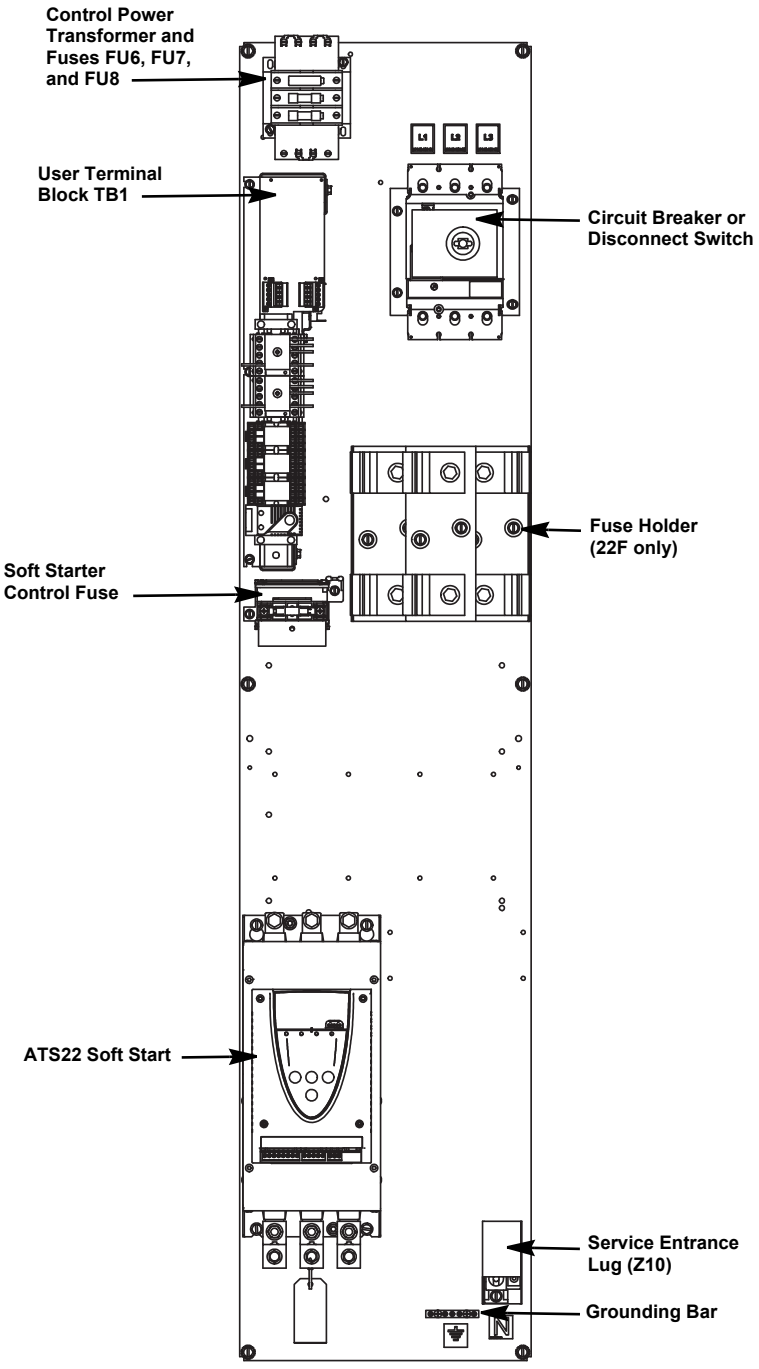

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Figure 35: Power Circuit N05

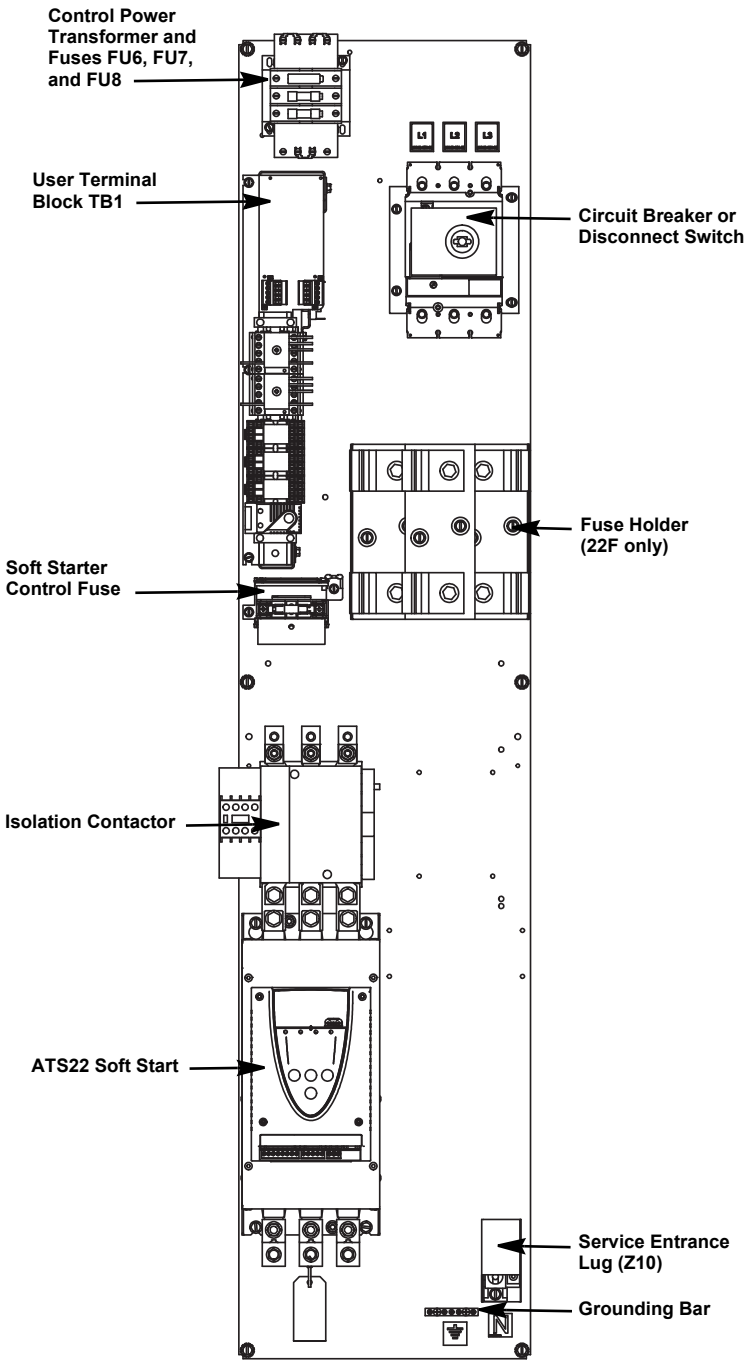

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Figure 36: Power Circuit R05

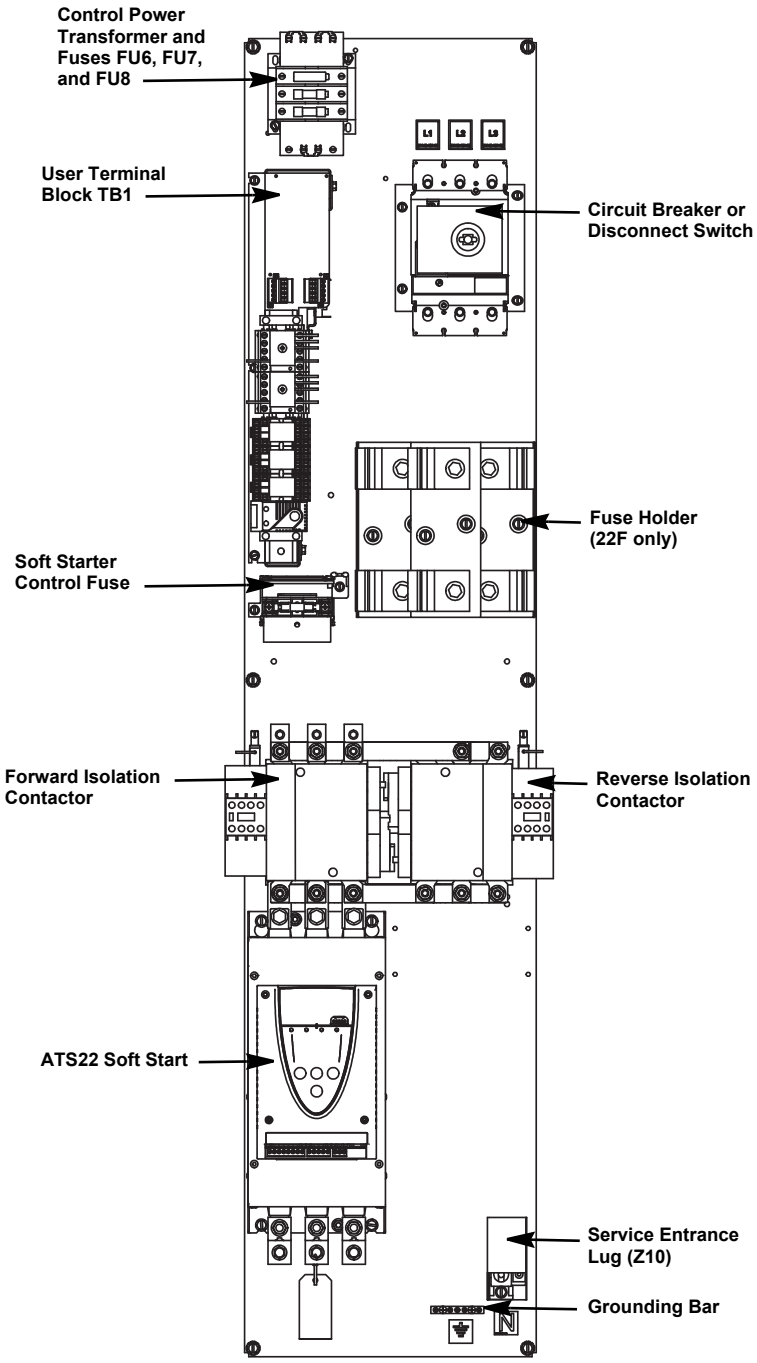

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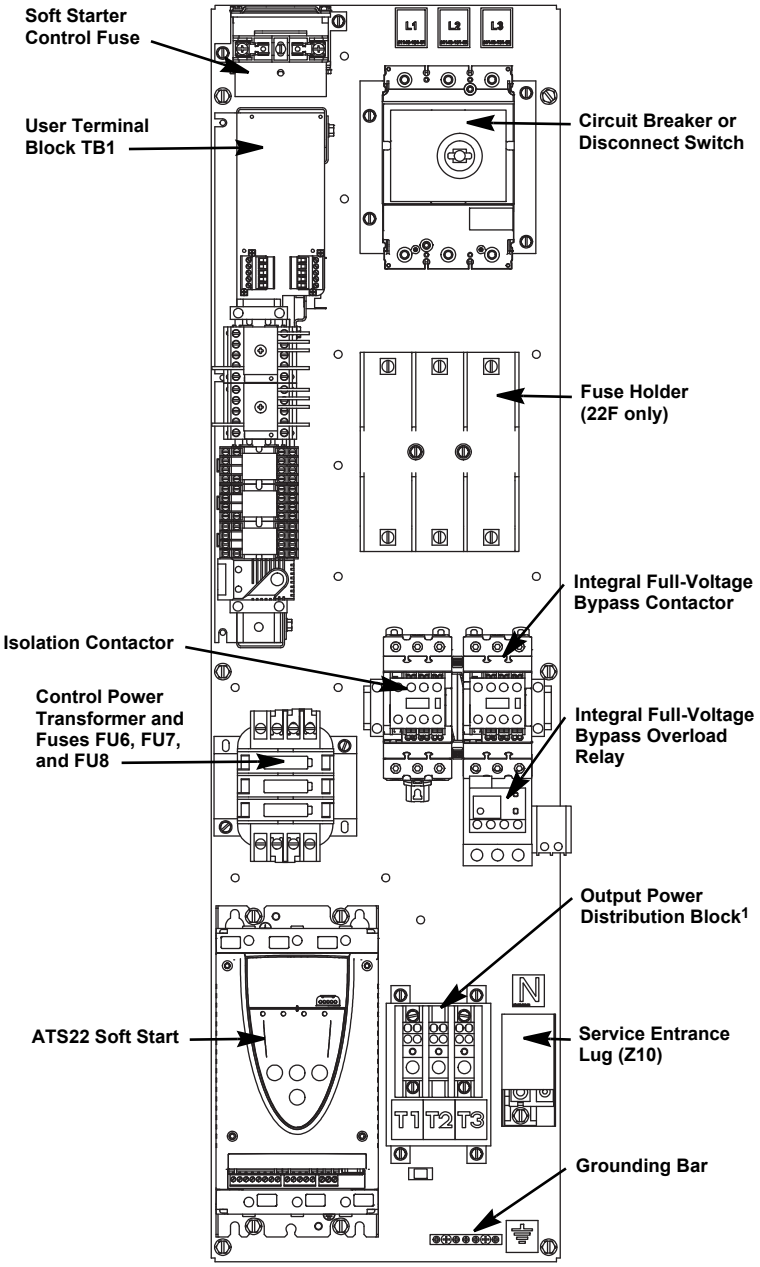
Figure 37: Power Circuit Y05



1 Power distribution block supplied for UL Type 1 and Type 12K enclosures in the following hp/voltages: 3–20 hp @ 208 V; 5–25 hp @ 230 V; 10–50 hp @ 460 V; 15–60 hp @ 575 V. Power Distribution Block supplied for UL Type 3R enclosures in the following hp/voltages: 3–20 hp @ 208 V; 5–20 hp @ 230 V; 10–40 hp @ 460 V; 15–60 hp @ 575 V.

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Power Wiring

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- Some terminals have voltage on them when the disconnect is open.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm that power is off.
- Replace covers before turning on power to equipment.
- Read and understand the precautions in “Before You Begin” on page 8 before performing the procedures in this section.

Failure to follow these instructions will result in death or serious injury.

⚠ CAUTION

IMPROPER WIRING

- Do not connect input power leads to the controller output terminals (T1, T2, T3 or U, V, W). This damages the controller and voids the warranty.
- Check the power connections before energizing the controller.

Failure to follow these instructions can result in injury or equipment damage.

⚠ CAUTION

HEAT AND FIRE DAMAGE

Follow the torque requirements specified on the Enclosed 22 controller nameplate.

Failure to follow these instructions can result in injury or equipment damage.

Table 16: Power Terminal Characteristics

Terminal	Function	Voltage (+10%/-15%)
GND	Ground (to grounding bar on panel)	—
L1, L2, and L3	Three-phase power supply (top of circuit breaker)	208
		230
		460
		575
T1, T2, and T3	Output connections to motor (bottom of soft starter, overload relay, or power distribution block)	208
		230
		460
		575

Table 17: Available Wire Bending Space, Power Circuit B05

Controller Rating			Wire Bending Space in. (mm)	Maximum Field Termination Wire Size[1]	Enclosure Size Reference
40 °C (104 °F) hp	UL Type 3R or 50 °C (122 °F) hp	V			
3–25	3–20	208	2.5 (63.5)	AWG 2 (66.4 mm^2)	A
5–30	5–25	230			
10–60	10–50	460			
15-75	15-60	575			
30–50	25–40	208	8 (203.2)	250 kcmil (127 mm^2)	B
40–60	30–50	230			
75–125	60–100	460			
60–125	50–100	208	11 (279.4)	(2) 350 kcmil (177 mm^2)	D
75–150	60–125	230			
150–300	125–250	460			
200–300	150–300	575			
150	125	208	17 (431.8)	(2) 500 kcmil (253 mm^2)	E
200	150	230			
350–400	300–350	460			
400–500	350–400	575			

[1] Maximum wire size according to NEC 2009 Table 312.6(B), based on provided wire bend.

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Table 18: Available Wire Bending Space, Power Circuits S05, N05, R05 and Y05

Controller Rating			Wire Bending Space in. (mm)	Maximum Field Termination Wire Size[1]	Enclosure Size Reference
40 °C (104 °F) hp	UL Type 3R or 50 °C (122 °F) hp	V			
3–10	3–10	208	3.0 (76.2)	AWG 3 (26.7 mm²)	B
5–15	5–10	230			
10–30	10–25	460			
15–40	15–30	575			
15–25	10–20	208	8.0 (203.2)	AWG 1/0 (53.5 mm²)	C
20–30	15–25	230			
40–60	30–50	460			
50–75	40–60	575			
30–50	25–40	208	7.0 (177.8)	AWG 4/0 (107 mm²)	D
40–60	30–50	230			
75–125	60–100	460			
100–150	75–125	575			
60–125	50–100	208	12 (304.8)	(2) 350 kcmil (177 mm²)	F
75–150	60–125	230			
150–300	125–250	460			
200–300	150–300	575			
150	125	208	13 (330.2)	(2) 500 kcmil (253 mm²)	G
200	150	230			
350–400	300–350	460			
400–500	350–400	575			

[1] Maximum wire size according to NEC 2009 Table 312.6(B), based on provided wire bend.

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Table 19: Line Power Terminal Wire Range and Torque Requirements[1]

L1, L2, L3 (Line)			Controller Style 22T or 22F			Controller Style 22U		
hp		V	Wire Range AWG (mm²)	Torque lb-in (N•m)	Strip Length in. (mm)	Wire Range AWG (mm²)	Torque lb-in (N•m)	Strip Length in. (mm)
3–25		208	14–10 (2.1–5.3) 8–3/0 (8.4–85)	50 (5.6) 120 (13.5)	0.65 (16)	14–10 (2.1–5.3) 8–3/0 (8.4–85)	50 (5.6) 120 (13.5)	0.65 (16)
5–30		230						
10–60		460						
15–75		575						
30–40		208	14–10 (2.1–5.3) 8–3/0 (8.4–85)	50 (5.6) 120 (13.5)	0.65 (16)	4–4/0 (21–107)	225 (25.4)	1 (25)
40		230						
75		460						
100		575						
50		230	4–4/0 (21–107)	225 (25.4)	1 (25)	4–4/0 (21–107)	225 (25.4)	1 (25)
100		460						
125		575						
50		208	3/0–350 (85–177)	225 (25.4)	1 (25)	3/0–350 (85–177)	225 (25.4)	1 (25)
60		230						
125		460						
150		575						
60		208	3/0–350 (85–177)	225 (25.4)	1 (25)	2–500 (33.6–253)	275[2] (31) 442[3] (50)	1.2 (31)
75		230						
150		460						
200		575						
75		208	2–500 (33.6–253)	275[2] (31) 442[3] (50)	1.2 (31)	2–500 (33.6–253)	275[2] (31) 442[3] (50)	1.2 (31)
100		230						
200		460						
250		575						
100		208	2–500 (33.6–253)	275[2] (31) 442[3] (50)	1.2 (31)	(2)[2] 2/0–350 (67.4–177) (2)[3] 2/0–500 (67.4–253)	275[2] (31) 442[3] (50)	(1) 1.2 (31) (2) 2.4 (61)
125		230						
250		460						
40 °C (104 °F) Rated	50 °C (122°F) Rated							
300	—	575	2–500 (33.6–253)	275[2] (31) 442[3] (50)	1.2 (31)	(2)[2] 2/0–350 (67.4–177) (2)[3] 2/0–500 (67.4–253)	275[2] (31) 442[3] (50)	(1) 1.2 (31) (2) 2.4 (61)
125	—	208	(2)[2] 2/0–350 (67.4–177) (2)[3] 2/0–500 (67.4–253)	275[2] (31) 442[3] (50)	(1) 1.2 (31) (2) 2.4 (61)	(2)[2] 2/0–350 (67.4–177) (2)[3] 2/0–500 (67.4–253)	275[2] (31) 442[3] (50)	(1) 1.2 (31) (2) 2.4 (61)
150	—	230						
300	—	460						
150	125	208	(3) 3/0–500 (85–253)	442 (50)	1 (25)	(3) 3/0–500 (85–253)	442 (50)	1 (25)
200	150	230						
350–400	300–350	460						
400–500	340–400	575						

1 Refer to the product nameplate to confirm torque requirements. The information provided in this table is for reference only.

2 Power terminal wire range and torque requirements for PowerPact D circuit breaker.

3 Power terminal wire range and torque requirements for PowerPact L circuit breaker.

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Table 20: Load Power Terminal Wire Range and Torque Requirements[1]

T1, T2, T3 (Load)			Power Circuit B05, S05, N05, R05			Power Circuit Y05		
40 °C (104 °F) hp	UL Type 3R or 50 °C (122 °F) hp	V	Wire Range AWG (mm²)	Torque lb-in (N•m)	Strip Length in. (mm)	Wire Range AWG (mm²)	Torque lb-in (N•m)	Strip Length in. (mm)
3–10	3–10	208	12–4 (2.5–16)	26 (3)	0.3 (7)	14–10 (2.1–5.3)	35 (3.9)	0.65 (16)
5–15	5–10	230				8 (8.4)	40 (4.5)	
10–30	10–25	460				6–2/0 (13–67)	120 (13.5)	
15–40	15–30	575						
15–20	15–20	208	10–1/0 (4–50)	88 (10)	0.6 (15)	8 (8.4)	40 (4.5)	0.65 (16)
20–25	15–20	230				6–2/0 (13–67)	120 (13.5)	
40–50	30–40	460						
50–60	40–60	575						
25	—	208	10–1/0 (4–50)	88 (10)	0.6 (15)	6–300 (13–151)	275 (31)	1 (25)
30	25	230						
60	50	460						
75	—	575						
30–50	25–40	208	6–300 (13–151)	275 (31)	1 (25)	6–300 (13–151)	275 (31)	1 (25)
40–60	30–50	230						
75–125	60–100	460						
100–150	75–125	575						
60–150	50–125	208	(2) 2–500 (33.6–253)	500 (56)	Lug 1: 1.0 (25) Lug 2: 2.0 (50)	(2) 2–500 (33.6–253)	500 (56)	Lug 1: 1.0 (25) Lug 2: 2.0 (50)
75–200	60–150	230						
150–400	125–350	460						
200–500	150–400	575						

[1] Refer to the product nameplate to confirm torque requirements. The information provided in this table is for reference only.

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Table 21: Grounding Bar Wire Range and Torque Requirements

Controller Rating		Grounding Bar		
hp	V	AWG (mm^2)	lb-in (N•m)	Strip Length in. (mm)
Enclosure Sizes A, B, or C				
3–50	208	14–4 (2–21)	35 (4.0)	0.35 (9)
5–60	230			
10–125	460			
15–150	575			
Enclosure Size D, Power Circuits S05, N05, R05 or Y05				
3–50	208	14–4 (2–21)	35 (4.0)	0.35 (9)
40–60	230			
75–125	460			
100–150	575			
Enclosure Size D, Power Circuit B05				
60–125	208	14–8 (2.1–8.4) 6–1/0 (13.3–53.5)	36 (4.1) 45 (5.1)	0.6 (15.2) 0.6 (15.2)
75–150	230			
150–300	460			
200–300	575			
Enclosure Sizes E, F, or G				
60–150	208	6–300 (13.3–151)	275 (31.1)	1 (25.4)
75–200	230			
150–400	460			
200–500	575			

Table 22: Service Entrance (Mod Z10) Wire Range and Torque Requirements

Controller Rating			Main Neutral		Ground	
40 °C (104 °F) hp	UL Type 3R or 50 °C (122 °F) hp	V	AWG (mm^2)	lb-in (N•m)	AWG (mm^2)	lb-in (N•m)
3–25	3–20	208	12–1/0 AL (3.3–53.3 AL) 14–1/0 CU (2.1–53.3 CU)	75 (8.5)	12–1/0 AL (3.3–53.3 AL) 14–1/0 CU (2.1–53.3 CU)	50 (5.6)
5–30	5–25	230				
10–60	10–50	460				
15–75	15–60	575				
30–50	25–40	208	4–300 (21.1–151)	250 (28.2)	6–4 (13.3–21.1) 8 (8.4)	45 (5.1) 40 (4.5)
40–60	30–50	230				
75–125	60–100	460				
100–150	75–125	575				

Continued on next page

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Table 22: Service Entrance (Mod Z10) Wire Range and Torque Requirements *(continued)*

Controller Rating			Main Neutral		Ground	
40 °C (104 °F) hp	UL Type 3R or 50 °C (122 °F) hp	V	AWG (mm^2)	lb-in (N•m)	AWG (mm^2)	lb-in (N•m)
75–125	60–100	208	1–500 (42.4–253)	300 (33.9)	4–300 (21.1–151)	250 (28.2)
100–150	75–125	230				
200–300	150–250	460				
250–300	200–250	575				
150	125	208	3/0–500 (85–253)	300 (33.9)	6–250 (13.3–127)	275 (31.1)
200	150	230				
350–400	300–350	460				
400–500	350–400	575				

Control Wiring

Connect the control wiring to the upper portion of the pull-apart terminal block TB1. See Figure 38 or 39 (pages 70 and 71).

- The control terminals are rated 250 V, 12 A. Maximum wire size for the control terminals:
  - — 12 AWG (2.5 mm^2), 1 wire
  - — 16 AWG (1.5 mm^2), 2 wire
- Minimum tightening torque: 4.5 lb-in (0.5 N•m)
- The user terminals for power circuit B05 are designated on the wiring diagrams. See Figures 43–52 on pages 92–101.

  For other power circuit options (S05, N05, R05 or Y05), refer to the documentation that ships with the controller.

Shunt Trip (B05)

Figure 38: TB1 and TB2 User Terminal Blocks

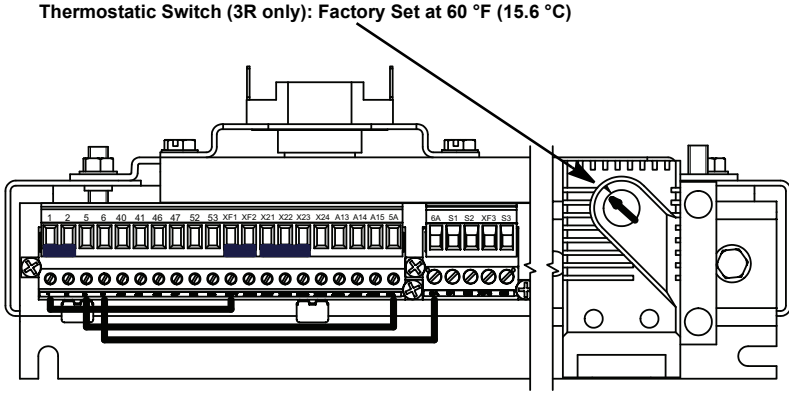

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Table 23: TB1 User Terminal Connections

Function	Description	User Terminals (See Figure 38)	
User Interlock	Remove the jumper between terminals 1 and 2 to add interlock.	1	2
Auto Start Contact[1]	Auto mode run input	5	6
Normally-Open (N.O.) Trip Contact[2]	Closes when the controller trips.	40	41
N.O. Auto Mode Contact[3]	Closes when auto mode is selected.	46	47
N.O. Run Contact[4]	Closes when a run command is provided.	52	53

1 Auto start contact valid only for control options C06 and E06.

2 Requires selecting miscellaneous option J10, N.O. auxiliary trip annunciation contact.

3 Requires selecting miscellaneous option H10, N.O. auxiliary auto mode contact. Valid only with control options C06 and E06.

4 Requires selecting miscellaneous option F10, N.O. auxiliary run mode contact.

Shunt Trip (S05) and Other Power Options (N05, R05, Y05)

Figure 39: TB1 User Terminal Block

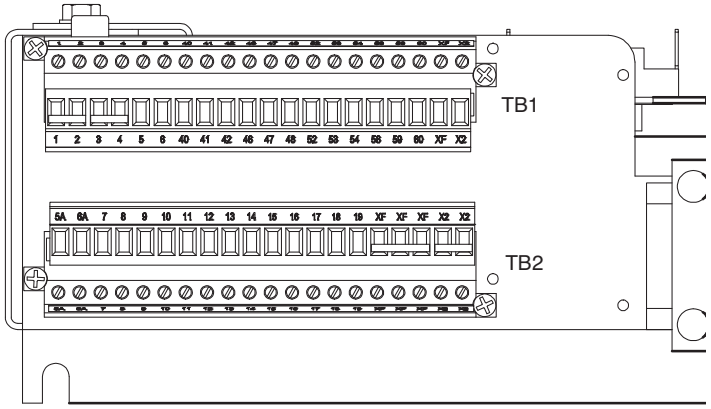

Table 24: TB1 User Terminal Connections

Function	Description	User Terminals (See Figure 39)	
User Interlock 1	Remove the jumper between terminals 1 and 2 to add the interlock.	1	2
User Interlock 2	Remove the jumper between terminals 3 and 4 to add the interlock.	3	4
Auto Start Contact[1]	Auto mode run input.	5	6
Normally-Open (N.O.) Trip Contact[2]	Closes when a fault is detected.	40	41
Normally-Closed (N.C.) Trip Contact[2]	Opens when a fault is detected.	41	42
N.O. Auto Mode Contact[3]	Closes when Auto mode is selected.	46	47
N.C. Auto Mode Contact[3]	Opens when Auto mode is selected.	47	48
N.O. Run Contact[4]	Closes when a run command is provided.	52	53
N.C. Run Contact[4]	Opens when a run command is provided.	53	54

Continued on next page

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Table 24: TB1 User Terminal Connections *(continued)*

Function	Description	User Terminals (See Figure 39)	
N.O. Bypass Contact[5]	Closes when the controller is placed in Bypass mode.	58	59
N.C. Bypass Contact[5]	Opens when the controller is placed in Bypass mode.	59	60
Control Power (120 Vac)	Provides access to control power when option B10 is selected.	XF	X2

1 Auto start contacts valid only for control options C06 and E06.

2 Requires selecting miscellaneous option J10, auxiliary trip annunciation contacts.

3 Requires selecting miscellaneous option H10, auxiliary Auto mode contacts. Valid only with control options C06 and E06.

4 Requires selecting miscellaneous option F10, auxiliary Run mode contacts.

5 Requires selecting miscellaneous option Y06 and miscellaneous option G10.

Initial Start-Up Procedure

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Read and understand the precautions in “Before You Begin” starting on page 8 before performing the procedures in this section.

Failure to follow these instructions will result in death or serious injury.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

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⚠ DANGER

UNQUALIFIED PERSONNEL

- This equipment must be installed and serviced only by qualified personnel.
- Qualified personnel performing diagnostics or troubleshooting requiring electrical conductors to be energized must comply with NFPA 70 E - Standard for Electrical Safety Requirements for Employee Workplaces and OSHA Standards – 29 CFR Part 1910 Subpart S Electrical.

Failure to follow these instructions will result in death or serious injury.

The Enclosed 22 controller is configured for the installed options and tested at the factory. Depending on the application requirements, minor adjustments may be required to complete the field installation. Follow this initial start-up procedure step by step.

With all incoming power removed, make the following equipment checks:

1. Verify that all equipment disconnects are open.
2. If provided, set the selector switch[1] to Off or Stop.
3. Turn off all power supplying this equipment before working on or inside the equipment, and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm that the power is off.
4. Place the unit handle in the Off position and open the door.
5. Check the wiring of the input power ground and the motor ground.
6. Ensure that the motor conductors are wired to the load terminals in the enclosure marked T1, T2, and T3. Load terminals are either at the softstarter, bypass overload relay or power distribution block, depending on the power circuit, horsepower, and voltage selected.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Properly ground the controller panel before applying power.
- Close and secure the enclosure door before applying power.
- Certain adjustments and test procedures require that power be applied to this controller. Exercise extreme caution as hazardous voltages exist. The enclosure door must be closed and secured while turning on power or starting and stopping this controller. Always follow practices and procedures from NFPA 70E, “Standard for Electrical Safety in the Workplace®.”

Failure to follow these instructions will result in death or serious injury.

7. Close and secure the enclosure door. Close the controller disconnect. Close the supplying equipment disconnect.
8. Open the controller disconnect by moving the handle to the Off position. Open the enclosure door.

[1] The selector switch is provided with control options A06, B06, D06, or E06.

9. Using a properly rated voltage sensing device set to the appropriate scale, verify that the incoming line voltage at the line side of the disconnecting means is within +10%/-15% of the input voltage rating on the controller nameplate.
10. Close and secure the enclosure door. Close the equipment disconnect means. The Off pilot light[1], if provided, illuminates.

    This controller provides direct thermal protection for the motor when a motor thermal sensor is connected to terminals PTC1 and PTC2 on the ATS22 soft starter terminal block. Refer to the *ATS22 User Manual*, BBV51330, for additional details.

⚠ CAUTION

MOTOR OVERHEATING HAZARD

Use a thermal sensor in the motor as required by the motor manufacturer to facilitate overheating protection at all speeds and load conditions.

Failure to follow these instructions can result in injury or equipment damage.

11. Adjust the full load current setting as follows:
    - — Press the down arrow key on the keypad terminal until the display shows **COnF**. Press the ENT key once, then press the down arrow key until **In** is displayed.
    - — Press the ENT key, then use the up and down arrow keys to adjust the setting to match the full load current listed on the motor nameplate.
    - — Press the ENT key to save the setting, and press the ESC key twice to return to the status menu.

    NOTE: The settings listed in this procedure are suitable for most applications. If your application requires different operating characteristics, refer to the *ATS22 User Manual*, BBV51330.

⚠ WARNING

HAZARDOUS MOVING PARTS

Before starting the Enclosed 22 controller, ensure that the motor and its connected load are clear of personnel and are ready to run.

Failure to follow these instructions can result in death or serious injury.

12. Check the direction of motor rotation as follows:
    - — Set the selector switch[2], if provided, to Hand or Run. Press the Start button[3], if provided. Check the direction of motor rotation. If correct, proceed to Step 13. If incorrect, press the Stop button and/or turn the selector switch back to Off or Stop.

[1] Pilot lights are provided with pilot options A07, B07, C07, or D07.

[2] The selector switch is provided with control options B06, C06, D06, and E06.

[3] The Start and Stop pushbuttons are provided with control options A06 and E06.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

— Turn off all power supplying this equipment before working on or inside the equipment, and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm that the power is off.

— Place the unit handle in the Off position and open the door.

— Correct the direction of motor rotation by reversing any two motor leads connected to the controller output.

— Close and secure the enclosure door. Close the equipment disconnect means. The Off pilot light, if provided, illuminates.

— Set the selector switch, if provided, to Hand or Run. Press the Start button, if provided. Check the direction of motor rotation. If correct, this completes the motor rotation check.

13. If required for the application, adjust the setting of acceleration time (**ACC**), deceleration time (**dEC**), current limit (**ILt**), max starting time (**tLs**), and other parameters.

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ATS22 Soft Starter Factory Settings

If the ATS22 soft starter has been replaced or reset to the factory settings, you may need to adjust some parameter values. The soft starter is factory configured as shown in Table 25. Refer to the *ATS22 User Manual*, BBV51330, for other settings and options.

Table 25: ATS22 Soft Starter Factory Settings

Menu	Parameter	Name	Unit	Description	Factory Setting
COnF	**UIn**	Line Voltage	V	Mains Voltage	According to nameplate
COnF	**In**	Motor Rated Current	A	Motor Rated Current	100% of the controller's nameplate rating
AdJ	**Snb**	# of Starts	—	Number of Starts	3
AdJ	**SLG**	Starts Period	min	Starts Period	60
IO	**LI2**	Logic Input LI2	(B05) Basic Shunt Trip Power Circuit	(A06) Start-Stop Pushbuttons	**Strt** (3-Wire)
				(C06) Hand-Off-Auto Selector Switch	**rUn** (2-Wire)
				(D06) Run-Stop Selector Switch	**rUn** (2-Wire)
				(E06) Hand-Auto Selector Switch and Start-Stop Pushbuttons	**Strt** (3-Wire)
			(S05, N05, R05, Y05) All Control Options		**rUn** (2-Wire)

Programming Access with Omit Keypad Option (U10) or UL Type 3R Enclosure (H03)

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Properly ground the controller panel before applying power.
- Close and secure the enclosure door before applying power.
- Certain adjustments and test procedures require that power be applied to this controller. Exercise extreme caution as hazardous voltages exist. The enclosure door must be closed and secured while turning on power or starting and stopping this controller. Always follow practices and procedures from NFPA 70E, “Standard for Electrical Safety in the Workplace.”

Failure to follow these instructions will result in death or serious injury.

When option U10, Omit Door-Mounted Keypad, is selected, the remote keypad (VW3G22101) and cable (WV3A1104R30) must be ordered to make programming changes to the soft starter. Option H03, UL Type 3R enclosure, includes a remote keypad and cable inside the enclosure.

To program the controller when options U10 or H03 are selected:

1. Remove all power from the controller, then test for the absence of voltage.

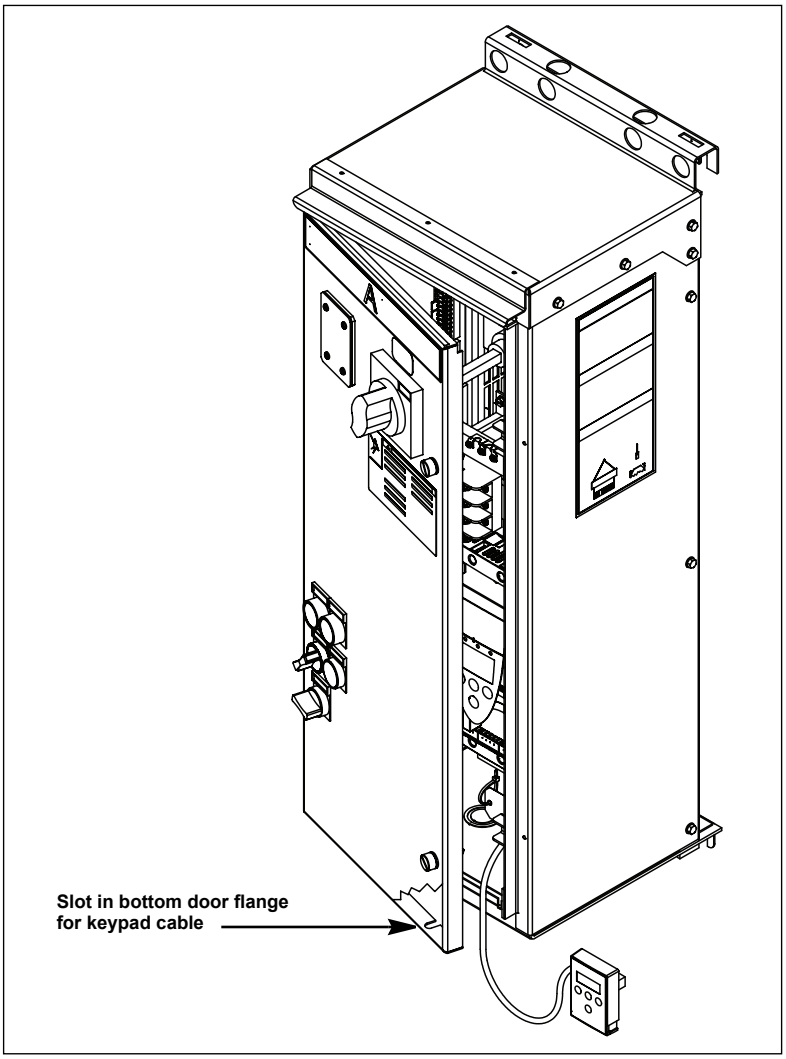
   NOTE: Verify that the voltage tester is functioning properly before and after testing for the absences of voltage.

2. Turn the circuit breaker and handle assembly to the Off position and open the enclosure door.
3. Remove the remote keypad and cable from the enclosure.

4. Connect the remote keypad and cable to the soft starter.
5. Route the keypad cable between the bottom enclosure flange and the notch in the bottom of the door flange. See Figure 40.
6. Close and secure the enclosure door. Ensure that the keypad cable is not pinched by the door.
7. Close the disconnect means.
8. Program the controller with the keypad.
9. When programming is complete, remove all power then test for the absence of voltage.
10. Open the enclosure door and remove the remote keypad cable from the soft starter.
11. Place the remote keypad and cable inside the enclosure. Do not leave the remote keypad in the bottom of the enclosure.
12. Close and secure the enclosure door.

To program or control the ATS22 soft starter through the Modbus™ communication port, refer to the *ATS22 User Manual*, BBV51330.

Figure 40: Remote Keypad Access on Wall-Mounted Enclosures



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Adjusting the PowerPact Motor Circuit Protector Trip Setting

Style 22T

If controller style 22T (Powerpact motor circuit protector disconnect) is provided, the adjustable magnetic-trip circuit breaker setting is factory-set to the minimum current. You may have to adjust these settings for proper motor start-up. Refer to the magnetic trip setpoint limits outlined in the applicable national standards.

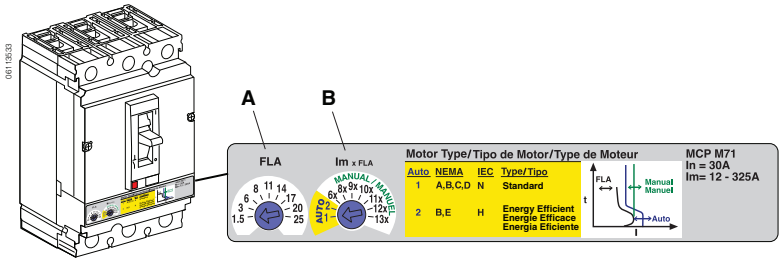
⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

Figure 41: PowerPact H/J FLA and Im Dials



To access the PowerPact H or J full load amps (FLA) and instantaneous trip setting (Im) dials:

1. Turn off all power supplying this equipment before working on or inside the equipment, and follow lockout/tagout procedures. Always use a properly rated voltage sensing device to confirm that the power is off.
2. Place the unit handle in the Off position and open the door.
3. To set the motor circuit protector, refer to the instruction bulletin supplied with the equipment, or download it from the Technical Library at www.schneider-electric.us.

NOTE: Motor circuit protectors are suitable for motors with locked-rotor indicating code letters based on applicable national codes and standards. For other motors, consult your local Schneider Electric field sales representative.

Table 26: Style 22T Motor Circuit Protector Selection

hp	208 V	230 V	460 V	575 V
3	HLL36030M71	—	—	—
5	HLL36030M71	HLL36030M71	—	—
7.5	HLL36050M72	HLL36050M72	—	—
10	HLL36050M72	HLL36050M72	HLL36030M71	—
15	HLL36100M73	HLL36100M73	HLL36050M72	HLL36030M71
20	HLL36150M74	HLL36100M73	HLL36050M72	HLL36030M71
25	HLL36150M74	HLL36150M74	HLL36050M72	HLL36050M72
30	HLL36150M74	HLL36150M74	HLL36100M73	HLL36050M72
40	HLL36150M74	HLL36150M74	HLL36100M73	HLL36100M73
50	JLL36250M75	JLL36250M75	HLL36150M74	HLL36100M73
60	JLL36250M75	JLL36250M75	HLL36150M74	HLL36100M73
75	DJL36400M36 LLL36400M37XLY	JLL36250M75	HLL36150M74	HLL36150M74
100	DJL36400M36 LLL36400M37XLY	DJL36400M36 LLL36400M37XLY	JLL36250M75	HLL36150M74
125	DJL36600M42[1] LLL36600M37X[1]	DJL36400M36 LLL36400M37XLY	JLL36250M75	JLL36250M75
150	PLL34060M68[2]	DJL36600M42[1] LLL36600M37X[1]	JLL36250M75	JLL36250M75
200	—	PLL34060M68[2]	DJL36400M36 LLL36400M37XLY	JLL36250M75
250	—	—	DJL36400M36 LLL36400M37XLY	DJL36400M36 LLL36400M37XLY
300	—	—	DJL36600M42[1] LLL36600M37X[1]	DJL36400M36 LLL36400M37XLY
350	—	—	PLL34060M68	—
400	—	—	PLL34060M68[2]	PKL36060M68
500	—	—	—	PKL36060M68[2]

1 600 A PowerPact P motor circuit protector is supplied for UL Type 3R or 50 °C (122 °F) rated enclosures.

2 Selection valid for UL Type 1 and Type 12 enclosures only. Not valid for 50 °C (122 °F) rated enclosures.

Style 22U

Some circuit breakers have trip settings that may need adjustment according to the application and motor type. For more information on trip setting adjustment, refer to the circuit breaker instruction bulletin provided with the equipment, or available for download from the Technical Library at www.schneider-electric.us.

Figure 42: PowerPact J FLA and Im Dial

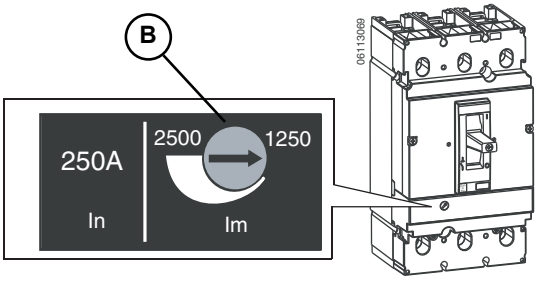


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Table 27: Style 22U Thermal-Magnetic Circuit Breaker Selection

hp	208 V	230 V	460 V	575 V
3	HLL36025	—	—	—
5	HLL36040	HLL36035	—	—
7.5	HLL36060	HLL36050	—	—
10	HLL36070	HLL36070	HLL36035	—
15	HLL36110	HLL36090	HLL36050	HLL36040
20	HLL36125	HLL36110	HLL36060	HLL36050
25	HLL36150	HLL36125	HLL36070	HLL36060
30	JLL36175	HLL36150	HLL36090	HLL36080
40	JLL36250	JLL36175	HLL36110	HLL36100
50	JLL36250	JLL36250	HLL36125	HLL36125
60	DLL36400E20 LLL36400U31XLY	JLL36250	HLL36150	HLL36150
75	DLL36400E20 LLL36400U31XLY	DLL36400E20 LLL36400U31XLY	JLL36175	HLL36150
100	DLL36600E20 LLL36600U31X	DLL36400E20 LLL36400U31XLY	JLL36250	JLL36175[1]
125	DLL36600E20[2] LLL36600U31X[2]	DLL36600E20 LLL36600U31X	JLL36250	JLL36250
150	MJL36600[3]	DLL36600E20[2] LLL36600U31X[2]	DLL36400E20 LLL36400U31XLY	JLL36250
200	—	MJL36800[3]	DLL36400E20 LLL36400U31XLY	DLL36400E20 LLL36400U31XLY
250	—	—	DLL36600E20 LLL36600U31X	DLL36400E20 LLL36400U31XLY
300	—	—	DLL36600E20[2] LLL36600U31X[2]	DLL36600E20 LLL36600U31X
350	—	—	MJL36800	—
400	—	—	MJL36800[3]	MJL36600
500	—	—	—	MJL36800[3]
Circuit Breaker Supplied with Option 610				
150	PLL34060[3]	—	—	—
200	—	PLL34080[3]	—	—
250	—	—	—	—
300	—	—	—	—
350	—	—	PLL34080	—
400	—	—	PLL34080[3]	PKL36060
500	—	—	—	PKL36080[3]

1 JLL36200 circuit breaker is supplied for UL Type 3R or 50 °C (122 °F) rated enclosures.

2 600 A PowerPact M or P circuit breaker is supplied for UL Type 3R or 50 °C (122 °F) rated enclosures.

3 Selection valid for UL Type 1 and Type 12 enclosures only. Not valid for 50 °C (122 °F) rated enclosures.

Power Fuse Recommendations Style 22F

You must supply and install the power fuses in controllers supplied with fusible switch disconnects. Select the fuses from Tables 28 and 29 (page 81). All Enclosed 22 controllers accept UL Class J time-delay fuses, depending on the full load current rating.

Select fuses according to the recommendations in this section and make sure they conform with all local and national codes regarding selection of fuse protection and the actual full load current of the motor. The selections provided in Tables 28 and 29 comply with the requirements of NFPA 70 (NEC) and with the Canadian Electric Code (CEC) based on the rated current of the Enclosed 22 controller.

To order power fuses from Schneider Electric, refer to Section 5 Maintenance beginning on page 103. Consult the factory for the ampacity of other fuses.

Table 28: Maximum Power Fuse Ampacity for Controllers with Fusible Switch Disconnect (22F)

hp	208 V	230 V	460 V	575 V
3	15	—	—	—
5	25	30	—	—
7.5	40	35	—	—
10	50	45	20	—
15	80	70	35	25
20	100	90	45	35
25	125	110	60	45
30	150	125	70	50
40	200	175	90	70
50	250	225	110	90
60	250	250	125	100
75	350	300	150	125
100	450	400	200	150
125	600	500	250	200
150	600[1]	600	300	250
200	—	600[1]	400	300
250	—	—	500	400
300	—	—	600	500
350	—	—	600	500
400	—	—	600[1]	600
500	—	—	—	600[1]

[1] Selection valid for UL Type 1 and Type 12 enclosures only. Not valid for 50 °C (122 °F) rated enclosures.

Table 29: Supplied UL Class J Fuse Base Current Rating for Controllers with Fusible Switch Disconnect (22F)

hp	208 V	230 V	460 V	575 V
3	30	—	—	—
5	30	30	—	—
7.5	60	60	—	—
10	60	60	30	—
15	100	100	60	30
20	100	100	60	60
25	200	200	60	60
30	200	200	100	60
40	200	200	100	100
50	400	400	200	100
60	400	400	200	100
75	400	400	200	200
100	600	400	200	200
125	600	600	400	200
150	600[1]	600	400	400
250	—	600[1]	400	400
250	—	—	600	400
300	—	—	600	600
350	—	—	600	600
400	—	—	600[1]	600
500	—	—	—	600[1]

[1] Selection valid for UL Type 1 and Type 12 enclosures only. Not valid for 50° C (122 °F) rated enclosures.

Overload Relay Adjustment

Always verify that the overload relay setting does not exceed the motor full load current or rated controller current found on the Enclosed 22 nameplate, whichever is less.

Tables 30 and 31 provide the adjustment ranges for overload relays according to horsepower rating and voltage. Contact the factory if the adjustment ranges do not meet the intended application.

Table 30: Overload Relay Adjustment Ranges for Full-Voltage Bypass Operation, UL Type 1 and Type 12

hp	208 V	230 V	460 V	575 V
3	9–13	—	—	—
5	12–18	12–18	—	—
7.5	23–28	16–24	—	—
10	23–32	25–32	12–18	—
15	37–50	37–50	16–24	12–18
20	48–65	48–65	23–28	17–25
25	60–100	55–70	30–40	23–32
30	60–100	60–100	30–40	30–40
40	90–150	90–150	48–65	37–50
50	90–150	90–150	55–70	48–65

Continued on next page

Table 30: Overload Relay Adjustment Ranges for Full-Voltage Bypass Operation, UL Type 1 and Type 12 *(continued)*

hp	208 V	230 V	460 V	575 V
60	132–220	132–220	60–100	48–65
75	200–330	132–220	60–100	60–100
100	200–330	200–330	90–150	90–150
125	300–500	200–330	132–220	90–150
150	300–500	300–500	132–220	132–220
200	—	380–630	200–330	132–220
250	—	—	200–330	200–330
300	—	—	300–500	200–330
350	—	—	300–500	—
400	—	—	380–630	300–500
500	—	—	—	380–630

Table 31: Overload Relay Adjustment Ranges for Full-Voltage Bypass Operation, UL Type 3R and 50 °C (122 °F)

hp	208 V	230 V	460 V	575 V
3	9–13	—	—	—
5	12–18	12–18	—	—
7.5	17–25	16–24	—	—
10	23–32	23–32	12–18	—
15	37–50	37–50	16–24	12–18
20	48–65	48–65	23–28	17–25
25	60–100	60–100	30–40	23–32
30	60–100	60–100	30–40	30–40
40	90–150	90–150	48–65	37–50
50	132–220	90–150	60–100	48–65
60	132–220	132–220	60–100	48–65
75	200–330	132–220	60–100	60–100
100	200–330	200–330	90–150	90–150
125	300–500	200–330	132–220	90–150
150	—	300–500	132–220	132–220
200	—	—	200–330	132–220
250	—	—	200–330	200–330
300	—	—	200–330	200–330
350	—	—	300–500	300–500
400	—	—	—	300–500

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Section 4—Circuit Descriptions

Precautions

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Read and understand the precautions in “Before You Begin” starting on page 8 before performing the procedures in this section.

Failure to follow these instructions will result in death or serious injury.

⚠ DANGER

UNINTENDED EQUIPMENT OPERATION

Before operating the Enclosed 22 controller:

- Read and understand the *ATS22 User Manual*, BBV51330, before changing any parameters from the factory defaults. Refer to Table 25 on page 76 for parameter settings.
- If the ATS22 soft starter is re-initialized using the total or partial factory setting function, the soft starter must be reprogrammed to the values listed in Table 25 on page 76.
- If the soft starter or the main control board of the soft starter is replaced, the soft starter must be reprogrammed to the values listed in Table 25 on page 76.

Failure to follow these instructions can result in death, or serious injury.

Power Circuit B: Basic Shunt Trip

The basic shunt trip power circuit is a space optimized version of the Enclosed 22 controller. Limited space is provided for field mountable control equipment.

If a fault is detected, a shunt trip coil in the circuit breaker trips the breaker, removing all power on the load side of the disconnect. After all detected fault conditions are cleared, the disconnect must be reset before restarting is permitted. The shunt trip function is coordinated by a time delay relay (time set for 2 seconds) signaled from the trip annunciation relay.

Power Circuit S: Full-Featured Shunt Trip

The full-featured shunt trip power circuit is a fully customizable version of the Enclosed 22 controller. Additional space is provided for engineered to order options and field installable equipment.

If a fault is detected, a shunt trip coil in the circuit breaker trips the breaker, removing all power on the load side of the disconnect. After all detected fault conditions are cleared, the disconnect must be reset before restarting is permitted. The shunt trip function is coordinated by a time delay relay (time set for 2 seconds) signaled from the trip annunciation relay.

Power Circuit N: Non-Reversing Isolation

The non-reversing power circuit provides a line isolation contactor ahead of the ATS22 softstarter when the starter is not in operation, protecting the starter from potentially hazardous power system transients induced by lightning or capacitor switching. Additional space is provided for engineered-to-order options and field-installable equipment.

On application of power, the softstarter is supplied control power. Mains power remains isolated from the softstarter until a run command is applied, at which time the isolation contactor closes and motor starting begins. In the event of a detected fault, or if the run command is removed, the isolation contactor opens.

NOTE: If a soft stop is programmed, the isolation contactor will remain closed until the end of the soft stop ramp time.

Power Circuit R: Reversing Operation

The reversing power circuit provides a line isolation contactor ahead of the ATS22 softstarter when the starter is not in operation, protecting the starter from potentially hazardous power system transients induced by lightning or capacitor switching. Additionally, integral reversing contactors allow for selection of motor operation in either forward or reverse direction.

On application of power, the softstarter is supplied control power. Mains power remains isolated from the softstarter until the directional selector switch is turned to forward or reverse, at which time the line side contactor closes and motor starting begins. In the event of a detected fault, or if the switch is turned to off, the line side contactor opens.

An intentional start delay of 15 seconds is factory set. When reversing motor direction, place the switch in the off position until the motor comes to a complete stop, then to the desired direction.

NOTE: Soft-stop functionality is not recommended in the reversing power circuit. Line isolation is provided when the run command is removed. Auto mode operation is not recommended.

Power Circuit Y: Isolation with Integral Full-Voltage Bypass

The Isolation with integral full-voltage bypass power circuit provides the same functionality as power circuit N described above. In addition, an integral full voltage bypass starter is provided in the unlikely condition that the starter becomes inoperable.

The integral full-voltage bypass starter includes a Class 20 bi-metallic or solid-state overload relay and door-mounted overload relay reset button.

NOTE: Switching between *Normal* mode and *Bypass* mode without allowing the motor to come to a complete stop is not recommended.

UL Type 3R Operation

To prevent condensation on the inside of the cabinet, leave the mains power energized even when the motor is not running.

Control Options

Mod A06: Start-Stop Pushbuttons

Mod A06 provides a door-mounted, black Start pushbutton and a door-mounted, red Stop pushbutton for operating the controller locally (3-wire control scheme).

- The Start pushbutton commands the controller to start the motor.
- The Stop pushbutton commands the controller to stop the motor by freewheel stop (factory setting) or by deceleration ramp.

Mod B06: Forward-Off-Reverse Selector Switch

Mod B06 provides a door-mounted Forward-Off-Reverse selector switch for operating the controller (2-wire control scheme).

- Forward and Reverse modes are for directional control of the motors attached to applications requiring rotation in both directions. When the switch is moved to either position, the controller starts the motor in the selected direction.
- Off mode commands the controller to stop the motor by freewheel stop. Programming the soft-stop function is not recommended as the attempt to softstop will trip the controller.

Always allow the motor to come to a complete stop before changing rotational direction.

Mod C06: Hand-Off-Auto Selector Switch

Mod C06 provides a door-mounted Hand-Off-Auto selector switch for operating the controller (2-wire control scheme).

- Hand mode is for local control. When Hand mode is selected, the controller starts the motor.
- Off mode commands the controller to stop the motor by freewheel stop (factory setting) or by deceleration ramp.
- Auto mode is for remote control. In Auto mode, the controller starts the motor when the user-supplied Start contact is closed between controller terminals 5 and 6. The controller stops the motor when the user-supplied Start contact is opened. See Table 23 on page 70.

Mod D06: Stop-Run Selector Switch

Mod D06 provides a door-mounted Stop-Run selector switch for operating the controller (2-wire control scheme).

- Run mode commands the controller to start the motor.
- Stop mode commands the controller to stop the motor by freewheel stop (factory setting) or by deceleration ramp.

Mod E06: Hand-Auto Selector Switch and Start-Stop Pushbuttons

Mod E06 provides a door-mounted, black Hand-Auto selector switch, a Start pushbutton, and a Stop pushbutton (mixed mode control scheme).

- Hand mode is for local control. In Hand mode:
  - The Start pushbutton commands the controller to start the motor.
  - The Stop pushbutton commands the controller to stop the motor by freewheel stop (factory setting) or by deceleration ramp.
- Auto mode is for remote control. In Auto mode, the controller starts the motor when the user-supplied Start contact is closed between controller

terminals 5 and 6. The controller stops the motor when the user-supplied Start contact is opened. See Table 23 on page 70. In auto mode:

— The Start pushbutton **does not** command the controller to start the motor locally.

— The Stop pushbutton does not command the controller to stop. To stop the controller, remove the auto-mode start command or turn off the mains disconnect switch.

No Control Operators

No door-mounted control operators provided. Omit a control option selection when ordering to receive no operators.

Pilot Light Cluster Options

Mod A07: Pilot Light Cluster #1

Mod A07 provides red Run (On) and green Off pilot lights for status annunciation.

Mod B07: Pilot Light Cluster #2

Mod B07 provides red Run (Push-to-Test) and green Off (Push-to-Test) pilot lights for status annunciation.

Mod C07: Pilot Light Cluster #3

Mod C07 provides red Run (On), green Off, and yellow Trip pilot lights for status annunciation.

Mod D07: Pilot Light Cluster #4

Mod D07 provides red Run (Push-to-Test), green Off (Push-to-Test), and yellow Trip pilot lights for status annunciation. The yellow Trip pilot light includes pushbutton functionality and also serves as a trip reset for the ATS22 soft starter.

No Pilot Lights

No door-mounted lights are provided. Omit a pilot light option selection when ordering to receive no lights.

Metering Options

Mod B08: Elapsed Run Time Meter

Mod B08 provides a door-mounted elapsed time meter, indicating the number of hours the controller has been running.

Miscellaneous Options

Mod A10: Floor Mounting Kit

Mod A10 Is provided for Enclosure D and includes a kit for mounting the equipment to the floor or ground.

Mod B10: 150 VA Control Power

Mod B10 provides additional control power transformer VA capacity to power field-installable equipment and control circuits.

Mod C10: Power Up On Delay

Mod C10 provides a delayed starting feature. The delay is programmable between one and thirty seconds by adjusting timer ODRT. The factory setting is fifteen seconds.

Mod D10: Emergency Stop Pushbutton

Mod D10 provides a door-mounted emergency stop pushbutton. When the option is selected, the disconnect is provided with a shunt trip function. Pressing the emergency stop pushbutton will trip the disconnect switch, removing all electrical power from the controller.

NOTE: To restore operation, the pushbutton must be pulled out and the disconnect switch must be reset to the Off position and then turned on.

Mod E10: cUL Label

Mod E10 provides a Canadian Underwriters Laboratories label when required by local code requirements.

ENGLISH

Mod F10: Auxiliary Contact for Run Mode Annunciation

Power Circuit B05

Mod F10 provides one Form A normally open (N.O.) contact, rated 5 A at 120 Vac, wired to the terminal blocks. The contact(s) change state when the controller is applying power to the motor.

Power Circuits S05, N05, R05, and Y05

Mod F10 provides one Form C set of contacts, rated 5 A at 120 Vac, wired to the terminal blocks. The contact(s) change state when the controller is applying power to the motor.

Mod G10: Auxiliary Contact for Bypass Run Indication

Mod G10 provides one Form C contact, rated 5 A at 120 Vac, to the terminal blocks. The contact closes when the controller is applying power to the motor.

Mod H10: Auxiliary Contact for Auto Mode Annunciation

NOTE: MOD C06 (Hand-Off-Auto Selector Switch) or E06 (Hand-Auto Selector Switch) must be specified with Mod H10.

Power Circuit B05

Mod H10 provides one Form A, normally open (N.O.) contact, rated 5 A at 120 Vac, wired to the terminal blocks. The contact(s) change state when the controller is placed in Auto (remote) mode.

Power Circuits S05, N05, and Y05

Mod H10 provides one Form C set of contacts, rated 5 A at 120 Vac, wired to the terminal blocks. The contact(s) change state when the controller is placed in Auto (remote) mode. Auto mode operation is not recommended for reversing applications so this option is not provided for power circuit R05.

Mod J10: Auxiliary Contact for Trip Condition Annunciation

Power Circuit B05

Mod J10 provides one Form A, normally open (N.O.) contact, rated 5 A at 120 Vac, wired to the terminal blocks. The contact(s) change state when the controller detects a fault or trips.

Power Circuits S05, N05, R05, and Y05

Mod J10 provides one Form C set of contacts, rated 5 A at 120 Vac, wired to the terminal blocks. The contact(s) change state when the controller detects a fault or trips.

Mod L10: Customer Engraved Nameplates

Mod L10 provides custom engraved nameplates for the controller, identifying the equipment or the equipment that it controls. Engraving information must be provided when the order is placed.

Mod M10: Ten Additional Unwired Terminal Points

Mod M10 provides an additional ten unwired control terminals for wiring and interfacing field-installable equipment. The terminals are rated 5 A at 250 Vac.

Mod P10: Permanent Wire Markers

Mod P10 provides shrink-wrapped control wire markers for identifying and troubleshooting control circuits.

Mod R10: Transient Voltage Surge Protection

Mod R10 provides an integrated supplementary voltage surge protective device to protect equipment from transient voltage surges associated with some electrical power distribution systems.

Mod U10: Omit Door-Mounted Keypad Display

Mod U10 omits the door-mounted keypad display. A keypad closing plate and gasket are provided on the door. See “Programming Access with Omit Keypad Option (U10) or UL Type 3R Enclosure (H03)” on page 76. To program or control the ATS22 soft starter with Modbus communication, refer to the *ATS22 User Manual*, BBV51330.

Mod X10: 50 °C Operation

Mod X10 provides a high ambient equipment rating above 40 °C (104 °F) to a maximum of 50 °C (122 °F) without derating.

NOTE: The 50 °C rating is standard on all UL Type 3R (H03) enclosures.

Mod Z10: Service Entrance Rating

Mod Z10 provides a UL869A approved insulated ground neutral lug assembly and mounting bracket with a bonded enclosure ground wire suitable for use as service entrance rated equipment. Service Entrance Rating is not available with Mod E10 (cUL Label).

Mod Y10: Seismic Qualified

Mod Y10 provides a certification label indicating that the enclosure is qualified with seismic rating AC156 acceptance criteria test protocol with an importance factor of 1.5. Refer to “Seismic Qualification Mounting Criteria” on page 32.

Mod 610: High Interrupting Rating

Mod 610 provides a high interrupting rating for size E and G Enclosed 22 controllers with circuit breaker disconnection (22U). Standard short circuit ratings are 65 kA @ 460 V and 25 kA @ 575 V. Selecting these ratings increases the short circuit current rating to 100 kA @ 460 V or 50 kA @ 575 V. The option is not valid with magnetic only (22T) or fusible (22F) disconnect types. These disconnect types are provided with high interrupting rating by default.

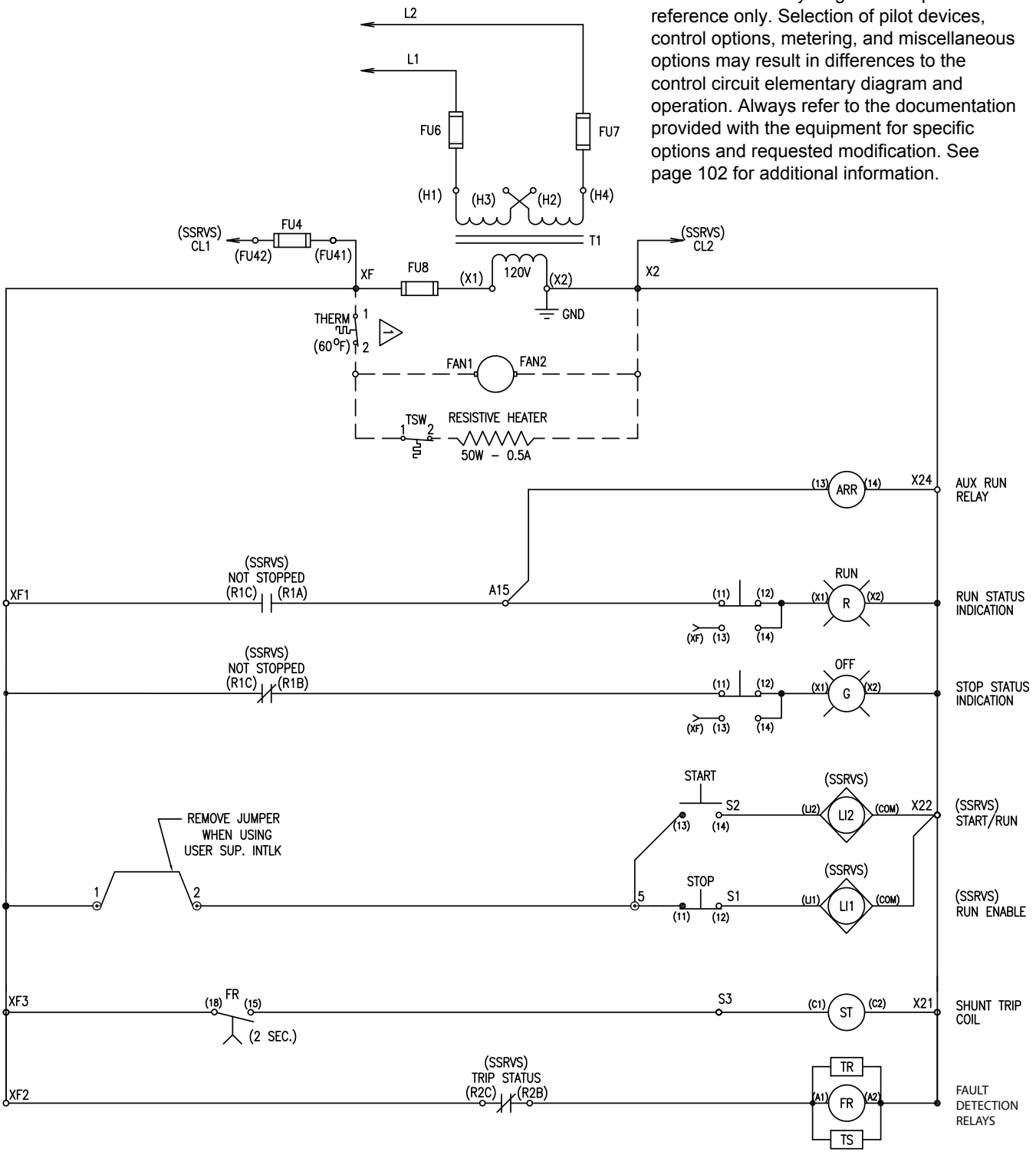
Mod 910: ARRA Option

Select Mod 910 to comply with requirements of the American Recovery and Reinvestment Act (ARRA) of 2009 (Pub.L. 111-5). Equipment will be assembled in the U.S.

ENGLISH

Figure 43: Power Circuit B05 Control Elementary Diagram, Mod A06, Start-Stop Pushbuttons

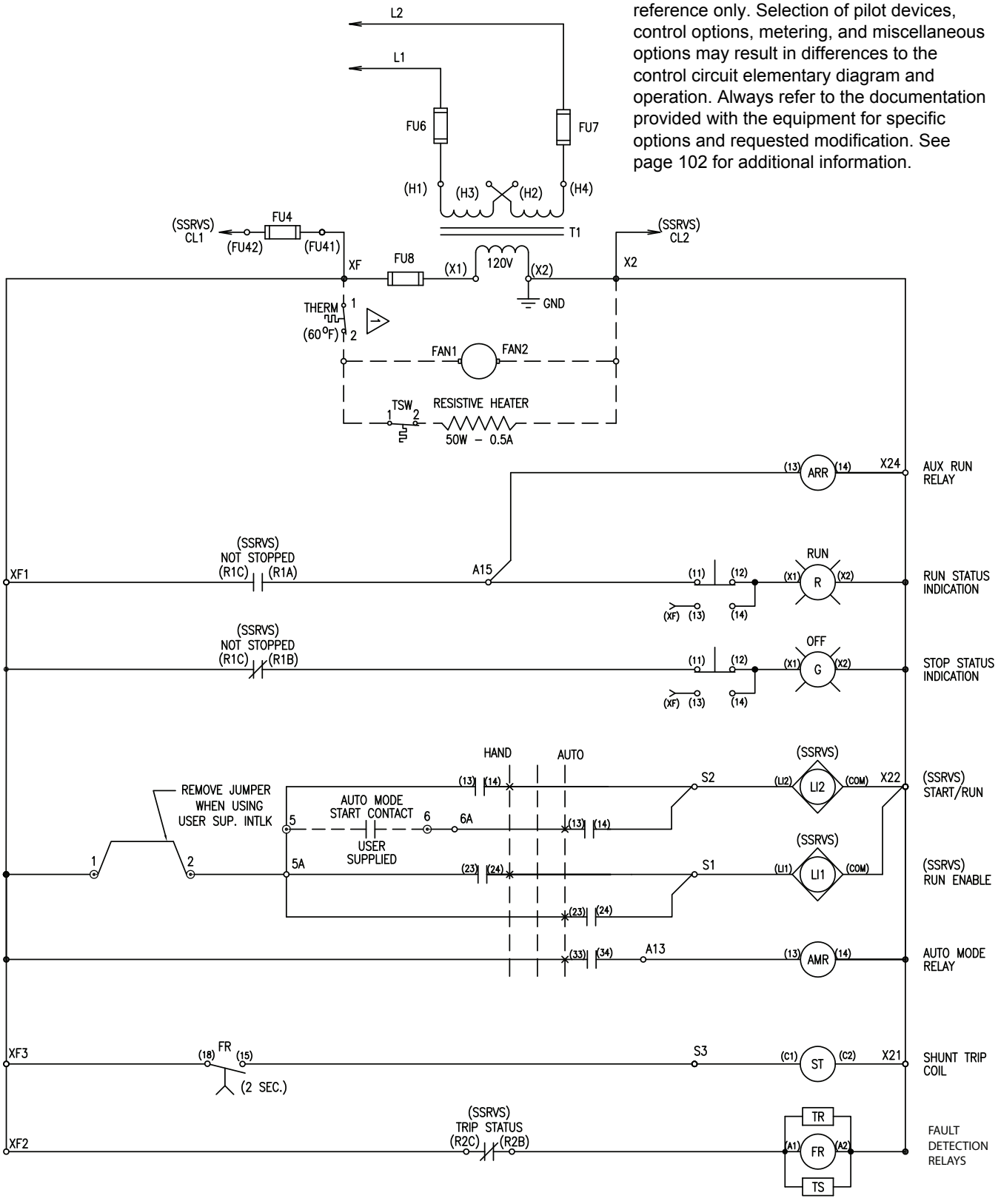
NOTE: Elementary diagrams are provided for reference only. Selection of pilot devices, control options, metering, and miscellaneous options may result in differences to the control circuit elementary diagram and operation. Always refer to the documentation provided with the equipment for specific options and requested modification. See page 102 for additional information.



ENGLISH

Figure 44: Power Circuit B05 Control Elementary Diagram, Mod C06, Hand-Off-Auto Selector Switch

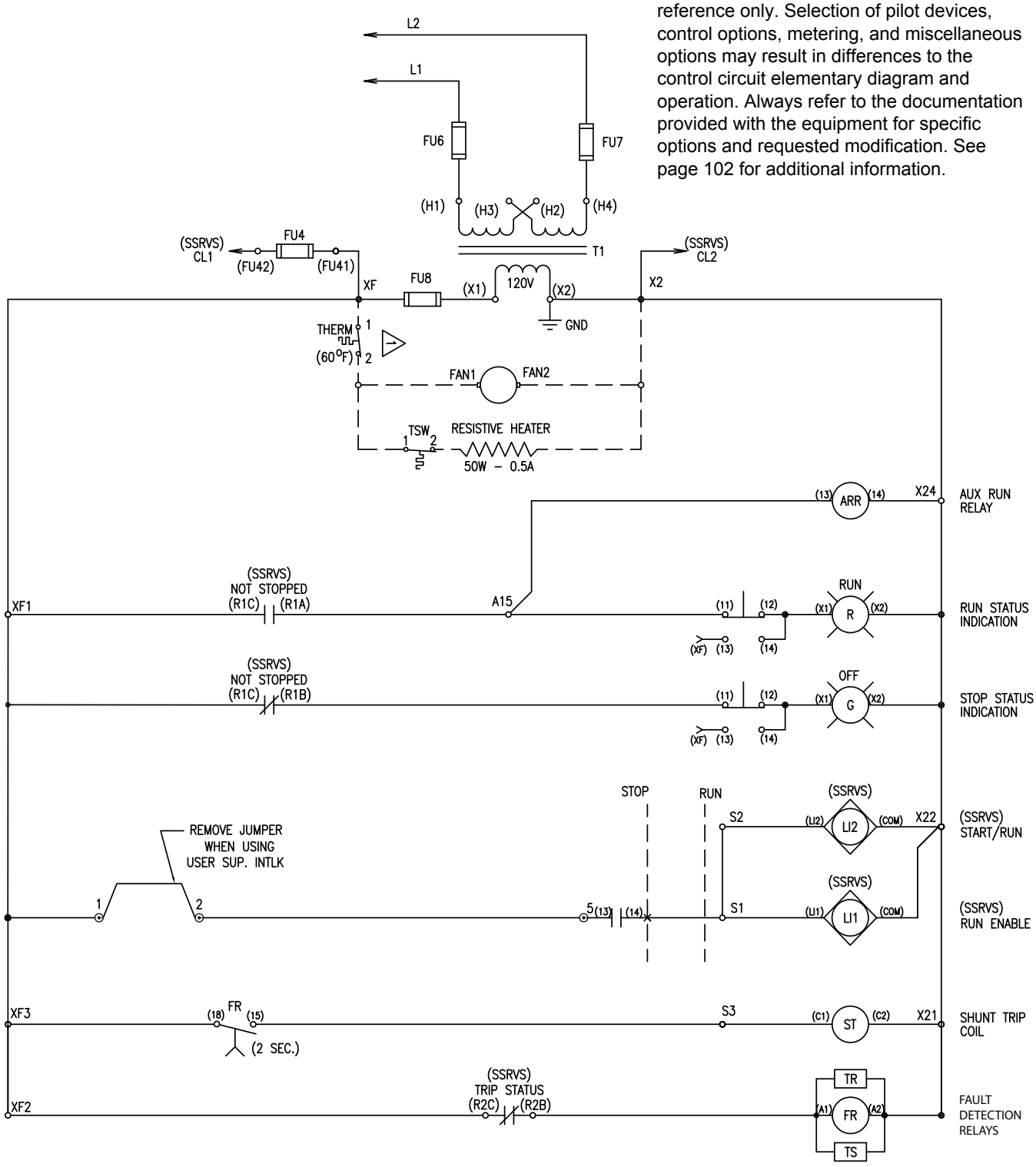
NOTE: Elementary diagrams are provided for reference only. Selection of pilot devices, control options, metering, and miscellaneous options may result in differences to the control circuit elementary diagram and operation. Always refer to the documentation provided with the equipment for specific options and requested modification. See page 102 for additional information.



ENGLISH

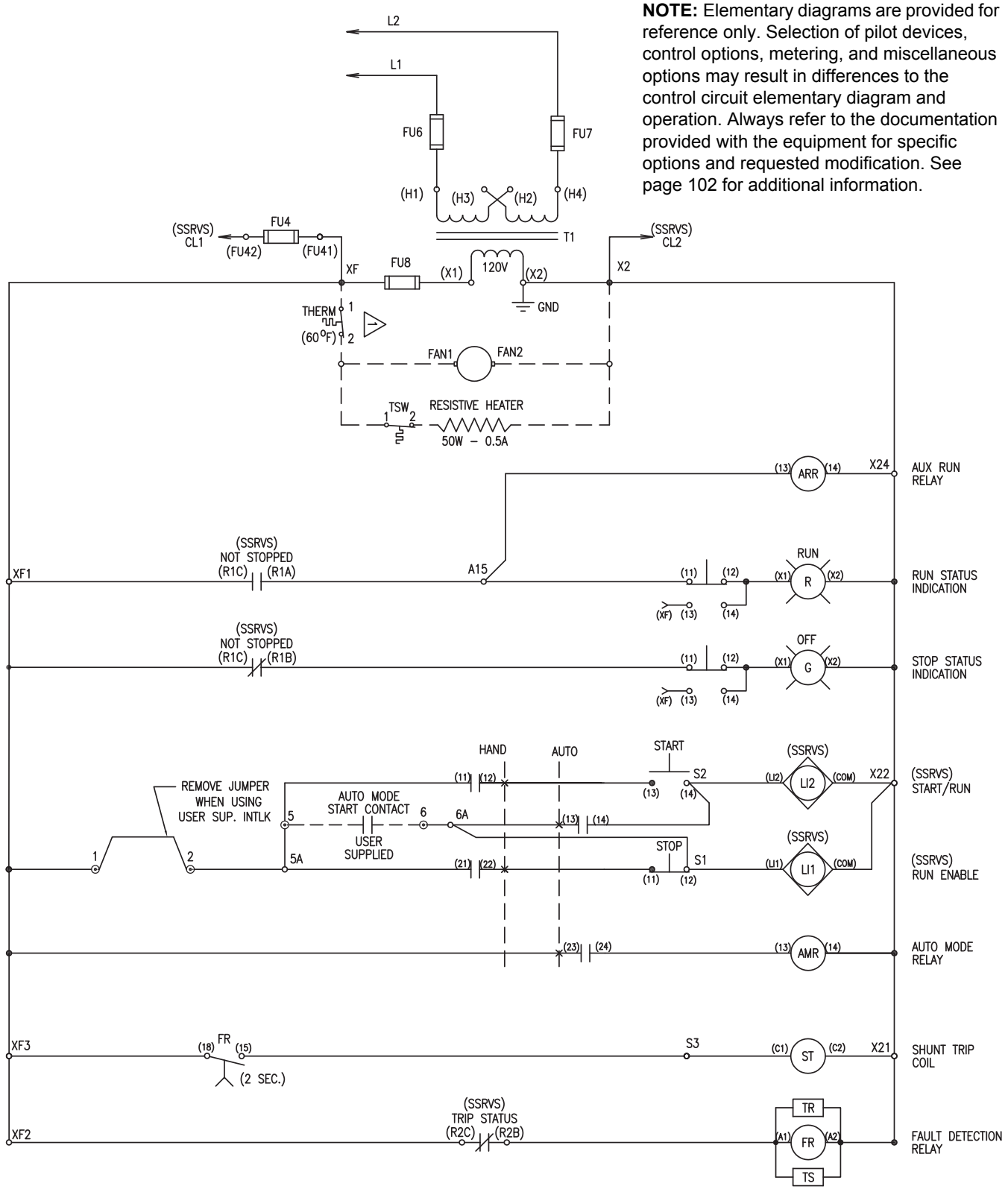
Figure 45: Power Circuit B05 Control Elementary Diagram, Mod D06, Stop-Run Selector Switch

NOTE: Elementary diagrams are provided for reference only. Selection of pilot devices, control options, metering, and miscellaneous options may result in differences to the control circuit elementary diagram and operation. Always refer to the documentation provided with the equipment for specific options and requested modification. See page 102 for additional information.



ENGLISH

Figure 46: Power Circuit B05 Control Elementary Diagram, Mod E06, Hand-Auto Selector Switch and Start-Stop Pushbuttons

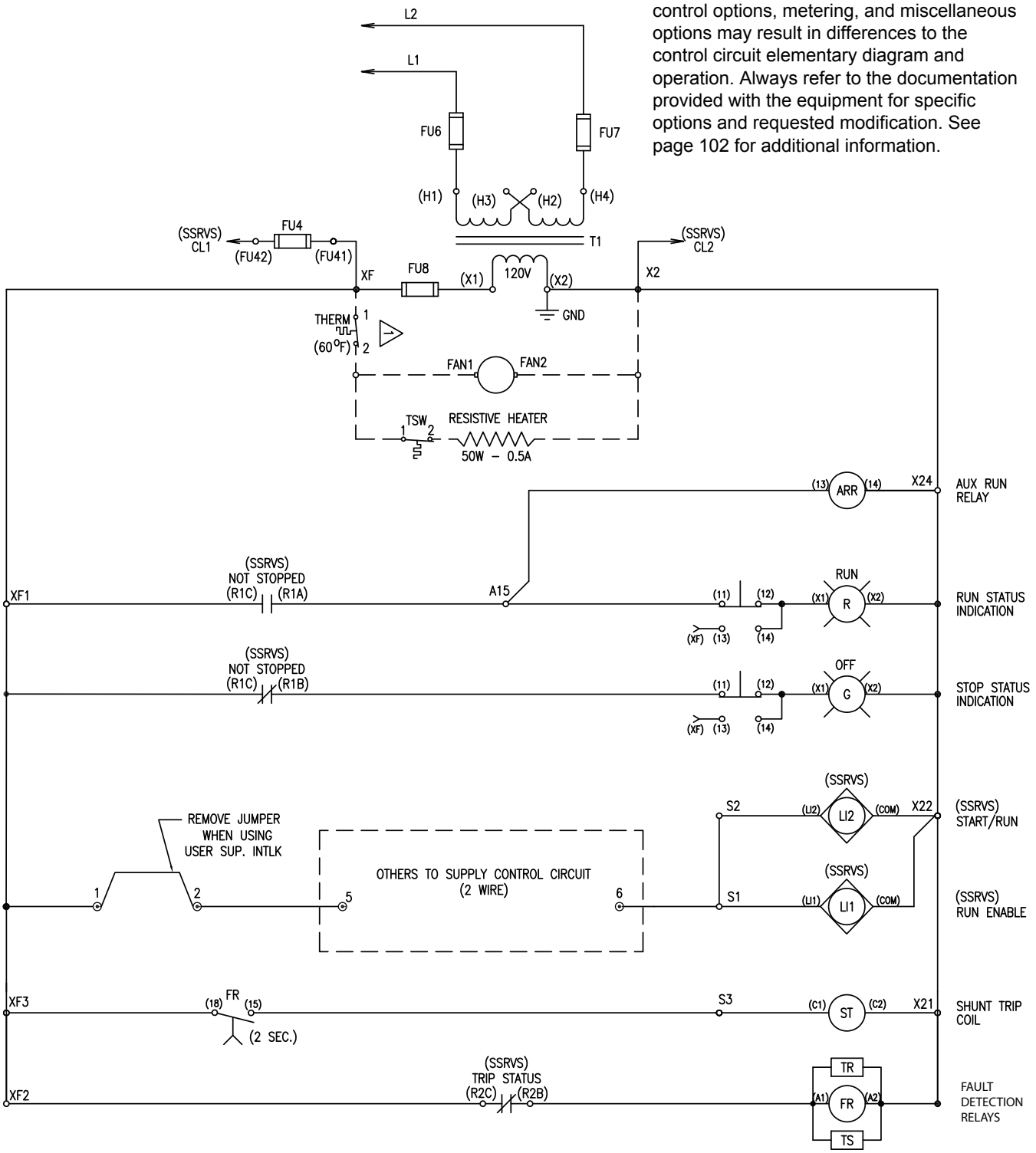


NOTE: Elementary diagrams are provided for reference only. Selection of pilot devices, control options, metering, and miscellaneous options may result in differences to the control circuit elementary diagram and operation. Always refer to the documentation provided with the equipment for specific options and requested modification. See page 102 for additional information.

ENGLISH

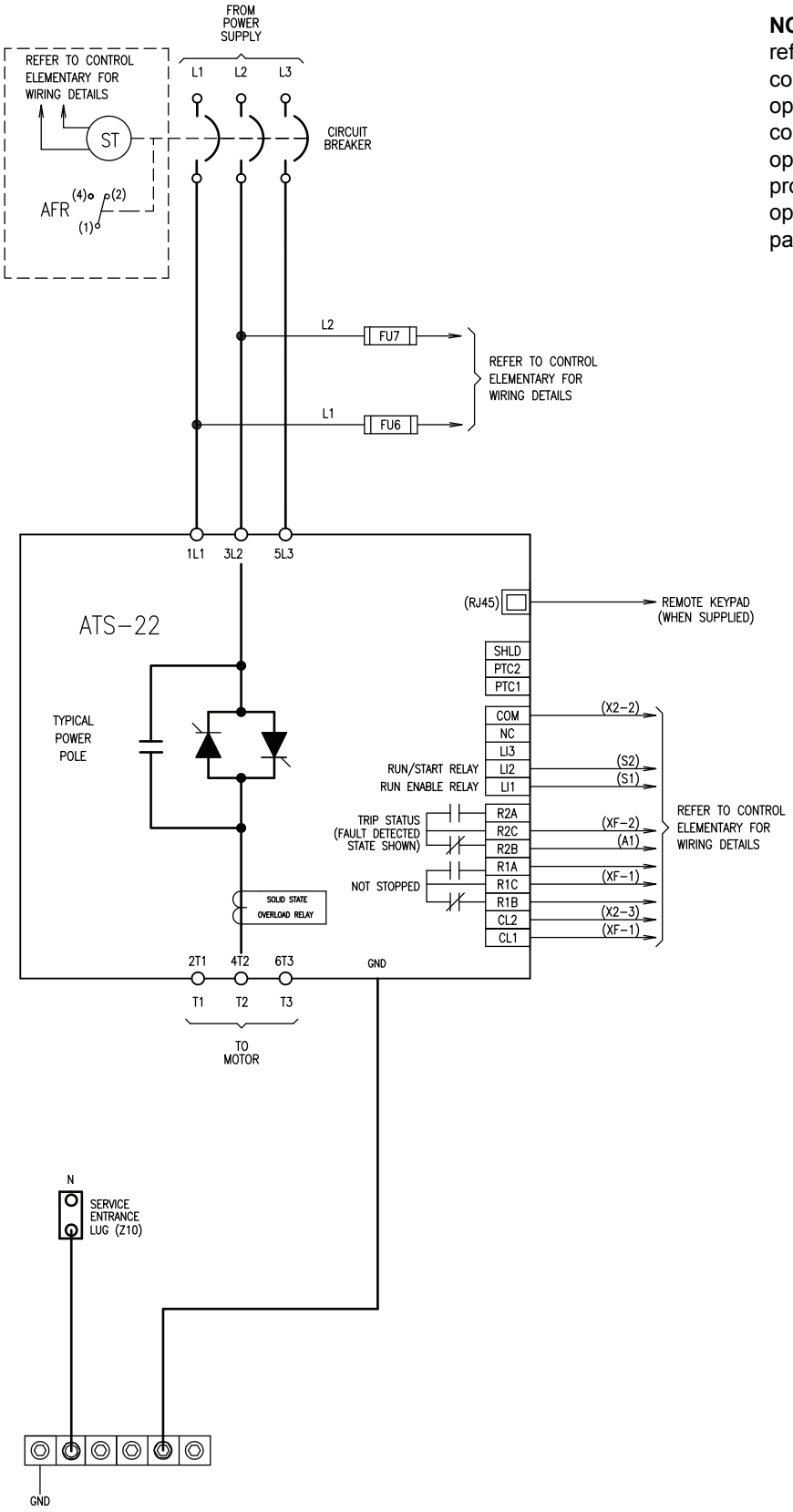
Figure 47: Power Circuit B05 Control Elementary Diagram without Operator Controls

NOTE: Elementary diagrams are provided for reference only. Selection of pilot devices, control options, metering, and miscellaneous options may result in differences to the control circuit elementary diagram and operation. Always refer to the documentation provided with the equipment for specific options and requested modification. See page 102 for additional information.



ENGLISH

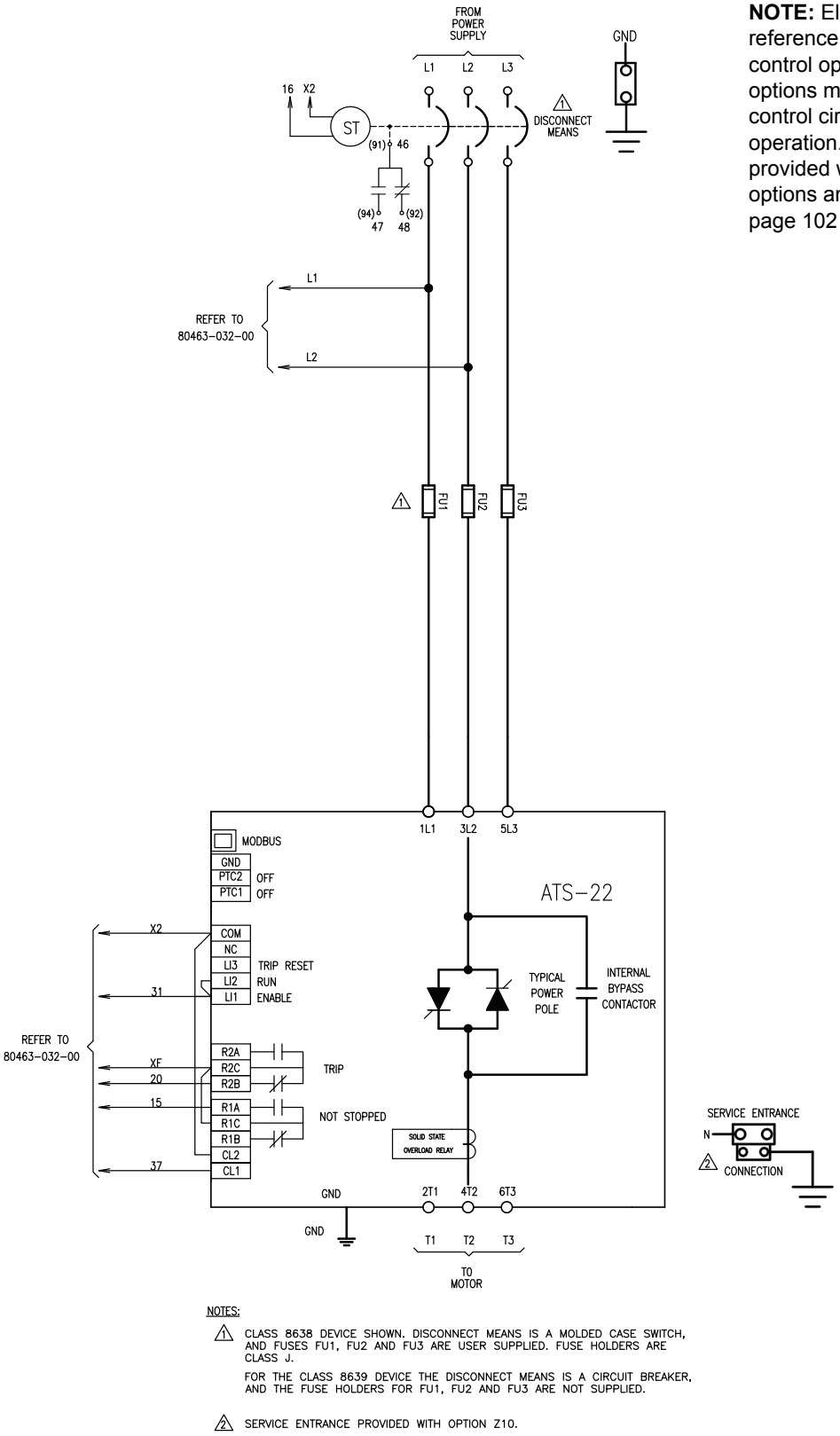
Figure 48: Power Circuit B05 Power Elementary Diagram



NOTE: Elementary diagrams are provided for reference only. Selection of pilot devices, control options, metering, and miscellaneous options may result in differences to the control circuit elementary diagram and operation. Always refer to the documentation provided with the equipment for specific options and requested modification. See page 102 for additional information.

ENGLISH

Figure 49: Power Circuit S05 Power Elementary Diagram



NOTES:

1. CLASS 8638 DEVICE SHOWN. DISCONNECT MEANS IS A MOLDED CASE SWITCH, AND FUSES FU1, FU2 AND FU3 ARE USER SUPPLIED. FUSE HOLDERS ARE CLASS J.

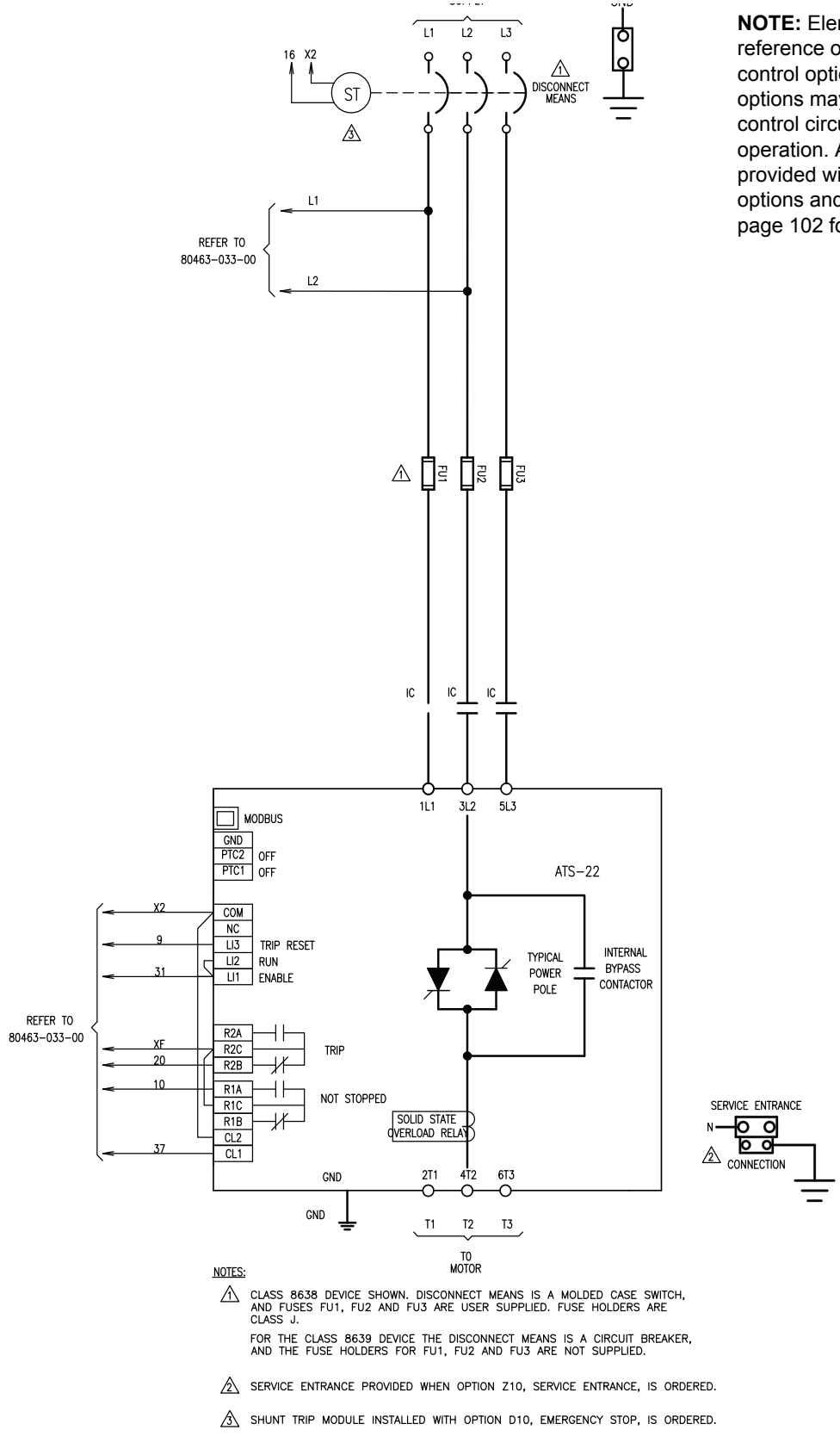
   FOR THE CLASS 8639 DEVICE THE DISCONNECT MEANS IS A CIRCUIT BREAKER, AND THE FUSE HOLDERS FOR FU1, FU2 AND FU3 ARE NOT SUPPLIED.

2. SERVICE ENTRANCE PROVIDED WITH OPTION Z10.

NOTE: Elementary diagrams are provided for reference only. Selection of pilot devices, control options, metering, and miscellaneous options may result in differences to the control circuit elementary diagram and operation. Always refer to the documentation provided with the equipment for specific options and requested modification. See page 102 for additional information.

ENGLISH

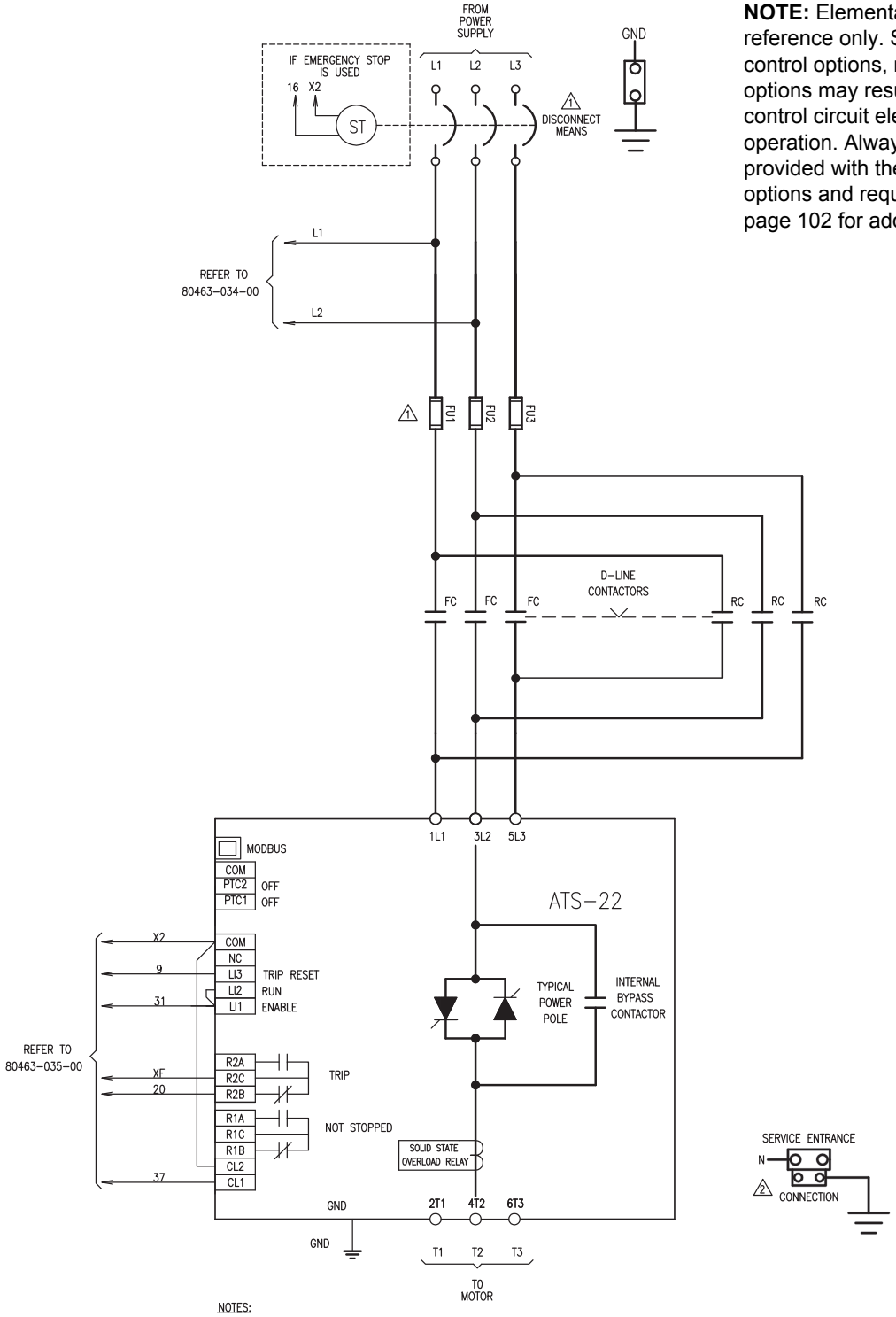
Figure 50: Power Circuit N05 Power Elementary Diagram



NOTE: Elementary diagrams are provided for reference only. Selection of pilot devices, control options, metering, and miscellaneous options may result in differences to the control circuit elementary diagram and operation. Always refer to the documentation provided with the equipment for specific options and requested modification. See page 102 for additional information.

ENGLISH

Figure 51: Power Circuit R05 Power Elementary Diagram



NOTE: Elementary diagrams are provided for reference only. Selection of pilot devices, control options, metering, and miscellaneous options may result in differences to the control circuit elementary diagram and operation. Always refer to the documentation provided with the equipment for specific options and requested modification. See page 102 for additional information.

NOTES:

1. CLASS 8638 DEVICE SHOWN. DISCONNECT MEANS IS A MOLDED CASE SWITCH, AND FUSES FU1, FU2 AND FU3 ARE USER SUPPLIED. FUSE HOLDERS ARE CLASS J.

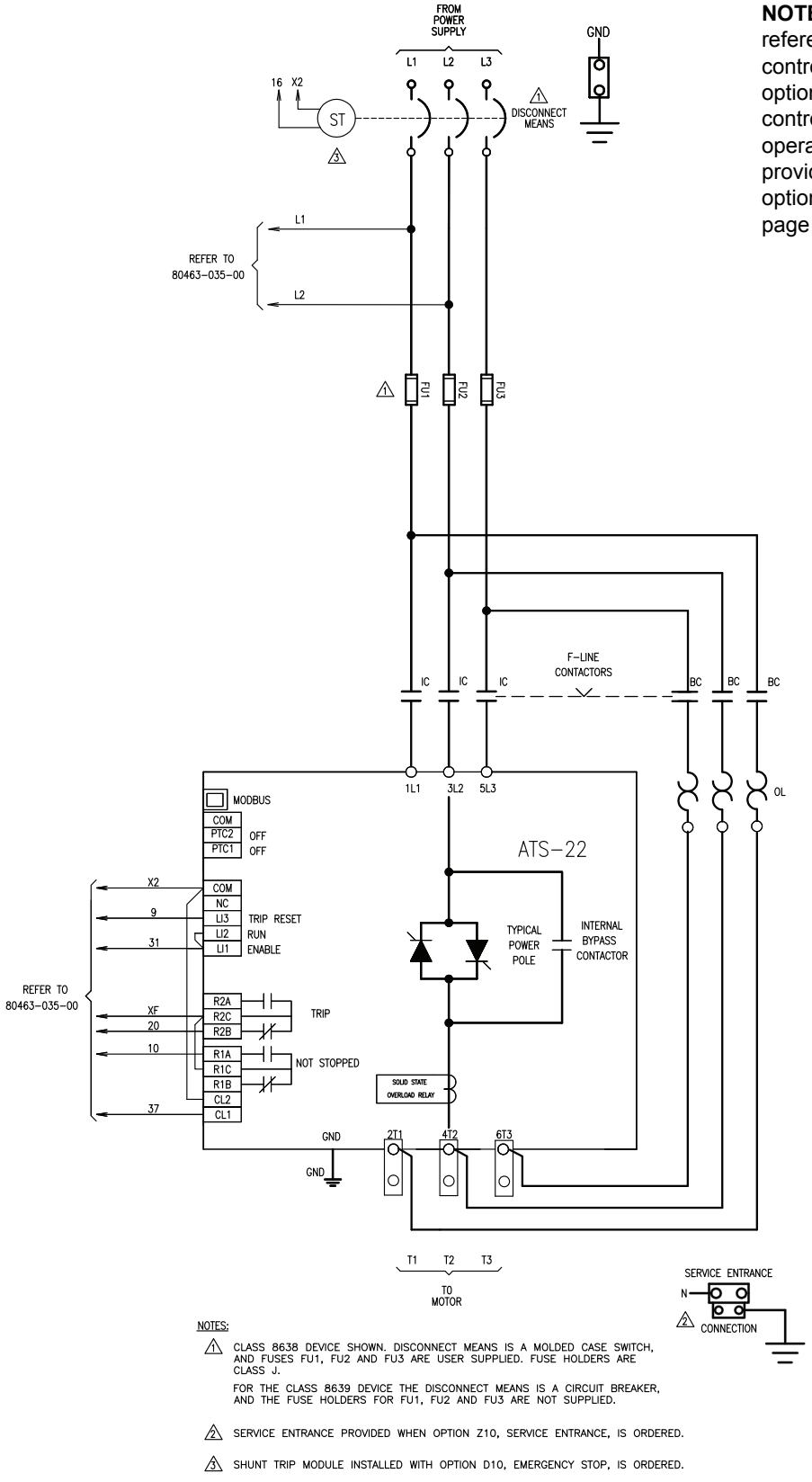
   FOR THE CLASS 8639 DEVICE THE DISCONNECT MEANS IS A CIRCUIT BREAKER, AND THE FUSE HOLDERS FOR FU1, FU2 AND FU3 ARE NOT SUPPLIED.

2. SERVICE ENTRANCE PROVIDED WHEN OPTION Z10, SERVICE ENTRANCE, IS ORDERED.

3. SHUNT TRIP MODULE INSTALLED WITH OPTION D10, EMERGENCY STOP, IS ORDERED.

ENGLISH

Figure 52: Power Circuit Y05 Power Elementary Diagram



NOTE: Elementary diagrams are provided for reference only. Selection of pilot devices, control options, metering, and miscellaneous options may result in differences to the control circuit elementary diagram and operation. Always refer to the documentation provided with the equipment for specific options and requested modification. See page 102 for additional information.

Engineered To Order Electrical Diagrams

For power circuits S05, N05, R05 and Y05, refer to the documentation included with the controller for specific wiring diagrams and the options provided. The power circuit figures provided in this manual are for reference only.

Contact the factory for additional copies of documentation for engineered to order options. Refer to the Technical Support section on page 105.

Section 5—Maintenance

Precautions

Before replacing any parts in the Enclosed 22 controller, read and observe the following safety messages and all other safety messages provided in this bulletin.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Read and understand this instruction bulletin before installing or operating the Enclosed 22 controller. Installation, adjustment, repair, and maintenance must be performed by qualified personnel.
- The user is responsible for compliance with all national and local electrical code requirements with respect to grounding of all equipment.
- Many parts of this controller, including the printed circuit boards, operate at the line voltage. DO NOT TOUCH. Use only electrically insulated tools.
- Some terminals have voltage on them when the disconnect is open.
- Before servicing the controller:
  - — Disconnect all power including external control power that may be present before servicing the controller.
  - — Place a “DO NOT TURN ON” label on the disconnect.
  - — Lock the disconnect in the open position.
- Install and close all covers and doors before applying power or starting and stopping the controller.

Failure to follow these instructions will result in death or serious injury.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must only be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside the equipment.
- Always use a properly rated voltage sensing device to confirm that the power is off.
- Replace all devices, doors, and covers before turning on the power to this equipment.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of anticipated transmission delays or failures of the link[1].
- Each implementation of an Enclosed 22 controller must be individually and thoroughly tested for proper operation before being placed into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

[1] For additional information, refer to NEMA ICS 1.1 (latest edition), “Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control.”

⚠ CAUTION

INCOMPATIBLE LINE VOLTAGE

Before turning on and configuring the controller, ensure that the line voltage is compatible with the line voltage range specified on the nameplate. Incompatible line voltage can cause equipment damage.

Failure to follow these instructions can result in injury or equipment damage.

External Signs of Damage

The following are signs of external damage:

- Cracked, charred, or damaged covers or enclosure parts
- Damage to the keypad terminal such as scratches, punctures, burn marks, chemical burns, or moisture in the screen
- Excessive surface temperatures of enclosures and conduits
- Damage to power or control conductors
- Unusual noise or odors from any of the equipment
- Abnormal temperature, humidity, or vibration

If you see any sign of external damage while powering up the equipment, immediately inform operating personnel and assess the risk of leaving the system powered up. Before removing power from the equipment, always consult with the operating personnel responsible for the machinery and process.

Diagnostic Codes

The keypad terminal displays a number of diagnostic and status codes to indicate the controller's operating and protective circuit functions and to assist with maintenance and troubleshooting. See the troubleshooting sheet on page 106.

Technical Support

When troubleshooting the Enclosed 22 controller, discuss the symptoms of the reported problems with operating personnel. Ask them to describe the problem, identify when they first observed the problem, and where the problem was seen.

Observe the system and process. Record the motor and peripheral equipment nameplate data on the Enclosed 22 Troubleshooting sheet provided on page 106. Copy this form as needed.

For support and assistance, contact the Drives Product Support Group. The Product Support Group is staffed from 8:00 am until 6:00 pm, Monday through Friday, Eastern time to assist with product selection, start-up, and diagnosis of product or application problems. Emergency phone support is available 24 hours a day, 365 days a year.

Toll free	1-888-778-2733
E-mail	drive.products.support@us.schneider-electric.com
Fax	919-217-6508

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ENCLOSED 22 TROUBLESHOOTING SHEET

When requesting after-sales service, it is important to disclose all conditions under which the equipment currently operates. This will help in diagnosing the system quickly. **Call the Product Support Group at 1-888-778-2733.**

DATE: _____
CONTACT NAME: _____
COMPANY: _____
ADDRESS: _____
CITY: _____
STATE: _____
PHONE: _____
FAX: _____

CONTROLLER CONFIGURATION

CATALOG NUMBER: _____
APPLICATION/EQUIPMENT DESIGNATION: _____

MOTOR NAMEPLATE DATA

HORSEPOWER:_____ VOLTAGE (3 PHASE):_____ FREQUENCY:_____ POLES:_____ FLA:_____
SERVICE FACTOR:_____ MOTOR INSULATION: ☐ NEW OR ☐ EXISTING
MOTOR CABLE TYPE:_____ LENGTH IN FEET:_____
IS MOTOR DESIGNED TO COMPLY WITH NEMA MG-1 PART 31 GUIDELINES? ☐ YES ☐ NO

POWER SOURCE AND ENVIRONMENT

VOLTAGE BETWEEN: L1 AND L2:_____ L2 AND L3:_____ L3 AND L1:_____
SERVICE TRANSFORMER RATING: _____KVA _____% Z FREQUENCY: ☐ 60 HZ OR ☐ 50 HZ
AMBIENT TEMPERATURES: MIN °C (°F)_____ MAX °C (°F)_____ HUMIDITY:_____
ALTITUDE IF GREATER THAN 3300 FEET ABOVE SEA LEVEL, SPECIFY:_____FT

CONTROLLER DETECTED FAULT CODES

☐ bPF BYPASS CONTACTOR DETECTED FAULT	☐ CFF INVALID CONFIGURATION ON POWER-UP	☐ EtF EXTERNAL DETECTED FAULT	☐ GrdF GROUND LEAKAGE CURRENT DETECTED FAULT
☐ InF INTERNAL DETECTED FAULT	☐ OCF MOTOR OVERCURRENT	☐ OHF OVERHEATING DETECTED FAULT	☐ OLF MOTOR OVERLOAD
☐ OSF OVERVOLTAGE	☐ OtF MOTOR OVERTEMPERATURE	☐ PHbd PHASE UNBALANCE	☐ PHF LOSS OF LINE PHASE
☐ P IF PHASE INVERSION	☐ trAP TRAP CODE	☐ SCF SHORT CIRCUIT	☐ SLF MODBUS TIME OUT
☐ SnbF TOO MANY STARTS	☐ SSCr SHORTED THYRISTOR / WRONG CONNECTION	☐ StF STARTING TIME DETECTED FAULT	☐ tbS TOO MANY STARTS
☐ UCF MOTOR UNDERCURRENT	☐ USF UNDERVOLTAGE OR NO VOLTAGE		

DETAILED DESCRIPTION OF PROBLEM

ATS22 Fan Replacement

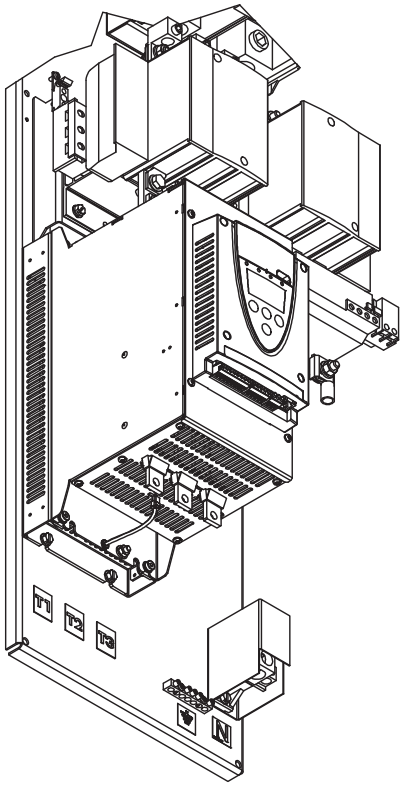
The soft starter heatsink cooling fan, included in some ATS22 models, may require maintenance or replacement after prolonged used. If the cooling fan stops working, order a replacement fan (VW3G22U402) from Schneider Electric.

Table 32: Enclosed 22 Controllers with Replaceable Soft Starter Cooling Fans

Voltage	UL Type 1	UL Type 12	UL Type 3R
208	863822FKG••• (50 hp)	863822FKA2••• (50 hp)	863822FJH2••• (40 hp)
230	863822FLG3••• (60 hp)	863822FLA3••• (60 hp)	863822FKH3••• (50 hp)
460	863822FPG4••• (125 hp)	863822FPA4••• (125 hp)	863822FNH4••• (100 hp)
575	863822FQG5••• (150 hp)	863822FQA5••• (150 hp)	863822FPH5••• (125 hp)

The ATS22 soft starter cooling fan is mounted directly behind the soft starter. Refer to Figure 53 and follow the procedure outlined in this section to replace the cooling fan.

Figure 53: ATS22 Soft Starter



1. Before replacing any parts in the Enclosed 22 controller, read and observe the precautions beginning on page 103.
2. Remove all power from the controller, following lockout/tagout procedures.
3. Open the enclosure door and check for signs of overheating or other damage. If the equipment appears damaged, discontinue equipment use and contact the Schneider Electric product support group. Otherwise continue with Step 4.

4. Remove the control power cable connecting the fan to the soft starter.
5. Loosen and remove the conductors supplying power to the line and load sides of the soft starter.
6. Remove the pull-apart control power terminals from the front the of the soft starter.
7. Loosen and remove the mounting screws attaching the base of the soft starter to the cooling fan. Retain the screws.
8. Remove the soft starter from the enclosure. Take care not to disturb other control power wires.
9. Loosen and remove the 1/4-20 x 0.5 in. mounting screws attaching the base of the cooling fan frame to the mounting pan. Remove the fan and retain the mounting screws.
10. Install the replacement VW3G22402 soft starter cooling fan to the mounting pan, using the mounting screws removed in Step 9. Tighten the screws to 60–72 lb-in (6.8–8.1 N•m).
11. Mount and secure the soft starter, using the mounting screws removed in Step 7. Tighten the screws to 31 lb-in (3.5 N•m).
12. Replace the power conductors on the soft starter and tighten to the torque specifications in ATS22 User Manual, BBV51330.
13. Replace control terminals at the front of the soft starter.
14. Connect the control power cable at the bottom of the soft starter connecting the soft starter to the fan.
15. Close and secure all doors and covers before returning the equipment to service.

Renewable Parts

Schneider Electric provides a limited number of renewable parts for the ATS22 soft starter and the Enclosed 22 controller. Before replacing any parts, consult your local field sales representative. Renewable parts must be installed by qualified personnel.

Table 33: Soft Starters

Type 1 or 12 hp	Type 3R or 50 °C (122 °F) Rated hp	208 V	230 V	460 V	575 V
3	3	ATS22D17S6U	—	—	—
5	—	ATS22D32S6U	ATS22D17S6U	—	—
7.5	5	ATS22D32S6U	ATS22D32S6U	—	—
10	7.5	ATS22D47S6U	ATS22D32S6U	ATS22D17S6U	—
—	10	ATS22D47S6U	ATS22D47S6U	ATS22D32S6U	—
15	—	ATS22D62S6U	ATS22D47S6U	ATS22D32S6U	ATS22D17S6U
20	15	ATS22D75S6U	ATS22D62S6U	ATS22D32S6U	ATS22D32S6U
25	20	ATS22D88S6U	ATS22D75S6U	ATS22D47S6U	ATS22D32S6U
30	25	ATS22C11S6U	ATS22D88S6U	ATS22D47S6U	ATS22D47S6U
40	30	ATS22C14S6U	ATS22C11S6U	ATS22D62S6U	ATS22D47S6U
50	40	ATS22C17S6U	ATS22C14S6U	ATS22D75S6U	ATS22D62S6U
60	50	ATS22C21S6U	ATS22C17S6U	ATS22D88S6U	ATS22D75S6U
75	60	ATS22C25S6U	ATS22C21S6U	ATS22C11S6U	ATS22D88S6U
100	75	ATS22C32S6U	ATS22C25S6U	ATS22C14S6U	ATS22C11S6U

Continued on next page

ENGLISH

Table 33: Soft Starters *(continued)*

Type 1 or 12 hp	Type 3R or 50 °C (122 °F) Rated hp	208 V	230 V	460 V	575 V
125	100	ATS22C41S6U	ATS22C32S6U	ATS22C17S6U	ATS22C14S6U
150	125	ATS22C48S6U	ATS22C41S6U	—	ATS22C17S6U
200	150	—	ATS22C59S6U	ATS22C21S6U	ATS22C21S6U
250	200	—	—	ATS22C32S6U	ATS22C25S6U
300	250	—	—	ATS22C41S6U	ATS22C32S6U
350	300	—	—	ATS22C48S6U	ATS22C41S6U
400	350	—	—	ATS22C59S6U	ATS22C48S6U
500	400	—	—	—	ATS22C59S6U

Table 34: Control Transformer Primary Fuses (FU6, FU7): Power Circuit B05

Enclosure Size	208 V	230 V	460 V	575 V
Type 1 or Type 12				
A or B	25430-20113 (1.125 A)	25430-20100 (1.0 A)	25430-20050 (0.5 A)	25430-20040 (0.4 A)
D or E	25430-20225 (2.25 A)	25430-20200 (2.0 A)	25430-20100 (1.0 A)	25430-20080 (0.8 A)
Type 3R				
A or B	25430-20350 (3.5 A)	25430-20321 (3.2 A)	25430-20161 (1.6 A)	25430-20113 (1.125 A)
D or E	25430-20400 (4.0 A)	25430-20400 (4.0 A)	25430-20200 (2.0 A)	25430-20150 (1.5 A)

Table 35: Control Transformer Primary Fuses (FU6, FU7): Power Circuit S05, N05, R05, Y01 without Option B10

Type 1 or Type 12	Type 3R	208 V	230 V	460 V	575 V
B	—	25430-20225 (2.25 A)	25430-20200 (2.0 A)	25430-20100 (1.0 A)	25430-20061 (0.6 A)
C	B or C	25430-20350 (3.5 A)	25430-20300 (3.0 A)	25430-20150 (1.5 A)	25430-20113 (1.125 A)
D or F	D	25430-20600 (6.0 A)	25430-20500 (5.0 A)	25430-20250 (2.5 A)	25430-20200 (2.0 A)
—	F	25430-20600 (6.0 A)	25430-20600 (6.0 A)	25430-20300 (3.0 A)	25430-20250 (2.5 A)
G	G	25430-20800 (8.0 A)	25430-20750 (7.5 A)	25430-20350 (3.5 A)	25430-20250 (2.5 A)

Table 36: Control Transformer Primary Fuses (FU6, FU7): Any Power Circuit with Option B10

Enclosure Size	208 V	230 V	460 V	575 V
B or D	25430-20625 (6.25 A)	25430-20600 (6.0 A)	25430-20321 (3.2 A)	25430-20250 (2.5 A)
D	25430-20800 (8.0 A)	25430-20600 (8.0 A)	25430-20500 (5.0 A)	25430-20321 (3.2 A)
F	25430-20800 (8.0 A)	25430-20600 (8.0 A)	25430-20500 (5.0 A)	25430-20400 (4.0 A)
G	25430-20800 (8.0 A)	25430-20800 (8.0 A)	25430-20500 (5.0 A)	25430-20400 (4.0 A)

Table 37: Control Transformer Secondary Fuse

Enclosure Size	Power Circuit B05 without Option B10	Power Circuit S05, N05, R05, or Y05 without Option B10	Any Power Circuit with Option B10
Type 1 or Type 12			
A or B	25430-20061 (0.6 A)	25430-20130 (1.3 A)	25430-20400 (4.0 A)
C	—	25430-20200 (2.0 A)	25430-20400 (4.0 A)
D	25430-20130 (1.3 A)	25430-20350 (3.5 A)	25430-20625 (6.25 A)
E	25430-20130 (1.3 A)	—	—
F	—	25430-20321 (3.2 A)	25430-20625 (6.25 A)
G	—	25430-20500 (5.0 A)	25430-20625 (6.25 A)
Type 1 or Type 12			
A, B, or C	25430-20200	25430-20200	25430-20400
D	25430-20250	25430-20350	25430-20625 (6.25 A)
E	25430-20250	—	—
F	—	25430-20400	25430-20625 (6.25 A)
G	—	25430-20500	25430-20625 (6.25 A)

Table 38: Soft Starter Control Power Fuse (FU4)

Enclosure Size	Power Circuit B05	Power Circuit S05, N05, R05, or Y05
A, B, or C	25430-20050 (0.5 A)	25430-20050 (0.5 A)
D	25430-20126 (1.2 A)	25430-20050 (0.5 A)
E	25430-20161 (1.6 A)	—
F	—	25430-20126 (1.2 A)
G	—	25430-20161 (1.6 A)

Table 39: Heater Stirring Fan (UL Type 3R Only)

All	26016-31001

Table 40: Heatsink Cooling Fan (when provided[1])

Voltage	UL Type 1 or Type 12 hp	UL Type 3R or 50 °C (122°F) Rated hp	Catalog Number
208	50	40	VW3G22U402
230	60	50	
460	125	100	
575	150	125	

1 A heatsink cooling fan is provided for above power ratings when equipment includes a fusible disconnect (Controller Style 22F).

Table 41: Condensation Heater (UL Type 3R Only)

All	HUA22191

Table 42: SE Supplied Power Fuses for Use with Enclosed 22 Controllers with Fusible Switch Disconnects (22F)[1]

hp	208 V	230 V	460 V	575 V
3	25423-30150	—	—	—
5	25423-30250	25423-30300	—	—
7.5	25423-30400	25423-30350	—	—
10	25423-30500	25423-30450	25423-30200	—
15	25423-30800	25423-30700	25423-30350	25423-30250
20	25423-31000	25423-30900	25423-30450	25423-30350
25	25423-31250	25423-31100	25423-30600	25423-30450
30	25423-31500	25423-31250	25423-30700	25423-30500
40	25423-32000	25423-31750	25423-30900	25423-30700
50	25423-32500	25423-32250	25423-31100	25423-30900
60	25423-32500	25423-32500	25423-31250	25423-31000
75	25423-33500	25423-33000	25423-31500	25423-31250
100	25423-34500	25423-34000	25423-32000	25423-31500
125	25423-36000	25423-35000	25423-32500	25423-32000
150	25423-36000	25423-36000	25423-33000	25423-32500
200	—	25423-36000	25423-34000	25423-33000
250	—	—	25423-35000	25423-34000
300	—	—	25423-36000	25423-35000
350	—	—	25423-36000	25423-35000
400	—	—	25423-36000	25423-36000
500	—	—	—	25423-36000

1 To include fuses with the equipment when shipped, contact the factory.

Table 43: Schneider Electric Supplied Power Fuses for Use with Enclosed 22 Controllers with Fusible Switch Disconnects (22F)[1]

hp	208 V	230 V	460 V	575 V
3	25423-30150	—	—	—
5	25423-30250	25423-30300	—	—
7.5	25423-30400	25423-30350	—	—
10	25423-30500	25423-30450	25423-30200	—
15	25423-30800	25423-30700	25423-30350	25423-30250
20	25423-31000	25423-30900	25423-30450	25423-30350
25	25423-31250	25423-31100	25423-30600	25423-30450
30	25423-31500	25423-31250	25423-30700	25423-30500
40	25423-32000	25423-31750	25423-30900	25423-30700
50	25423-32500	25423-32250	25423-31100	25423-30900
60	—	25423-32500	25423-31250	25423-31000
75	—	—	25423-31500	25423-31250
100	—	—	25423-32000	25423-31500
125	—	—	25423-32500	25423-32000
150	—	—		25423-32500

[1] To include fuses with the equipment when shipped, contact the factory.

Schneider Electric USA, Inc.
8001 Knightdale Blvd.
Knightdale, NC 27545 USA
1-888-778-2733
www.schneider-electric.us

30072-453-26 Rev. 03, 12/2012 Replaces 30072-453-26 Rev. 02, 08/2011

VARIABLE FREQUENCY DRIVE

SQUARE D
by Schneider Electric

Job Name:	East Grove Pump Station	Square D Quotation #:	44596636
Job Location:	FALL RIVER, MA	Quotation Revision #:	
		Sales Contact:	CPQ
		Sales Contact Location:	106
Purchaser:	GRAYBAR ELECT CO 5818836	Customer:	SPARKS CO INC
Purchaser PO #:		Customer PO #:	
User:	SPARKS CO INC	Architect:	SPARKS CO INC
User Location:		Cons. Engineer:	
Drawing Status:	RECORD		

TABLE OF CONTENTS

SQUARE D FACTORY ORDER NUMBER: 44596636–007

REV	DESCRIPTION	BY	DATE
–	----	--	--/--/--
–	----	--	--/--/--
–	----	--	--/--/--
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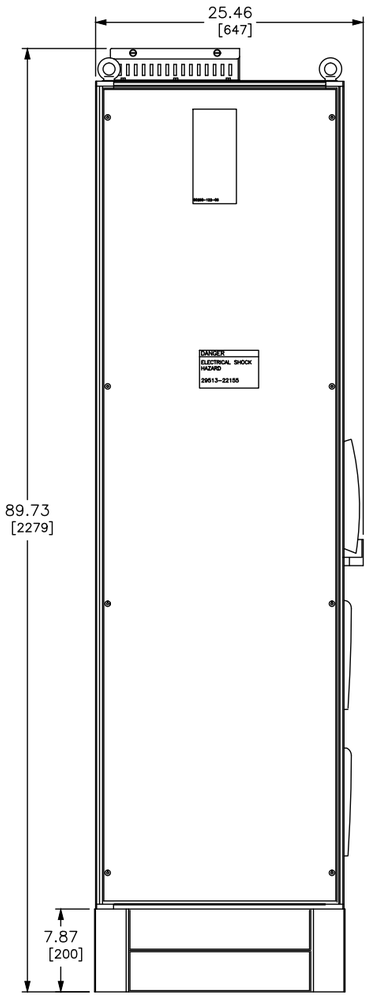
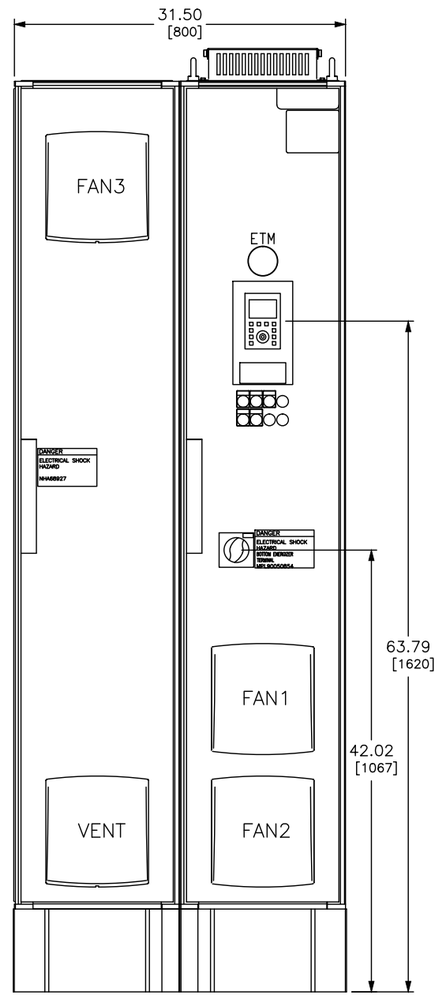
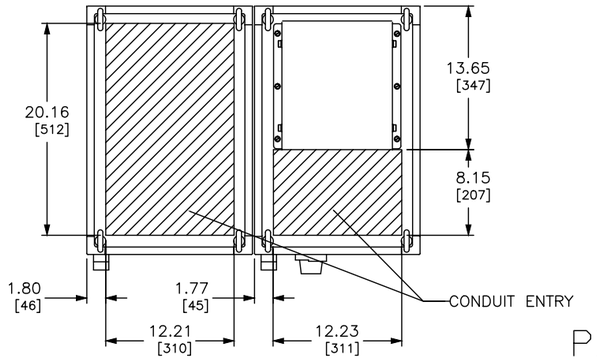
–	----	--	--/--/--
–	----	--	--/--/--



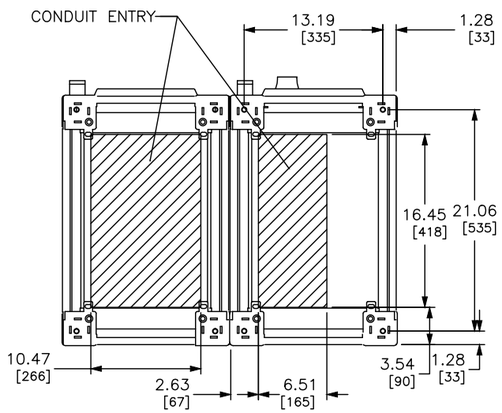
LEFT VIEW



FRONT VIEW



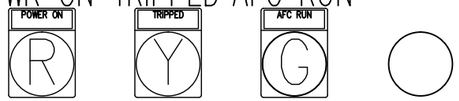
TOP VIEW



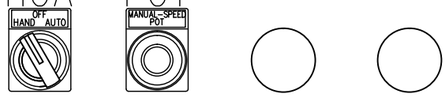
BOTTOM VIEW
MOUNTING LOCATIONS

PILOT DEVICE DETAIL

PWR ON TRIPPED AFC RUN

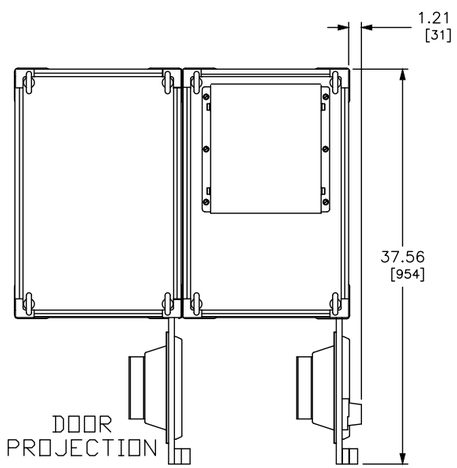


HOA POT



NOTES:

⚠1 REFER TO CONTROLLER NAMEPLATE TO COMPLETE P/N.



ENCLOSURE OUTLINE & GENERAL ARRANGEMENT FOR CONTROLLER P/N

⚠1 ATV660 D90 T4 H A A W

MAX FLA	KILOWATTS/HP	VOLTAGE/PH	DUTY TYPE	ENCLOSURE TYPE	HARMONIC MITIGATION	POWER CIRCUIT TYPE
145 AMPS	75KW/100HP	460V/3 PH	HEAVY	TYPE 12	5% REACTOR	W/BYPASS

THIS ASSEMBLY MUST MEET UNDERWRITERS LABORATORIES STANDARD UL 508A.

JOB NAME:	East Grove Pump Station	EQUIPMENT DESIGNATION:	**WELL PUMP VFD**
JOB LOCATION:	FALL RIVER MA	EQUIPMENT TYPE:	ALTIVAR PROCESS DRIVE
DRAWN BY:	GH	DRAWING TYPE:	ELEVATION
ENGR:	G. HEATHERLY		SQUARE D by Schneider Electric
DATE:	June 01 2022		
DRAWING STATUS:	RECORD	DWG# **F44596636-007-01**	PG 1 OF 1 REV –

REV	DESCRIPTION	BY	DATE
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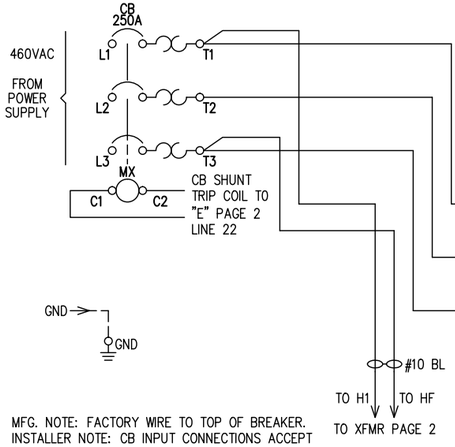
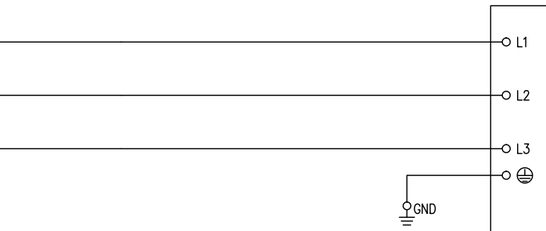
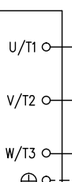
–	-----	--	--/--/--



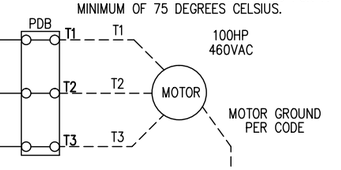
MFG. NOTE: FACTORY WIRE TO TOP OF BREAKER.
INSTALLER NOTE: CB INPUT CONNECTIONS ACCEPT
(1) #4–#4/0 CABLE PER PHASE.
TORQUE WIRE BINDING SCREWS TO 225 LB–IN (26 N–m).

FIELD WIRING MUST BE COPPER
CONDUCTORS ONLY AND BE RATED
FOR A MINIMUM OF 75 DEGREES CELSIUS.

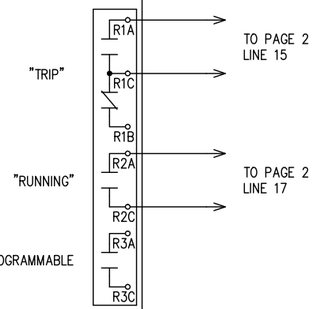


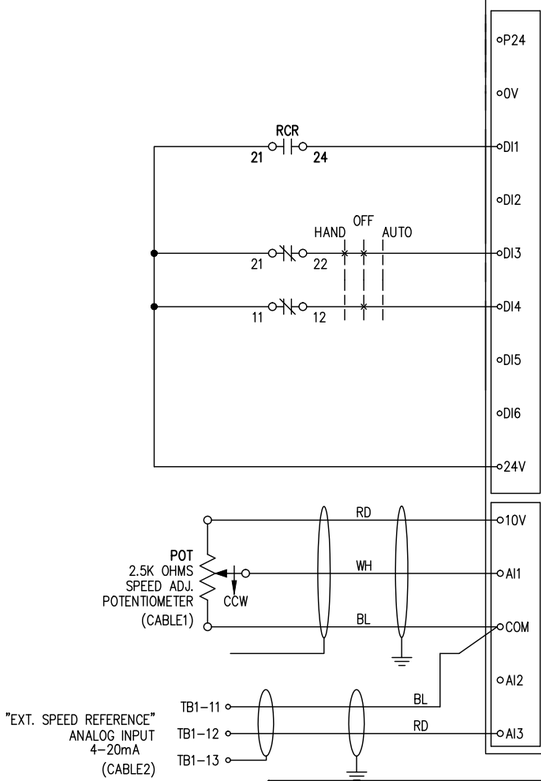


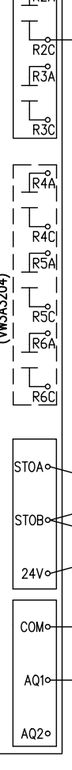
FIELD WIRING MUST BE COPPER
CONDUCTORS ONLY AND BE RATED FOR A
MINIMUM OF 75 DEGREES CELSIUS.

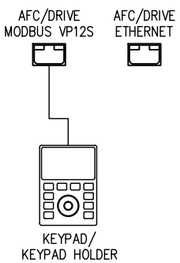


PDB LUGS ACCEPT
(1) #4–600 MCM PER PHASE
TORQUE TO 500 LB–IN (56.5 N·m)









24V SEQUENCING AND CONFIGURATION

MFG. WIRING NOTES:

1. ALL 24V CONTROL WIRE #16 AWG BLUE.
   ALL 120V LINE CONTROL WIRE #16 AWG RED.
   ALL 120V NEUTRAL CONTROL WIRE #16 AWG WHITE.
   SHIELDED CABLE IS RED/WHITE/BLACK OR RED/BLACK.
   GROUND WIRE TO BE #14 GREEN OR GREEN/YELLOW.
   (UNLESS OTHERWISE NOTED)

ATV630/660 FACTORY CONFIGURATION- VARIATIONS FROM DEFAULT

MENU	TAB	SUBMENU	DESCRIPTION	SETTING	CODE	ADJ
1	S. START	----------	2/3 WIRE CONTROL	2C	TCC	2C
1	S. START	----------	BASIC FREQUENCY	60HZ NEMA	BFR	60
1	S. START	----------	MAX FREQUENCY	60	TFR	60
1	S. START	----------	LOW SPEED	3	LSP	3
1	S. START	----------	ACCELERATION	10	ACC	10
1	S. START	----------	DECELERATION	10	DEC	10
5.2	----------	SWITCHING FREQUENCY	SWITCHING FREQUENCY	2.5	SFR	2.5
5.2	----------	MOTOR PARAMATERS	DUAL RATING	HEAVY DUTY	DRT	HIGH
5.5	----------	----------	REF. FREQ 1 CONFIG	AI3	FR1	AI3
5.5	----------	----------	FREQ SWITCH ASSIGN	DI3	RFC	DI3
5.5	----------	----------	2-WIRE TYPE	LEVEL	TCT	LEL
5.5	----------	----------	REF. FREQ 2 CONFIG	AI1	FR2	AI1
5.5	----------	CONTROL MODE	MIXED MODE CONFIG	CONTROL MODE I/O PROFILE	CHCF	IO
5.5	----------	COMMAND SWITCHING	COMMAND SWITCHING	DI3	CCS	DI3
5.5	----------	CMD CHANNEL 1	CMD CHANNEL 1	TERMINAL	CD1	TER
5.5	----------	CMD CHANNEL 2	CMD CHANNEL 2	TERMINAL	CD2	TER
5.11	AI/AQ	AI3 CONFIGURATION	AI3 TYPE	CURRENT	AI3T	0A
5.11	AI/AQ	AI3 CONFIGURATION	AI3 MIN VALUE	4	CRL3	4
5.11	AI/AQ	AQ1 CONFIGURATION	AQ1 ASSIGNMENT	MOTOR FREQUENCY	AO1	OFR
5.11	AI/AQ	AQ1 CONFIGURATION	AQ1 MIN OUTPUT	4	AOL1	4
5.11	RELAY	R1 CONFIGURATION	R1 ASSIGNMENT	OPERATING STATE	R1	FLT
5.11	RELAY	R2 CONFIGURATION	R2 ASSIGNMENT	DRIVE RUNNING	R2	RUN
5.12	----------	CATCH ON THE FLY	CATCH ON THE FLY	YES	FLR	YES
5.12	----------	FAULT (TRIP) RESET	FAULT (TRIP) RESET	DI4	RSF	DI4

TABLE FOR POWER WIRING		
POWER WIRING	WIRES/PHASE	EQUIPMENT GROUND
WIRE, 2/0 AWG, BLACK	1	WIRE, 4 AWG

UNLESS OTHERWISE NOTED

JOB NAME:	East Grove Pump Station	EQUIPMENT DESIGNATION:	**WELL PUMP VFD**
JOB LOCATION:	FALL RIVER MA	EQUIPMENT TYPE:	ALTIVAR PROCESS DRIVE
DRAWN BY:	GH	DRAWING TYPE:	ELEMENTARY
ENGR:	G. HEATHERLY		SQUARE D by Schneider Electric
DATE:	June 01 2022		
DRAWING STATUS:	RECORD	DWG#	**E44596636-007-01** PG 1 OF 2 REV –

REV	DESCRIPTION	BY	DATE
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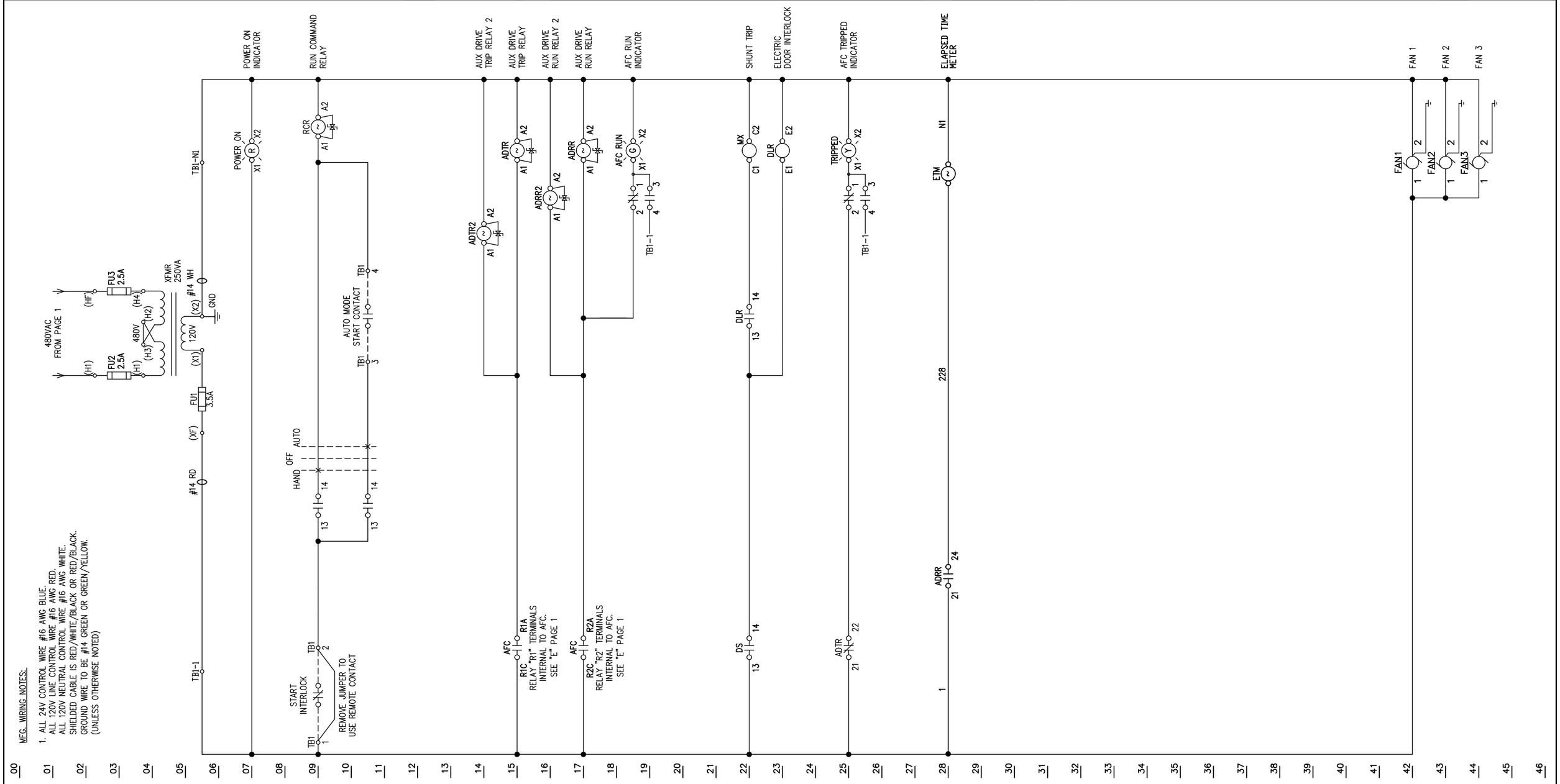
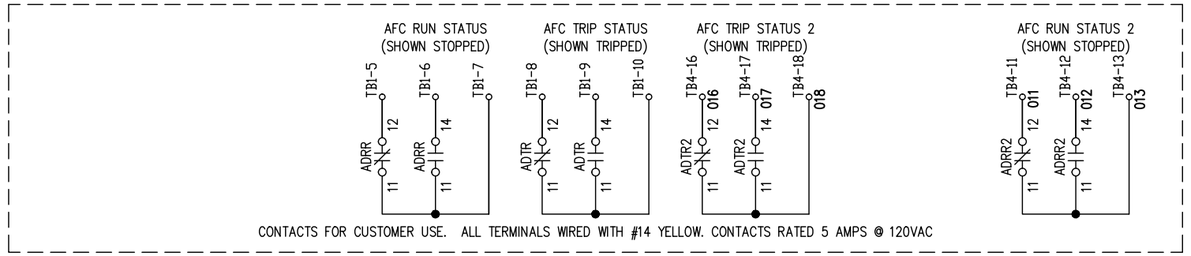
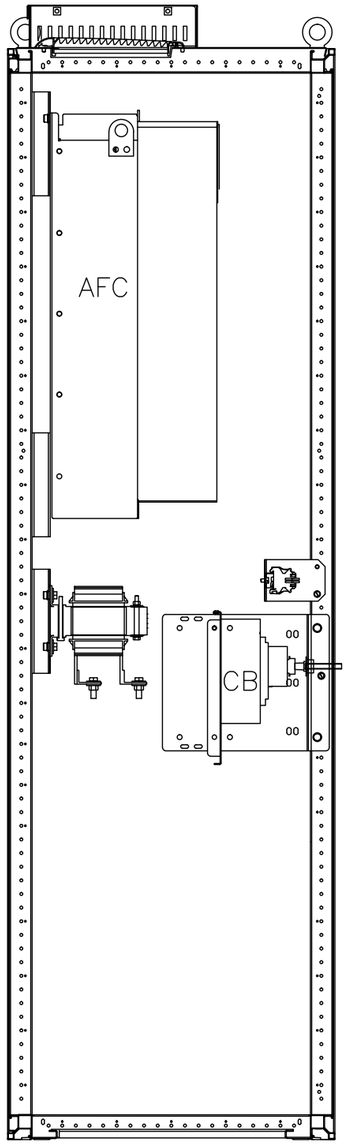


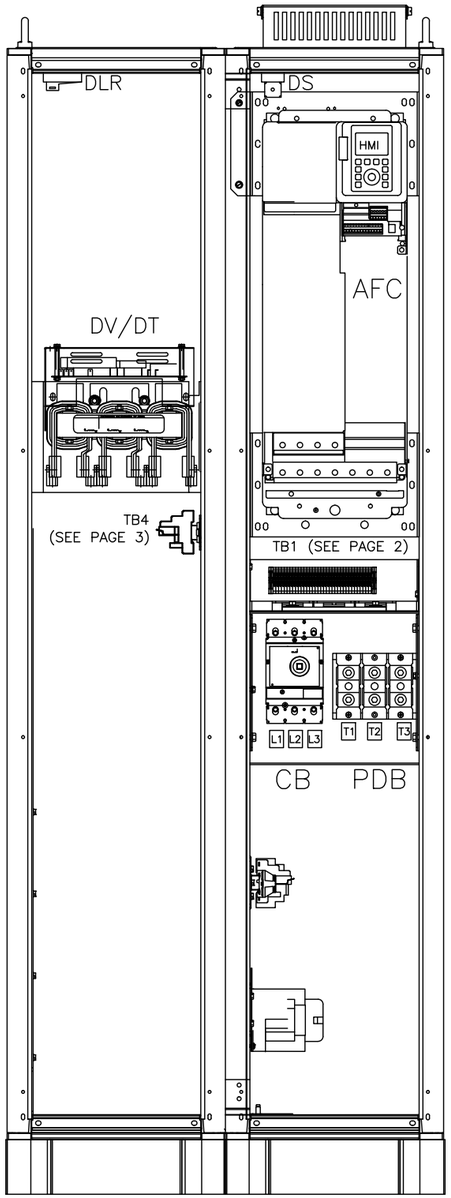


JOB NAME:	East Grove Pump Station	EQUIPMENT DESIGNATION:	**WELL PUMP VFD**
JOB LOCATION:	FALL RIVER MA	EQUIPMENT TYPE:	ALTIVAR PROCESS DRIVE
DRAWN BY:	GH	DRAWING TYPE:	ELEMENTARY
ENGR:	G. HEATHERLY		
DATE:	June 01 2022		
DRAWING STATUS:	RECORD	DWG#	**E44596636-007-01**
		PG	2 OF 2
		REV	–

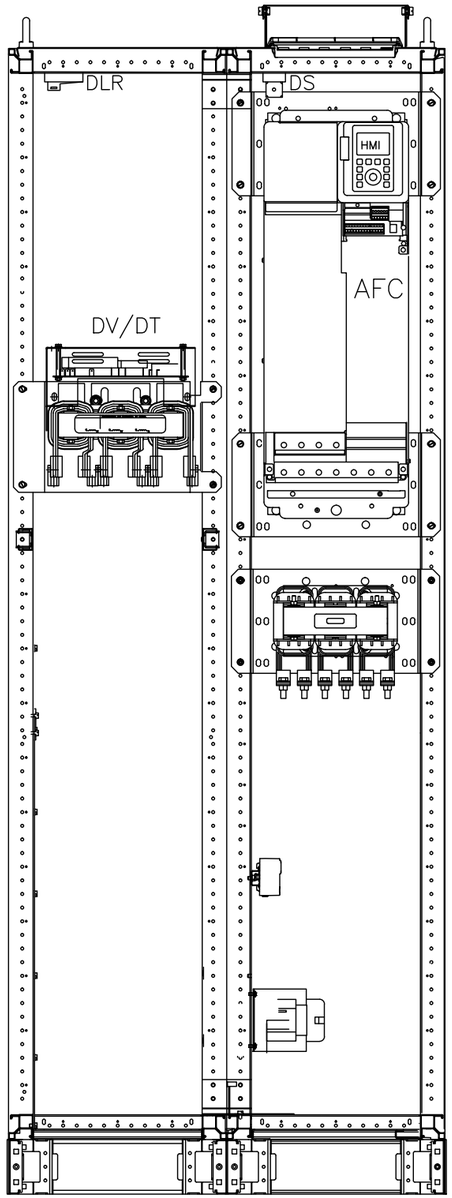
REV	DESCRIPTION	BY	DATE	–	----	--	--/--/--	–	----	--	--/--/--
–	----	--	--/--/--	–	----	--	--/--/--	–	----	--	--/--/--



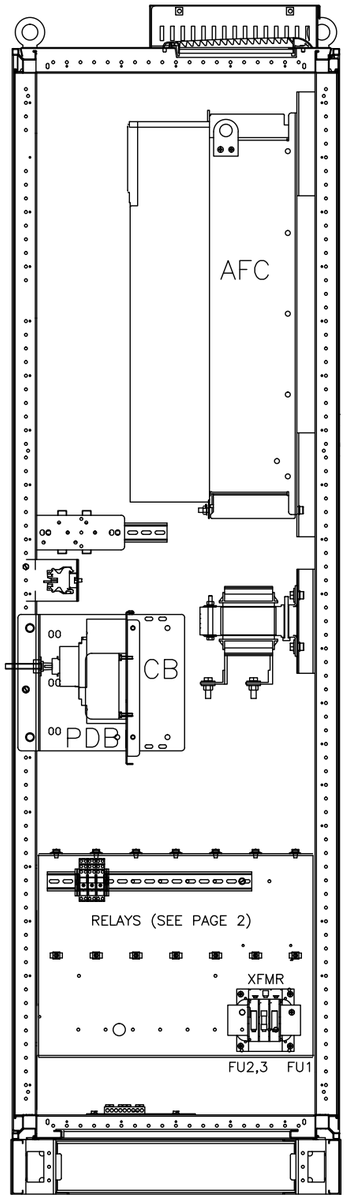
DRIVE SECTION LEFT VIEW



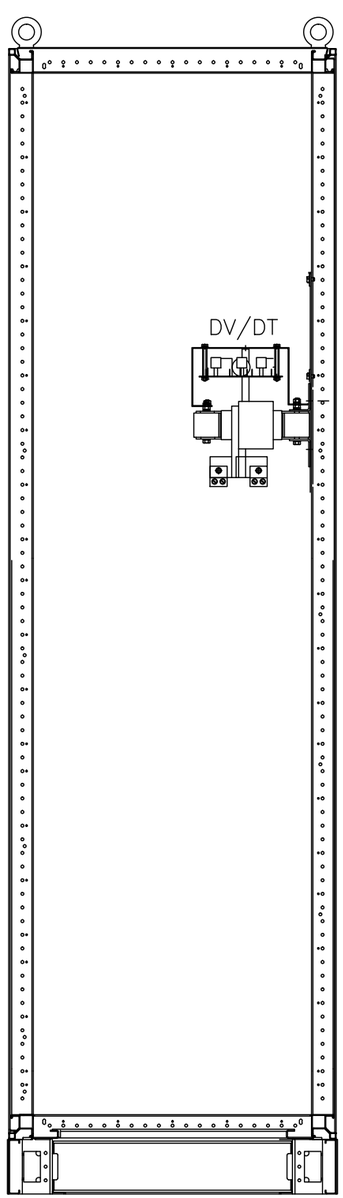
FRONT VIEW



FRONT VIEW (BACK PANEL ONLY)



RIGHT VIEW DRIVE SECTION



RIGHT VIEW LEFT SECTION

JOB NAME:	East Grove Pump Station	EQUIPMENT DESIGNATION:	**WELL PUMP VFD**
JOB LOCATION:	FALL RIVER MA	EQUIPMENT TYPE:	ALTIVAR PROCESS DRIVE
DRAWN BY:	GH	DRAWING TYPE:	LAYOUT
ENGR:	G. HEATHERLY		SQUARE D by Schneider Electric
DATE:	June 01 2022		
DRAWING STATUS:	RECORD	DWG# **R44596636-007-01**	PG 1 OF 3 REV –

REV	DESCRIPTION	BY	DATE	–	----	--	--/--/--	–	----	--	--/--/--
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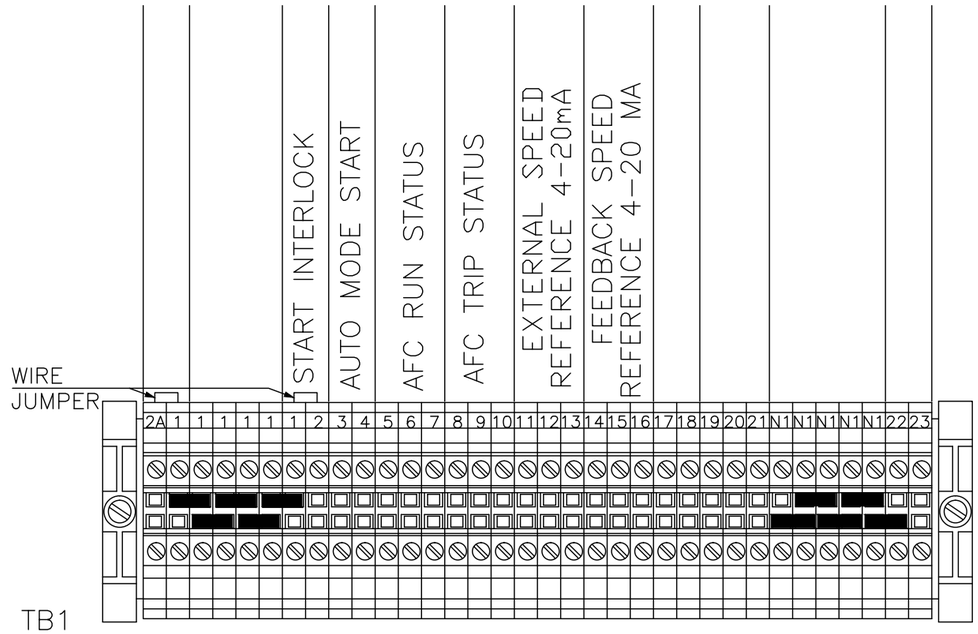
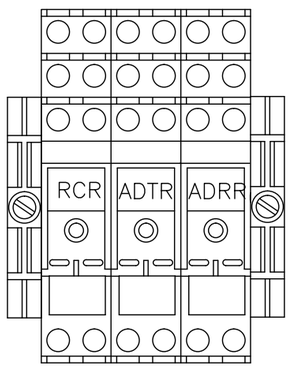


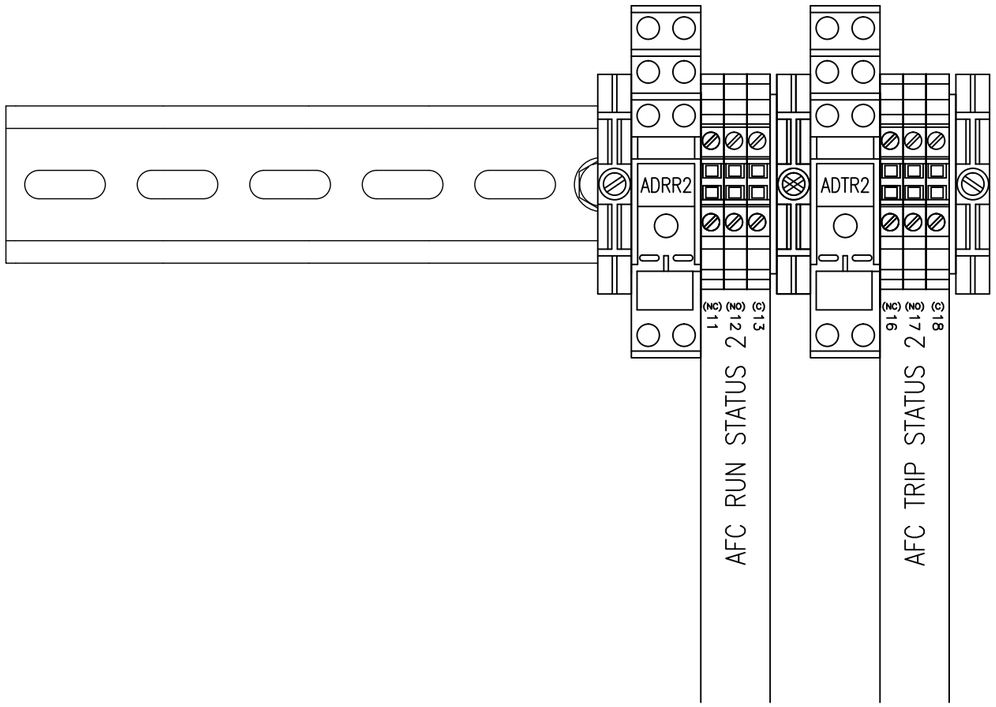
FACTORY WIRE SIDE



JOB NAME:	East Grove Pump Station	EQUIPMENT DESIGNATION:	**WELL PUMP VFD**
JOB LOCATION:	FALL RIVER MA	EQUIPMENT TYPE:	ALTIVAR PROCESS DRIVE
DRAWN BY:	GH	DRAWING TYPE:	LAYOUT
ENGR:	G. HEATHERLY		
DATE:	June 01 2022		
DRAWING STATUS:	RECORD	DWG# **R44596636–007–01**	PG 2 OF 3 REV –

REV	DESCRIPTION	BY	DATE	–	----	--	--/--/--	–	----	--	--/--/--
–	----	--	--/--/--	–	----	--	--/--/--	–	----	--	--/--/--

TB4
FACTORY WIRE SIDE



JOB NAME:	East Grove Pump Station	EQUIPMENT DESIGNATION:	**WELL PUMP VFD**
JOB LOCATION:	FALL RIVER MA	EQUIPMENT TYPE:	ALTIVAR PROCESS DRIVE
DRAWN BY:	GH	DRAWING TYPE:	LAYOUT
ENGR:	G. HEATHERLY		SQUARE D by Schneider Electric
DATE:	June 01 2022		
DRAWING STATUS:	RECORD	DWG# **R44596636-007-01**	PG 3 OF 3 | REV –

Altivar™ 660 Process Drive

Instruction Bulletin

NHA91297
Rev. 02, 08/2016

Retain for future use.

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Bulletin NHA60269, *Drives Systems Installation and Maintenance*, contains important information on installation, operation, service, and maintenance of this product. Read NHA60269 before performing any work on or with this product.

Schneider Electric™

Hazard Categories and Special Symbols

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury. The safety alert symbol is not used with this signal word.

NOTE: Provides additional information to clarify or simplify a procedure.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

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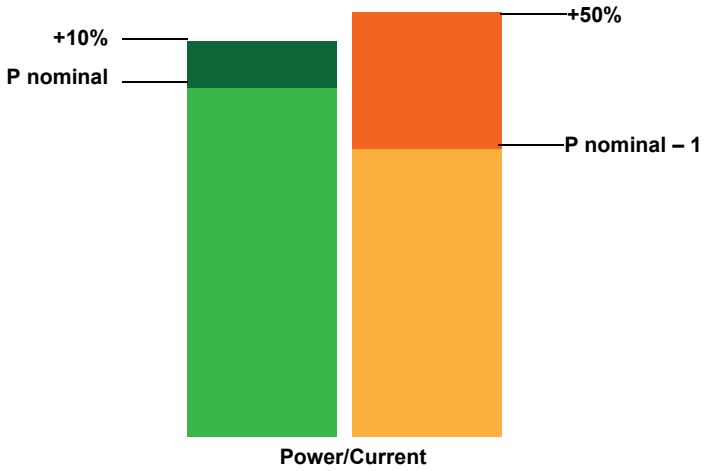
Section 1— Introduction

Application Considerations

Altivar 660 Process Drives are designed for use in two operating modes that can optimize the drive nominal rating according to the system constraints:

- Normal duty (ND): Dedicated mode for applications requiring a slight overload (up to 110%) with a motor power no higher than the drive nominal power
- Heavy duty (HD): Dedicated mode for applications requiring a significant overload (up to 150%) with a motor power no higher than the drive nominal power derated by one rating.

Figure 1 – Normal Duty (Left) and Heavy Duty (Right) Modes



About this Document

This instruction bulletin contains specifications, installation, operation, and maintenance information for the Altivar 660 (ATV660) process drives. The following document is also available from the Technical Library at www.schneider-electric.com:

- NHA60269, *Drives Systems Installation and Maintenance*

NHA60269 contains important information on installation, operation, service, and maintenance of this product. Read NHA60269 before performing any work on or with this product.

To replace documents, download them from the Technical Library at www.schneider-electric.us or contact your local Schneider Electric field office.

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Terminology

The following terminology is used in this instruction bulletin:

- Enclosed drive or process drive refers to the combination of the drive, enclosure, and the power and control circuits that constitute the ATV660 Process Drive.
- Drive or power converter refers to the ATV630 or ATVG60 components.
- Bypass, or integral bypass starter, refers to the optional, integrated full voltage combination starter in the ATV660 Process Drive. When provided, the integral bypass starter may be used to start and run the motor in the unlikely event that the drive becomes inoperable.

Product Overview

The ATV660 Process Drive is for industrial, municipal, and high end commercial applications. All ratings are UL 508A Listed, with selectable control and power configurations.

Two power converters are used in the ATV660 Process Drive:

- ATV630 for 1–125 hp ND
- ATVG60 for 150–900 hp ND

This instruction bulletin contains information about the ATV660 Process Drive. Since the process drive is engineered to order, your equipment may not have the same features, functions, or characteristics described in this document. For information specific to your process drive, consult the additional documentation shipped with it.

Figure 2 – Altivar 660 Process Drive, 1–125 hp, Types 1, 12, and 3R

Figure 3 – Altivar 660 Process Drive, 150–500 hp, Type 12

Standard Features

Process Drive Only

Process drives without bypass are available up to 700 hp HD / 900 hp ND @ 460 V; or 50 hp HD / 60 hp ND @ 230 V. The following are standard features for process drives without bypass, when no options are ordered:

- Circuit breaker disconnect
- UL Listed per UL 508A
- 100,000 AIC short-circuit rating
- Disconnect handle with lockout/tagout provisions
- Door mounted keypad holder and display
- One form C AFC Trip contact
- One form C AFC Run Mode contact
- Six programmable digital inputs
- Standard 3% input impedance
- Standard color RAL735
- Controller programming
  - — Acceleration (ACC): 10 s
  - — Deceleration (DEC): 10 s
  - — Low speed (LSP): 3 Hz
- White component mounting plate

- Removable conduit entry plate on floor-mounted enclosures
- Class 10 overload protection

Process Drive with Bypass (up to and including 250 hp)

The following are standard features for process drives with bypass when no options are ordered:

- Circuit breaker disconnect
- UL Listed per UL 508A
- 100,000 AIC short-circuit rating
- Disconnect handle with lockout/tagout provisions
- Hand-Off-Auto (H-O-A) selector switch and manual speed potentiometer
- AFC-Off-Bypass and Test-Normal selector switches
- Door-mounted keypad display
- One form C AFC Trip contact
- One form C AFC Run Mode contact
- One Form C contact for remote indication of Bypass operation
- Manual trip condition reset in Off position of H-O-A selector switch
- Safety Interlock / Run Permissive wired to the user terminal block
- Controller programming
  - — Acceleration (ACC): 10 s
  - — Deceleration (DEC): 10 s
  - — Low speed (LSP): 3 Hz
- White component mounting plate
- Removable conduit entry plate on floor-mounted enclosures
- Bypass with line reactor and communication card, including 24 V power supply to keep drive electronics alive in Bypass mode
- Class 20 overload protection
- Overload Trip (yellow) and Bypass (yellow) pilot lights
- Bypass and isolation contactors with mechanical and electrical interlocking
- Bypass and isolation contactor sequencing provides true motor isolation
- Remote bypass operation using Auto Start contacts

Installation and Maintenance Precautions

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Read and understand the precautions in bulletin NHA60269, *Drives Systems Installation and Maintenance*, before performing any procedures in this bulletin.

Failure to follow these instructions will result in death or serious injury.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Read and understand this manual before installing or operating the enclosed drive. Installation, adjustment, repair, and maintenance must be performed by qualified personnel.
- The user is responsible for compliance with national and local electrical codes with respect to grounding of all equipment.
- Many parts of this equipment, including the printed circuit boards, operate at the line voltage. DO NOT TOUCH. Use only electrically-insulated tools.
- DO NOT touch unshielded components or terminal strip screw connections with voltage present.
- DO NOT short across terminals PA/+ and PC/- or across the DC bus capacitors.
- Before servicing the equipment:
  - — Disconnect the power, including the external control power that may be present. The circuit breaker or disconnecting switch does not always open all circuits.
  - — Lock the circuit breaker or disconnecting switch in the opened position.
  - — Place a “DO NOT TURN ON” label on the circuit breaker or disconnect switch of the enclosed drive.
  - — Wait 15 minutes to allow the DC bus capacitors to discharge. Then follow the “DC Bus Voltage Measurement Procedure” in document NHA60269 to verify that the DC voltage is less than 42 V. The enclosed drive LED is not an indicator of the absence of DC bus voltage.
- Install and close all covers before applying power or starting and stopping the equipment.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

DAMAGED ENCLOSED DRIVE

- Do not install or operate any enclosed drive that appears damaged.
- If you find shipping damage, notify the carrier and your Schneider Electric sales representative.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ CAUTION

RISK OF BURNS AND ROTATING FAN BLADES

- Make sure that the device is sufficiently cooled and that the permitted ambient conditions are maintained.
- Do not touch components inside the enclosure. Heat sinks, chokes, and transformers may remain hot after removing power.
- Before opening the enclosure, ensure that the fans are not running. After switching off the voltage supply, the device fans may continue running for some time.

Failure to follow these instructions can result in injury or equipment damage.

Operation Precautions

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Before working on this equipment, turn off all power supplying it and perform the “DC Bus Voltage Measurement Procedure” in document NHA60269.

Failure to follow these instructions will result in death or serious injury.

⚠ DANGER

UNQUALIFIED PERSONNEL

- This equipment must be installed and serviced only by qualified personnel.
- Qualified personnel performing diagnostics or troubleshooting that requires electrical conductors to be energized must comply with:
  - NFPA 70 E® – Standard for Electrical Safety Requirements for Employee Workplaces®
  - CSA Z462 – Workplace Electrical Safety
  - OSHA Standards – 29 CFR Part 1910 Subpart S Electrical
  - NOM-029-STPS – Maintenance of Electrical Installation in the Workplace, Safety Conditions
  - Other national and local electrical codes that may apply

Failure to follow these instructions will result in death or serious injury.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Properly ground the enclosed drive Before Applying Power.
- Close and secure the enclosure doors before applying power.
- Certain adjustments and test procedures require that power be applied to this enclosed drive. Exercise extreme caution as hazardous voltages exist. The enclosure door must be closed and secured while turning on power or starting and stopping this enclosed drive. Always follow practices and procedures from NFPA 70E®, CSA Z462, NOM-029-STPS, and other applicable regulations defining safe electrical work practices.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and over travel stop.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of anticipated transmission delays or failures of the link.[1]
- Each implementation of the ATV660 Process Drive must be individually and thoroughly tested for proper operation before being placed into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

[1] For additional information, refer to NEMA ICS 1.1 (latest edition), “Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control.”

⚠ CAUTION

INCOMPATIBLE LINE VOLTAGE

Before powering up and configuring the equipment, ensure that the line voltage is compatible with the supply voltage shown on the enclosed drive nameplate. The enclosed drive may be damaged if the line voltage is not compatible.

Failure to follow these instructions can result in injury or equipment damage.

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Section 2— Product Characteristics

Catalog Number Description

The catalog number is on the nameplate attached to the inside of the process drive door (see Figure 4 on page 16). The catalog number is coded to describe the configuration of the drive.

Use Table 2 on page 14 to translate the catalog number into a description of the process drive. The example in Table 1 translates the catalog number shown on the nameplate in Figure 1.

For descriptions of the options listed in Table 2, refer to Section 4 beginning on page 43.

Table 1 – Catalog Number Example: ATV660D22T4N2ANWAANAGK

Field											
01–02	**03–04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**
ATV660	**D22**	**T4**	**N**	**2**	**A**	**N**	**W**	**A**	**A**	**N**	**A,G,K**
Altivar 660 Process Drive	3 hp	460 V, 3 phase	Normal Duty Power Rating	UL Listed	UL Type 12K Enclosure	No Harmonic Mitigation	Without Bypass	H-O-A Speed Pot.	Red Power On, Yellow Tripped, Green AFC Run, Yellow Auto	No Comm. Card	Ethernet Port in Front Door; Type 1 SPD; Additional 150 VA Control Power

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Table 2 – Catalog Number Description

Field	Digit	Characteristic	Description	
01–02	1–6	Drive Style	Altivar 660 Process Drive, 2-quadrant, 6-pulse drive	
03–04	7–9	Power Rating (kW)	**Normal Duty**	**Heavy Duty**
			U07 = 1 hp	
			U15 = 2 hp	U15 = 1 hp
			U22 = 3 hp	U22 = 2 hp
			U40 = 5 hp	U30 = 3 hp
			U55 = 7.5 hp	U55 = 5 hp
			U75 = 10 hp	U75 = 7.5 hp
			D11 = 15 hp	D11 = 10 hp
			D15 = 20 hp	D15 = 15 hp
			D18 = 25 hp	D18 = 20 hp
			D22 = 30 hp	D22 = 25 hp
			D30 = 40 hp	D30 = 30 hp
			D37 = 50 hp	D37 = 40 hp
			D45 = 60 hp	D45 = 50 hp
			D55 = 75 hp	D55 = 60 hp
			D75 = 100 hp	D75 = 75 hp
			D90 = 125 hp	D90 = 100 hp
			C11 = 150 hp	C11 = 125 hp
			C13 = 200 hp	C13 = 150 hp
			C16 = 250 hp	C16 = 200 hp
			C20 = 300 hp	C20 = 250 hp
			C25 = 400 hp	C25 = 300 hp
			C31 = 500 hp	C31 = 400 hp
			C40 = 600 hp	C40 = 500 hp
			C50 = 700 hp	C50 = 600 hp
			C63 = 900 hp	C63 = 700 hp
05	10–11	Voltage Class	U3 = 230 V, Three Phase T4 = 460 V, Three Phase	
06	12	Duty Rating	N = Normal Duty H = Heavy Duty	
07	13	Region	2 = UL Marking 6 = cUL Marking (Canada)	
08	14	Enclosure Type	G = Type 1 General Purpose A = Type 12K Industrial Use, Dust-tight/Drip-tight H = Type 3R Outdoor Use	
09	15	Line Harmonic Mitigation	N = None A = Line Reactor M = Passive Harmonic Filter	
10	16	Power Circuit	W = without Bypass Y = Integral Full-Voltage Bypass	

Table 2 – Catalog Number Description *(continued)*

Field	Digit	Characteristic	Description
11	17	Control Options	N = Prewired for Remote H-O-A A = H-O-A, Speed Potentiometer B = H-O-A, Speed Potentiometer, Start/Stop Push Button
12	18	Light Options	N = None A = Red Power On, Yellow Tripped, Green AFC Run, Yellow Auto B = Red Power On, Yellow Tripped, Green AFC Run (Default)
13	19	Communication Card	N = None A = Profibus DP V1 B = CANopen Daisy Chain C = DeviceNet D = CANopen SUB-D E = CANopen Open Style F = ProfiNet G = Ethernet IP Dual Port
14	Varies	Miscellaneous Options	A = Ethernet Port in Front Door B = Line Contactor C = Drive I/O Extension D = Relay Output Card E = 0–10 V Auto Speed Reference F = 1 N.O. (Form A) Auxiliary Auto Mode Contact G = Surge Protective Device (SPD) (Type 1) H = SPD (Type 2) K = Additional 150 VA Control Power L = Push-to-Test Pilot Lights P = Permanent Wire Markers Q = Door-Mounted Overload Reset Push Button R = Service Entrance (3R only) S = 50 °C Ambient Operation T = Service Switch U = Wireway Cubical (when available) V = Manufactured in the U.S. X = dV/dt Filter (1000 ft)

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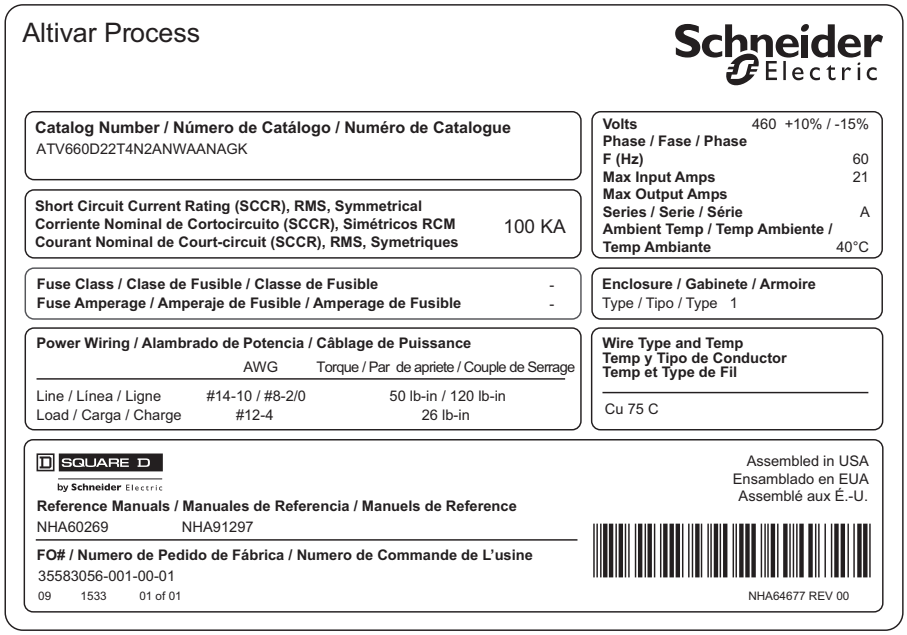
Nameplate Identification

The nameplate for the Altivar 660 Process Drive is on the inside of the enclosure door. See Figure 4. The nameplate identifies the drive type and modification options. When identifying or describing the Altivar 660 Process Drive, use the data from this nameplate.

Figure 4 – Nameplate



Short-Circuit Ratings

All Altivar 660 Process Drives include a circuit breaker as a disconnect device and have a short-circuit rating of 100,000 A at up to 480 V.

⚠ WARNING

IMPROPER OVERCURRENT COORDINATION

- Properly coordinate all protective devices.
- Do not connect the equipment to a power feeder whose short-circuit capacity exceeds the short-circuit current rating listed on the equipment nameplate.

Failure to follow these instructions can result in death or serious injury.

Technical Characteristics

Table 3 – Electrical Specifications

Input voltage	208 Vac ±10%, 230 Vac ±10%, 460 Vac ±10% Other voltages available on request
Short circuit current rating (AC symmetrical)	100 kA
Control voltage	24 Vdc, 115 Vac +10%/-15% (control power transformer included)
Displacement power factor	98% through speed range (in AFC operation mode)
Input frequency	50/60 Hz ± 5%
Output voltage	Three-phase output, maximum voltage equal to input voltage
Galvanic isolation	Galvanic isolation between power and control (inputs, outputs, and power supplies)
Output frequency range of power converter	0.1–500 Hz (factory setting of 60 Hz)
Torque/Overtorque	Normal Duty: 110% of nominal motor torque for 60 s Heavy Duty: 150% of nominal motor torque for 60 s
Current (transient)	Normal Duty: 110% of drive rated current for 60 s Heavy Duty: 150% of drive rated current for 60 s
Switching frequency	Selectable from 0.5–8 kHz. Factory setting: 2.5 kHz The drive reduces the switching frequency automatically in the event of excessive heatsink temperature.

Table 4 – Environmental Specifications

Storage temperature	-13 to +149 °F (-25 to +65 °C)
Operating temperature 1–100 hp HD, 1–125 hp ND 460 V; 1–50 hp HD, 1–60 hp ND 230 V	+14 to +104 °F (-10 to +40 °C), Type 1/12/3R; +14 to +122 °F (-10 to +50 °C), 1/12/3R (Optional)
Operating temperature 125–700 hp HD, 150–900 hp ND 460V	+14 to +122 °F (-10 to +50 °C), Type 1/12 (below 0 °C with additional enclosure heating, above +40 °C with derating). See “Maximum Ambient Temperature” on page 19 for more information.
Humidity	95% with no condensation or dripping water, conforming to IEC 60068-2-78
Altitude	3,300 ft. (1000 m), without derating, derating of the current by 1% for each additional 330 ft. (100 m) up to 9,842 ft. (3000 m) maximum
Enclosure	UL Type 1: General indoor (ventilated); UL Type 12: Indoor dust-tight (ventilated); UL Type 3R: Outdoor (ventilated)
Pollution degree	Pollution degree 2 (Type 1, 3R) or 3 (Type 12) per NEMA ICS-1 Annex A and IEC 61800-5-1
Operational test vibration	Conforming to IEC/EN 60068-2-6 1.5 mm at 3–10 Hz, 0.6 g at 10–200 Hz 3M3 conforming to IEC/EN 60721-3-3
Transit shock test	Conforming to National Safe Transit Association and International Safe Transit Association test for packages.
Operational shock	Conforming to IEC/EN 60068-2-27 4 g for 11 ms 3M3 conforming to IEC/EN 60721-3-3
Codes and standards	UL Listed per UL 508A IEEE519 compliant (passive harmonic filter required); Conforms to applicable NEMA ICS, NFPA, and IEC standards; Manufactured under ISO 9001 standards.

Table 5 – Operation and Control

Maximum current	ND: 110% for 60 seconds per 10 minutes HD: 150% for 60 seconds per 10 minutes
Speed reference	**AI1:** 0–10 V, Impedance = 30 kΩ. Can be used for speed potentiometer, 1–10 kΩ. **AI2:** Factory setting: 4–20 mA. Impedance = 242 kΩ (reassignable, X–Y range with graphic display terminal).
Frequency resolution in analog reference	0.1 for 100 Hz (11 bits)
Harmonics	Less than 48% TDDi standard. Less than 5% TDDi with harmonic filter
Speed regulation	V/*f* control: equal to the motor's rated slip. Sensorless flux vector control (SFVC): 10% of the motor's rated slip from 20–100% of nominal motor torque
Efficiency	95% (or greater) at full load typical
Reference sample time	2 ms ±0.5 ms
Acceleration and deceleration ramps	Drive: 0.1–999.9 s (definition in 0.1 s increments)
Graphic display terminal	Self diagnostics with trip indication messages in three languages. Refer to the Programming Manuals available online at www.schneider-electric.com.

Table 6 – Protection

Motor and Pump:	
Thermal overload	Class 10 electronic overload protection (drive) Class 20 bypass overload protection (drive with bypass)
Drive System:	
Overcurrent protection	An overcurrent protection device (OCPD) provides Type 1 coordination to the short-circuit current ratings.
Overtemperature protection	Protection if heatsink temperature exceeds 85 °C (185 °F)
Functional Safety:	
Functional safety of the drive	The function Safe Torque Off (STO) allows a controlled shut-down as well as switch-off of the power supply when at a standstill. It also helps prevent any unintended start of the motor according to ISO 13849-1, performance level PL e, according to IEC/EN 61508 safety integrity level SIL 3 and IEC/EN 61800-5-2.
Response time	≤ 100 ms at STO (Safe Torque Off)

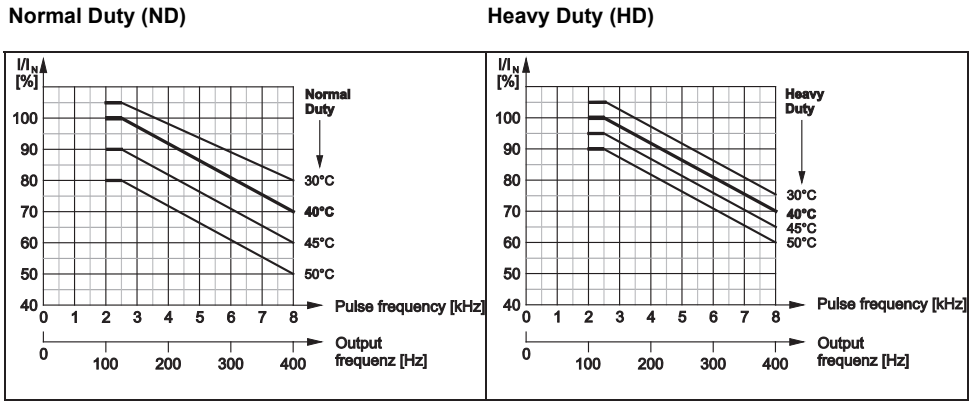
Maximum Ambient Temperature

For Type 1 and 12 enclosed drives rated 125–700 hp HD and 150–900 hp ND at 460 V, derating may be necessary depending on the pulse frequency, the maximum ambient temperature, and the desired output frequency. Consult Figure 5 and follow these guidelines:

- For output frequencies higher than 125 Hz, the pulse frequency is increased automatically. For example, at 200 Hz output frequency, the pulse frequency is increased to 4 kHz. Consequently, consider a derating of 8% at a maximum ambient temperature of 40 °C.
- The overload capability of the enclosed drive is also reduced due to the reduction of the output current.
- At higher pulse frequencies, motor cable length must be reduced.
- For full shaft power, the motor size must not be more than one power rating higher than the drive.

NOTE: If the ambient temperature is too high, the pulse frequency is automatically reduced, which helps to prevent an overload of the drive (except in case of operation with sinusoidal motor filters).

Figure 5 – Current Reduction Depending on Ambient Temperature, Pulse Frequency, and Output



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Ratings

Table 7 – Input and Output Current Ratings and Dissipated Heat, Normal Duty Operation

VAC	Rating		Drive Rating	Full Load Input Current (A)	Full Load Output Current (A)	Full Load Bypass Current (A)	Typical Dissipated Power at Rated Load (W)
	hp	kW					
230	1	0.7	U07	2.6	4.6	4.2	63
	2	1.5	U15	5	8	6.8	100
	3	2.2	U22	7.2	11.2	9.6	138
	5	3	U40	12.9	18.7	15.2	226
	7.5	5.5	U55	17.1	25.4	22	289
	10	7.5	U75	22.8	32.7	28	401
	15	11	D11	32.9	46.8	42	651
	20	15	D15	45.5	63.4	54	768
	25	18	D18	54.5	78.4	68	860
	30	22	D22	64.3	92.6	80	972
	40	30	D30	88.6	123	104	1231
	50	37	D37	107.8	149	130	1553
	60	45	D45	130.4	175	154	1789
460	1	0.7	U07	1.3	2.2	2.1	60
	2	1.5	U15	2.6	4	3.4	84
	3	2.2	U22	3.8	5.6	4.8	115
	5	3	U40	6.7	9.3	7.6	173
	7.5	5.5	U55	9.1	12.7	10	231
	10	7.5	U75	11.9	16.5	14	272
	15	11	D11	17	23.5	21	378
	20	15	D15	23.3	31.7	27	515
	25	18	D18	28.9	39.2	34	680
	30	22	D22	34.4	46.3	40	739
	40	30	D30	45.9	61.5	52	898
	50	37	D37	57.3	74.5	65	1072
	60	45	D45	69.1	88	77	1324
	75	55	D55	84.2	106	96	1418
	100	75	D75	112.7	145	124	1823
	125	90	D90	135.8	173	156	2120
	150	110	C11	195	211	180	2530
	200	130	C13	232	250	240	3150
	250	160	C16	277	302	302	4030
	300	200	C20	349	370	(1)	4380
	400	250	C25	432	477	(1)	5750
	500	310	C31	538	590	(1)	7810
	600	400	C40	681	730	(1)	9900
	700	500	C50	846	900	(1)	13330
	900	630	C63	1058	1140	(1)	16250

1 Consult Schneider Electric.

Weights

⚠ WARNING

UNSTABLE LOAD

- Use extreme care when moving heavy equipment.
- Verify that the moving equipment is rated to handle the weight.
- When removing equipment from a shipping pallet, carefully balance and secure it using a safety strap.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Table 8 – Approximate Weight by Feature Set

Voltage	hp	Process Drive System Weight lb (kg)
230	1–7.5	135 (61)
460	1–15	
230	10–15	175 (79.4)
460	20–30	
230	20–30	270 (122.5)
460	40–60	
230	40–60	550 (249.5)
460	75–125	
460	150–250	750 (340.2)
460	300–500	980 (444.5)
460	600–700	1550 (703.1)
460	900	2000 (907.2)

Accessing the Lifting Brackets

Type 3R floor mounted enclosed drives include a rain hood that covers the brackets provided for transporting and installing the equipment. Temporarily remove the rain hood to access the lifting brackets as follows:

1. Remove four thumb screws and lift the hood off the brackets as shown in Figure 6 on page 22.
2. After the enclosed drive is installed, replace the rain hood and hand tighten the thumb-screws.
3. For more information, refer to the instructions and precautions in 'Handling the Equipment' in instruction bulletin NHA60269, *Drive Systems Installation and Maintenance*.

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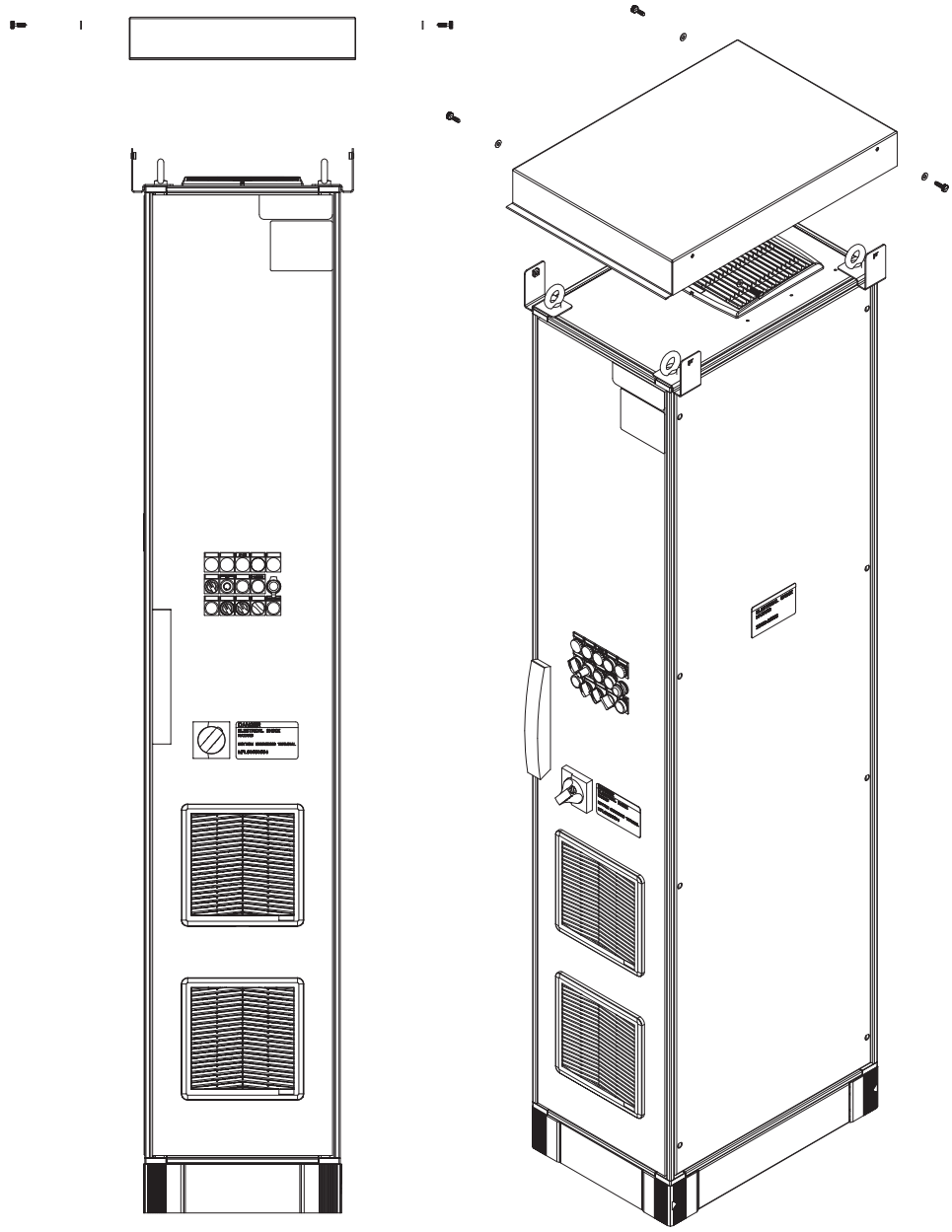
Figure 6 – Removing the Rain Hood



Electrical Installation

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Read and understand the precautions in bulletin NHA60269, *Drives Systems Installation and Maintenance*, before performing any procedures in this bulletin.

Failure to follow these instructions will result in death or serious injury.

Wire Range and Terminal Torque Requirements

Normal Duty, Line Side

Table 9 – Power Terminal Wire Range and Torque Requirements, Normal Duty, Line Side

Voltage	hp	Circuit Breaker	Line (L1, L2, L3)	
			Wire Range AWG (mm^2)	Torque lb-in (N•m)
230	1	HLL36015LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
230	2	HLL36015LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
230	3	HLL36025LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
230	5	HLL36030LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
230	7.5	HLL36050LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
230	10	HLL36060LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
230	15	HLL36070LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
230	20	HLL36090LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
230	25	HLL36110LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
230	30	HLL36125LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
230	40	JLL36175LU	4–4/0 (25–95)	225 (25)
230	50	JLL36225LU	3/0–350 (95–185)	225 (25)
230	60	JLL36250LU	3/0–350 (95–185)	225 (25)
460	1	HLL36015LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
460	2	HLL36015LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)

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Table 9 – Power Terminal Wire Range and Torque Requirements, Normal Duty, Line Side *(continued)*

Voltage	hp	Circuit Breaker	Line (L1, L2, L3)	
			Wire Range AWG (mm^2)	Torque lb-in (N•m)
460	3	HLL36015LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
460	5	HLL36015LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
460	7.5	HLL36025LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
460	10	HLL36030LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
460	15	HLL36050LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
460	20	HLL36060LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
460	25	HLL36070LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
460	30	HLL36080LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
460	40	HLL36100LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
460	50	HLL36125LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
460	60	HLL36150LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
460	75	JLL36175LU	4–4/0 (25–95)	225 (25)
460	100	JLL36200LU	3/0–350 (95–185)	225 (25)
460	125	JLL36250LU	3/0–350 (95–185)	225 (25)
460	150–200	LLP36400U31X	(2) 2/0–500 (70–240)	275 (31)
460	250	LLP36600U31X	(2) 2/0–500 (70–240)	275 (31)
460	300	LLP36600U31X	(2) 2/0–500 (70–240)	275 (31)
460	400	PLP34080RE10	(3) 3/0–500 (95–240)	275 (31)
460	500	PLP34100U44ASARE10	(4) 3/0–500 (95–240)	275 (31)
460	600–700	PLP34120U44ASARE10	(4) 3/0–500 (95–240)	275 (31)
460	900	PLP34120U44ASARE10	(4) 3/0–500 (95–240)	275 (31)

Normal Duty, Load Side

Table 10 – Power Terminal Wire Range and Torque Requirements, Normal Duty, Load Side

Voltage	hp	Load, Enclosed Drive Only (T1, T2, T3)		Load with Bypass (T1, T2, T3)	
		Wire Range AWG (mm²)	Torque lb-in (N•m)	Wire Range AWG (mm²)	Torque lb-in (N•m)
230	1-7.5	14–6 (2.5–16)	15 (1.7)	14–10 (2.5–6)	15 (1.7)
230	10	14–10 (2.5–6)	22 (2.5)	14–8 (2.5–10)	15 (1.7)
		8–2 (10–35)	40 (4.5)	14–8 (2.5–10)	15 (1.7)
230	15	14–10 (2.5–6)	22 (2.5)	14–4 (2.5–25)	44 (5)
		8–2 (10–35)	40 (4.5)	2 (35)	70 (8)
230	20	6–2 (16–35)	44 (5)	14–4 (2.5–25)	44 (5)
		1–1/0 (35–50)	97 (11)	2 (35)	70 (8)
230	25	6–2 (16–35)	44 (5)	10–2 (6–35)	75 (9)
		1–1/0 (35–50)	97 (11)	10–2 (6–35)	75 (9)
230	30	6–2 (16–35)	44 (5)	6–3/0 (16–95)	200 (22.5)
		1–1/0 (35–50)	97 (11)	6–3/0 (16–95)	200 (22.5)
230	40–50	4–1/0 (25–50)	88 (10)	6–3/0 (16–95)	200 (22.5)
		2/0–300 (70–150)	159 (18)	6–3/0 (16–95)	200 (22.5)
230	60	4–1/0 (25–50)	88 (10)	(1)	(1)
		2/0–300 (70–150)	159 (18)	(1)	(1)
460	1–10	14–6 (2.5–16)	15 (1.7)	14–10 (2.5–6)	15 (1.7)
460	15	14–6 (2.5–16)	15 (1.7)	14–8 (2.5–10)	22.1 (2.5)
460	20	14–10 (2.5–6)	22 (2.5)	14–8 (2.5–10)	22.1 (2.5)
		8–2 (10–35)	40 (4.5)	14–8 (2.5–10)	22.1 (2.5)
460	25–30	14–10 (2.5–6)	22 (2.5)	14–4 (2.5–25)	44 (5)
		8–2 (10–35)	40 (4.5)	2 (35)	70 (8)
460	40	6–2 (16–35)	44 (5)	14–4 (2.5–25)	44 (5)
		1–1/0 (35–50)	97 (11)	2 (35)	70 (8)
460	50	6–2 (16–35)	44 (5)	10–2 (2.5–35)	75 (9)
		1–1/0 (35–50)	97 (11)	10–2 (2.5–35)	75 (9)
460	60	6–2 (16–35)	44 (5)	6–3/0 (16–95)	200 (22.5)
		1–1/0 (35–50)	97 (11)	6–3/0 (16–95)	200 (22.5)
460	75–100	4–1/0 (25–50)	88 (10)	6–3/0 (16–95)	200 (22.5)
		2/0–300 (70–150)	159 (18)	6–3/0 (16–95)	200 (22.5)
460	125	4–1/0 (25–50)	88 (10)	4–1/0 (25–50)	88 (10)
		2/0–300 (70–150)	159 (18)	2/0–300 (70–150)	159 (18)
460	150–250	(2) 4–500 (25–240)	500 (56.5)	(2) 4–500 (25–240)	500 (56.5)
460	300–500	(3) 4–500 (25–240)	500 (56.5)	(1)	(1)
460	600–700	(6) 3/0–750 (95–400)	550 (62)	(1)	(1)
460	900	(8) 3/0–750 (95–400)	550 (62)	(1)	(1)

1 Consult Schneider Electric.

Heavy Duty, Line Side

Table 11 – Power Terminal Wire Range and Torque Requirements, Heavy Duty, Line Side

Voltage	hp	Circuit Breaker	Line (L1, L2, L3)	
			Wire Range AWG (mm^2)	Torque lb-in (N•m)
230	1	HLL36015LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
230	2	HLL36015LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
230	3	HLL36025LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
230	5	HLL36040LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
230	7.5	HLL36060LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
230	10	HLL36070LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
230	15	HLL36090LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
230	20	HLL36110LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
230	25	HLL36125LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
230	30	HLL36125LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
230	40	JLL36225LU	4–4/0 (25–95)	225 (25)
230	50	JLL36250LU	4–4/0 (25–95)	225 (25)
460	1	HLL36015LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
460	2	HLL36015LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
460	3	HLL36015LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
460	5	HLL36020LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
460	7.5	HLL36025LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
460	10	HLL36035LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
460	15	HLL36050LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
460	20	HLL36060LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)

Table 11 – Power Terminal Wire Range and Torque Requirements, Heavy Duty, Line Side *(continued)*

Voltage	hp	Circuit Breaker	Line (L1, L2, L3)	
			Wire Range AWG (mm^2)	Torque lb-in (N•m)
460	25	HLL36080LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
460	30	HLL36100LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
460	40	HLL36125LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
460	50	HLL36150LU	14–10 (2.5–6)	50 (6)
			8–3/0 (10–95)	120 (14)
460	60	JLL36175LU	4–4/0 (25–95)	225 (25)
460	75	JLL36200LU	4–4/0 (25–95)	225 (25)
460	100	JLL36250LU	4–4/0 (25–95)	225 (25)
460	125–200	LLP36400U31X	(2) 2/0–500 (70–240)	275 (31)
460	250	LLP36600U31X	(2) 2/0–500 (70–240)	275 (31)
460	300	LLP36600U31X	(2) 2/0–500 (70–240)	275 (31)
460	400	PLP34100U44ASARE10	(3) 3/0–500 (95–240)	275 (31)
460	500	PLP34100U44ASARE10	(3) 3/0–500 (95–240)	275 (31)
460	600–700	PLP34120U44ASARE10	(4) 3/0–500 (95–240)	275 (31)

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Heavy Duty, Load Side

Table 12 – Power Terminal Wire Range and Torque Requirements, Heavy Duty, Load Side

Voltage	hp	Load, Enclosed Drive Only (T1, T2, T3)		Load with Bypass (T1, T2, T3)	
		Wire Range AWG (mm^2)	Torque lb-in (N•m)	Wire Range AWG (mm^2)	Torque lb-in (N•m)
230	1–5	14–6 (2.5–16)	15 (1.7)	14–10 (2.5–6)	15 (1.7)
230	7.5	14–6 (2.5–16)	22 (2.5)	14–8 (2.5–10)	15 (1.7)
		8–2 (10–35)	40 (4.5)	14–8 (2.5–10)	15 (1.7)
230	10	14–10 (2.5–6)	22 (2.5)	14–4 (2.5–25)	44 (5)
		8–2 (10–35)	40 (4.5)	2 (35)	70 (8)
230	15	6–2 (16–35)	44 (5)	14–4 (2.5–25)	44 (5)
		1–1/0 (35–50)	97 (11)	2 (35)	70 (8)
230	20	6–2 (16–35)	44 (5)	10–2 (2.5–35)	75 (9)
		1–1/0 (35–50)	97 (11)	10–2 (2.5–35)	75 (9)
230	25	6–2 (16–35)	44 (5)	6–3/0 (16–95)	200 (22.5)
		1–1/0 (35–50)	97 (11)	6–3/0 (16–95)	200 (22.5)
230	30–40	4–1/0 (25–50)	88 (10)	6–3/0 (16–95)	200 (22.5)
		2/0–300 (70–150)	159 (18)	6–3/0 (16–95)	200 (22.5)
230	50	4–1/0 (25–50)	88 (10)	6–3/0 (16–95)	200 (22.5)
		2/0–300 (70–150)	159 (18)	6–3/0 (16–95)	200 (22.5)
460	1–7.5	14–6 (2.5–16)	15 (1.7)	14–10 (2.5–6)	15 (1.7)
460	10	14–6 (2.5–16)	15 (1.7)	14–8 (2.5–10)	22.1 (2.5)
460	15	14–10 (2.5–6)	22 (2.5)	14–8 (2.5–10)	22.1 (2.5)
		8–2 (10–35)	40 (4.5)	14–8 (2.5–10)	22.1 (2.5)
460	20	14–10 (2.5–6)	22 (2.5)	14–4 (2.5–25)	44 (5)
		8–2 (10–35)	40 (4.5)	2 (35)	70 (8)
460	25–30	6–2 (16–35)	44 (5)	14–4 (2.5–25)	44 (5)
		1–1/0 (35–50)	97 (11)	2 (35)	70 (8)
460	40	6–2 (16–35)	44 (5)	10–2 (2.5–35)	75 (9)
		1–1/0 (35–50)	97 (11)	10–2 (2.5–35)	75 (9)
460	50	6–2 (16–35)	44 (5)	6–3/0 (16–95)	200 (22.5)
		1–1/0 (35–50)	97 (11)	6–3/0 (16–95)	200 (22.5)
460	60–75	4–1/0 (25–50)	88 (10)	6–3/0 (16–95)	200 (22.5)
		2/0–300 (70–150)	159 (18)	6–3/0 (16–95)	200 (22.5)
460	100	4–1/0 (25–50)	88 (10)	4–1/0 (25–50)	88 (10)
		2/0–300 (70–150)	159 (18)	2/0–300 (70–150)	159 (18)
460	125–200	(2) 4–500 (25–240)	500 (56.5)	(2) 4–500 (25–240)	500 (56.5)
460	250–400	(3) 4–500 (25–240)	500 (56.5)	(1)	(1)
460	500–600	(6) 3/0–750 (95–400)	550 (62)	(1)	(1)
460	700	(8) 3/0–750 (95–400)	550 (62)	(1)	(1)

1 Consult Schneider Electric.

Grounding Bar and Lugs

Table 13 – Grounding Bar Wire Range and Torque Requirements

Voltage	hp (Normal Duty)	Grounding Bar and Grounding Lugs	
		Wire Range AWG (mm²)	Torque lb-in (N•m)
230	1–60	14–10 (2.5–6)	20 (2.25)
		8 (10)	25 (2.8)
		6–4 (16–25)	35 (4)
460	1–125	14–10 (2.5–6)	20 (2.25)
		8 (10)	25 (2.8)
		6–4 (16–25)	35 (4)
460	150–900	8–250 (10–120)	200 (22.5)

Service Entrance

Table 14 – Service Entrance Wire Range and Torque Requirements

Voltage	hp	Main Neutral		Ground	
		Wire Range AWG (mm²)	Torque lb-in (N•m)	Wire Range AWG (mm²)	Torque lb-in (N•m)
230	1–40	12–1/0 Al (4–50 Al)	75 (8.5)	12–1/0 Al (4–50 Al)	50 (5.6)
		14–1/0 Cu (2.5–50 Cu)	75 (8.5	14–1/0 Cu (2.5–50 Cu)	
460	1–60	12–1/0 Al (4–50 Al)	75 (8.5)	12–1/0 Al (4–50 Al)	50 (5.6)
		14–1/0 Cu (2.5–50 Cu)	75 (8.5	14–1/0 Cu (2.5–50 Cu)	
230	50–60	4–300 (25–150)	250 (28.2)	8 (10)	40 (4.5)
				6–4 (16–25)	45 (5.1)
460	75–125	4–300 (25–150)	250 (28.2)	8 (10)	40 (4.5)
				6–4 (16–25)	45 (5.1)

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Control Wiring

Connect the control wiring to terminal block TB1.

- The control terminals are rated 250 V, 12 A. Maximum wire size for the control terminals:
  - 12 AWG (2.5 mm^2), one-wire
  - 16 AWG (1.5 mm^2), two-wire
- Minimum tightening torque: 4.5 lb-in (0.5 N•m)
- The user terminals are designated on the wiring diagrams provided with the equipment.

Table 15 – TB1 User Terminal Connections

Function	Terminal	
Customer interlock (120 Vac) (+)	1	
Customer interlock (120 Vac)	2	
Customer interlock, bypass (120 Vac) (+)	1	
Customer interlock, bypass (120 Vac)	2A	
Auto mode remote start	3	4
AFC run status (N.C.)	5	7
AFC run status (N.O.)	6	7
AFC trip status (N.C.)	8	10
AFC trip status (N.O.)	9	10
4–20 mA (0-10 V) speed reference (common)	11	
4–20 mA (0-10 V) speed reference (+)	12	
4–20 mA (0-10 V) speed reference SHLD/GRD	13	
4–20 mA DC output speed SHLD/GRD	14	
4–20 mA DC output speed (+)	15	
4–20 mA DC output speed (common)	16	
Auto mode status (N.O.)	17	18
Bypass status (N.C.)	19	21
Bypass status (N.O.)	20	21
150 VA fused (3 A) (+)	22	
150 VA fused (3 A) (neutral)	23	

Section 3— Programming and Setup

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Read and understand the precautions in bulletin NHA60269, *Drives Systems Installation and Maintenance*, before performing any procedures in this bulletin.

Failure to follow these instructions will result in death or serious injury.

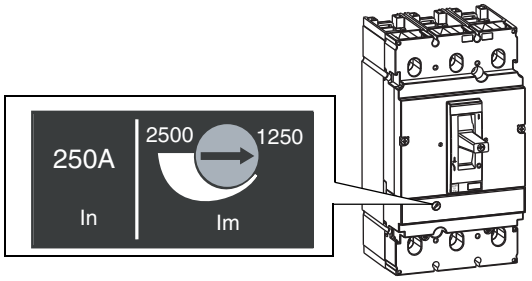
Factory Settings

If the power converter has been replaced or reset to the factory settings, you may need to adjust some parameter values. Parameter settings are included in the documentation provided with the equipment.

Adjusting the PowerPact™ Circuit Breaker Trip Settings

Some circuit breakers have trip settings that may need adjustment according to the application and motor type. For more information on trip setting adjustment, refer to the circuit breaker instruction bulletin provided with the equipment, or available for download from the Technical Library at www.schneider-electric.us.

Figure 7 – PowerPact J FLA and Im Dial



Overload Relay Adjustment

Always verify that the overload relay setting does not exceed the motor full load current or rated power converter current found on the nameplate, whichever is less.

Table 16 provides the adjustment range for overload relays according to horsepower rating and voltage. Contact Schneider Electric if the adjustment range does not meet the intended application.

Table 16 – Overload Relay Adjustment Range for Full Voltage Bypass Operation

hp	230 V	460 V
1	4–6	1.6–2.5
2	5.5–8	2.5–4
3	9–13	4–6
5	12–18	5.5–8
7.5	17–24	9–13
10	23–32	12–18
15	37–50	17–24

Table 16 – Overload Relay Adjustment Range for Full Voltage Bypass Operation *(continued)*

hp	230 V	460 V
20	48–65	23–32
25	55–70	30–40
30	60–100	30–40
40	90–150	48–65
50	90–150	55–70
60	[1]	60–100
75	—	60–100
100	—	90–150
125	—	132–220
150	—	132–220
200	—	200–330
250	—	200–330

[1] Consult Schneider Electric.

Programming Access with Type 3R Enclosure

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E®, CSA Z462, NOM-029-STPS, and other applicable regulations defining safe electrical work practices.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

Type 3R enclosures come with a remote keypad and cable inside the enclosure. To program the process drive with this equipment:

1. Remove all power from the enclosed drive.
2. Turn the circuit breaker and handle assembly to the Off position and open the enclosure door.
3. Test for the absence of voltage.

   NOTE: Verify that the voltage tester is functioning properly before and after testing for the absence of voltage.
4. Remove the remote keypad and cable from the enclosure.
5. Connect the remote keypad and cable to the drive.
6. Route the keypad cable between the bottom enclosure flange and the bottom of the door flange. See Figures 8 and 9 on pages 33–34.
7. Close and secure the enclosure door. Ensure that the keypad cable is not pinched by the door.

8. Close the disconnect means.
9. Program the drive with the keypad.
10. When programming is complete, remove all power then test for the absence of voltage.
11. Open the enclosure door and remove the remote keypad cable from the drive.
12. Place the remote keypad and cable inside the enclosure. Do not leave the remote keypad in the bottom of the enclosure.
13. Close and secure the enclosure door.

Figure 8 – Routing the Remote Keypad on Floor Standing Enclosures

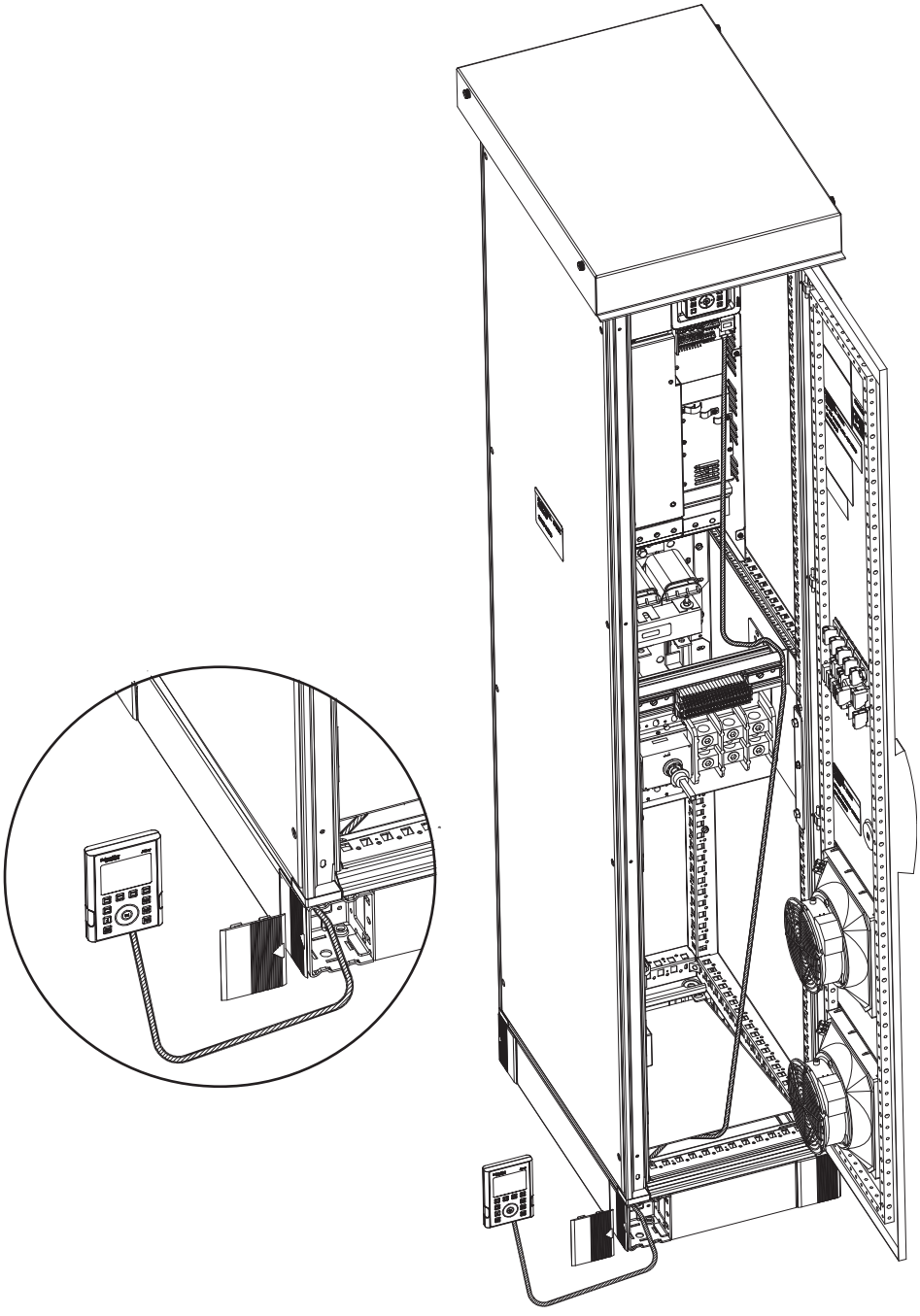


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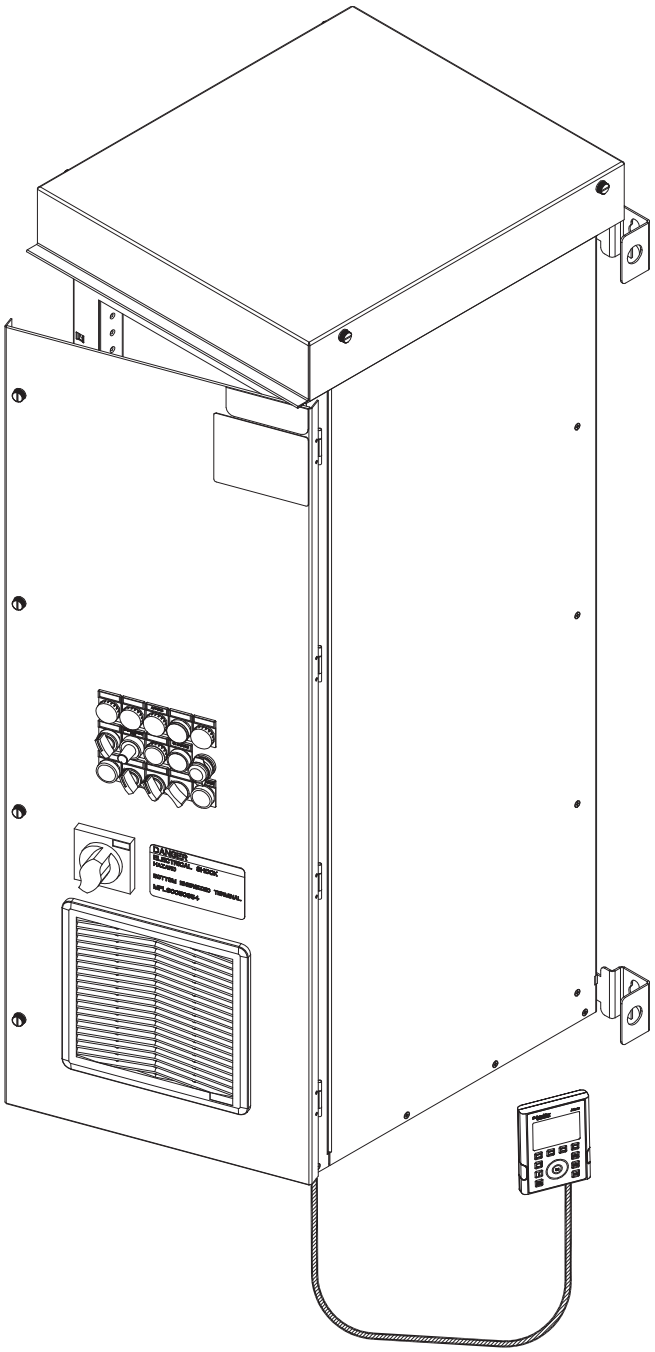
Figure 9 – Routing the Remote Keypad on Wall Mounted Enclosures



Section 4— Circuit Operation and Options

Precautions

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Read and understand the precautions in bulletin NHA60269, *Drives Systems Installation and Maintenance*, before performing any procedures in this bulletin.

Failure to follow these instructions will result in death or serious injury.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Before operating the ATV660 process drive:

- Read and understand the *Altivar Process Programming Manual*, EAV64318, before changing any parameters from the factory defaults.
- If the ATV630 drive is re-initialized using the total or partial factory setting function, the drive must be reprogrammed to the values listed in Tables 17–21 (pages 36–37).
- If the drive or the main control board of the drive is replaced, the drive must be reprogrammed to the values listed in Tables 17–21 (pages 36–37) and in the order which they are given.

Failure to follow these instructions will result in death or serious injury.

Programming the Power Converter

The ATV660 process drive system is factory configured as shown in Table 17 on page 36. Be sure to configure the drive's motor full-load current as shown on the motor nameplate. For additional programming information, see the Altivar 630 Programming Manual, EAV64318, available online at www.schneider-electric.com.

⚠ WARNING

LOSS OF CONTROL

Changes to the factory set parameters must be completed in the sequence given in Table 17 on page 36.

Failure to follow these instructions will result in death, serious injury, or equipment damage.

Changes to parameter factory settings must be completed in the order in which the parameters appear in Table 17 on page 36. Space is provided in the table for noting changes to the factory settings for your records.

Table 17 – Drive System without Full Voltage Bypass

Menu	Parameter	Description	Factory Setting	Custom Setting
1	bFr	Basic Frequency	60	
1	tFr	Max Frequency	60	
1	LSP	Low Speed	3	
5.2	SFr	Switching frequency	2.5	
5.5	Fr1b	REF. 1B CHANNEL	AI2	
5.5	rCb	REF. 1B SWITCHING	DI3	
5.5	tCt	2-wire type	LEL	
5.11	AI2T	AI2 TYPE	0A	
5.11	CrL2	AI2 min value	4	
5.11	AO1	AQ1 ASSIGNMENT	oFr	
5.11	AOL1	AQ1 min output	4	
5.11	r1	R1 ASSIGNMENT	FLt	
5.11	r2	R2 ASSIGNMENT	run	
5.12	FLr	Catch on the fly	YES	

Adjust the parameters shown in Tables 18–21 if these optional features are included with the equipment.

Table 18 – Drive System with Integral Full Voltage Bypass (Y10)

Menu	Parameter	Description	Factory Setting	Custom Setting
5.9	nSt	DI2 (Low Level)	DI2	

Table 19 – Drive system with Integral Passive Harmonic Filter (M09)

Menu	Parameter	Description	Factory Setting	Custom Setting
5.9	Ftd	Motor Freq Thd	1	
5.11	FtA	R3 Assignment	Motor frequency high threshold	
5.11	rld	R3 Delay time	2000	
5.12	EtF	Ext Error assign	DI6	

Table 20 – Drive System Configured For Heavy Duty (H06)

Menu	Parameter	Description	Factory Setting	Custom Setting
5.2	drt	Dual rating	HIGH	

Table 21 – Drive System Configured for 0-10 V Speed Reference (E14)

Menu	Parameter	Description	Factory Setting	Custom Setting
5.11	AI2T	AI2 TYPE	10u	

Power Circuit W: Without Bypass

The non-bypass power circuit provides a coordinated drive and circuit breaker package. It includes a number of possible power circuit additions including selection of harmonic and transient mitigation methods. Additional space is provided for engineered to order options and field installable equipment.

Power Circuit Y: With Integral Full Voltage Bypass

The bypass power circuit provides a coordinated drive and circuit breaker package and the flexibility and security of a full voltage bypass motor drive that is available at any time. A number of possible power circuit additions, including selection of harmonic and transient mitigation methods and options like the field service disconnect and line isolation contactor, are available in this power circuit configuration allowing for even greater reliability and serviceability. Additional space is provided for engineered to order options and field installable equipment.

The integral full voltage bypass starter includes a Class 10 bimetallic or solid-state overload relay and door-mounted overload relay reset button.

NOTICE

HAZARD OF EQUIPMENT DAMAGE

Switching between Drive mode and Bypass mode without allowing the motor to come to a complete stop is not recommended.

Failure to follow these instructions could result in equipment damage.

UL® Type 3R Operation

To prevent condensation on the inside of the cabinet, leave the process drive energized even when the motor is not running.

The enclosed drive has a UL 869A approved insulated ground neutral lug assembly and mounting bracket with a bonded enclosure ground wire suitable for use as service entrance rated equipment. Service Entrance Rating is not available with cUL Label.

Control Options

Mod A11: Hand-Off-Auto Selector Switch

Mod A11 provides a door-mounted Hand-Off-Auto selector switch for operating the drive system (two-wire control scheme).

- Hand mode is for local control. When Hand mode is selected, the drive starts the motor and speed command reference is provided by the door mounted speed potentiometer.
- Off mode commands the drive to stop the motor by freewheel stop (factory setting) or by deceleration ramp.

- Auto mode is for remote control. In Auto mode, the drive starts the motor when the user-supplied Start contact is closed between drive terminals 3 and 4. The drive stops the motor when the user-supplied Start contact is opened.

  The speed command reference is provided by the speed control reference signal supplied to AI3 (factory set for 4-20 mA input).

Mod B11: Hand-Auto Selector Switch and Start-Stop Push Buttons

⚠ WARNING

INABILITY TO INITIATE A STOP

The Stop push button is only active in the Hand mode.

- To stop the controller, open the disconnect switch or set the Hand-Off-Auto switch to Off.
- Use appropriate guarding or interlocking.

Failure to follow these instructions can result in death or serious injury.

Mod B11 provides a door-mounted, Hand-Off-Auto selector switch, a Start push button, and a Stop push button (mixed mode control scheme).

- Hand mode is for local control. In Hand mode:
  - The Start push button commands the drive to start the motor.
  - The Stop push button commands the drive to stop the motor by freewheel stop (factory setting) or by deceleration ramp.
  - The speed command reference is provided by the door-mounted speed potentiometer.
- Off mode commands the drive to stop the motor by freewheel stop (factory setting) or by deceleration ramp.
- Auto mode is for remote control. In Auto mode, the drive starts the motor when the user-supplied Start contact is closed between drive terminals 3 and 4. The drive stops the motor when the user-supplied Start contact is opened. In Auto mode:
  - The Start push button **does not** command the drive to start the motor locally.
  - The Stop push button **does not** command the drive to stop the motor locally.
  - The speed command reference is provided by the speed control reference signal supplied to AI1 (factory set for 4-20 mA input).

Mod N11: No Control Operators

No door-mounted control operators are provided. Omit a control option selection when ordering to receive no operators.

Pilot Light Cluster Options

Mod A12: Pilot Light Cluster 1

Mod A12 provides red Run (On), green Run, and yellow Trip and Auto pilot lights for status enunciation.

Mod B12: Pilot Light Cluster 2

Mod B12 provides red Run (On), green Run, and yellow Trip pilot lights for status enunciation.

Mod N12: No Pilot Lights

No door-mounted lights are provided. Omit a pilot light option selection when ordering to receive no lights.

Miscellaneous Options

Mod A14: Door Mounted Ethernet Port

Provides a port on the door of the enclosed drive for making an Ethernet connection.

Mod B14: Line Contactor

This option is only available for Power Circuit Y (Bypass). It provides a factory-wired line contactor between the circuit breaker disconnect (or line reactor or harmonic filter when provided) and the power converter. When the line contactor is open, serial communication is disabled.

Mod E14: 0–10 V Auto Speed Reference

This option provides a 0–10 V user-supplied auto speed reference signal into the AI2 input, terminals 12 and 13 on terminal block TB1. The 0–10 V analog input is not optically isolated.

Mod F14: 1 N.O. (Form A) Auxiliary Auto Mode Contact

Mod F14 provides one Form A, normally open (N.O.) contact, rated 5 A at 120 Vac, wired to the terminal blocks. The contact(s) change state when the controller is placed in Auto (Remote) mode.

Mod G14: Type 1 Surge Protective Device

Mod G14 provides an integrated Type 1 supplementary voltage surge protective device to protect equipment in the event of transient voltage surges associated with some electrical power distribution systems. The SPD is suitable for peak surge currents up to 40 kA.

Mod H14: Type 2 Surge Protective Device

Mod H14 provides an integrated Type 2 supplementary voltage surge protective device (SPD) to protect equipment in the event of transient voltage surges associated with some electrical power distribution systems. The SPD is suitable for peak surge currents up to 80 kA.

Mod K14: 150 VA Control Power

Mod K14 provides additional VA capacity of the control power transformer to power field installable equipment and control circuits.

Mod L14: Push-to-Test Pilot Lights

This option provides a push-to-test feature on all pilot lights except Power On.

Mod P14: Permanent Wire Markers

Mod P14 provides permanent wire markers for control wires for use in identification and troubleshooting of control circuits.

Mod Q14: Trip Reset

Provides a push button signal to reset a drive trip or bypass overload trip. Mod Y10 Bypass must also be selected.

Mod S14: 50 °C Operation

Mod S14 provides a high ambient equipment rating above 40 °C (104 °F) to a maximum of 50 °C (122 °F) without derating.

Mod T14: Drive Input Disconnect Switch

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Do not operate the switch under load with the door open.

Failure to follow these instructions will result in death or serious injury.

This option provides an input line power disconnect switch between the mains power disconnect and the power converter. The Drive Input Disconnect Switch will disconnect line power to the power converter. The motor can run in bypass mode in the unlikely event the power converter becomes inoperative.

Mod U14: Wireway Cubicle

Mod U14 provides additional wireway space for floor-mounted equipment, especially where mains or motor conductors are feed from the top of the equipment.

Mod V14: Assembled in USA

Assembled in the United States is optional for wall mount units only. All floor standing units are assembled in the United States.

Mod X14: dv/dt Filter

Provides a factory mounted and wired dv/dt filter on the drive output for long motor lead lengths in excess of published guidelines.

Drive Communications and Expansion Cards

ATV660 process drives come factory configured with integral Modbus and Ethernet communications for the drive. The optional expansion cards described in this section are available for additional communication systems and feature configurations.

Mod A13: Profibus DP V1

Mod A13 provides a factory installed plug-in Profibus DP V1 card (VW3A3607). Connect to the Profibus DP card with one nine-pin female SUB-D connector.

Mod B13: CANopen Daisy Chain

Mod B13 provides a factory installed plug-in CANopen daisy chain card (VW3A3608). Connect to the CANopen daisy chain card with two RJ-45 ports.

Mod C13: DeviceNet

Mod C13 provides a factory installed plug-in DeviceNet card (VW3A3609). Connect to the DeviceNet card with one five-point terminal block.

Mod D13: CANopen SUB-D

Mod D13 provides a factory installed plug-in CANopen Sub-D9 card (VW3A3618). Connect to the CANopen Sub-D9 card with one nine-pin male SUB-D connector.

Mod E13: CANopen Open Style

Mod E13 provides a factory installed plug-in CANopen open style card (VW3A3628). Connect to the CANopen open style card with one five-point terminal block.

Mod F13: ProfiNet

Mod F13 provides a factory installed plug-in ProfiNet card (VW3A3627). Connect to the ProfiNet card with two RJ-45 ports.

Mod G13: Ethernet IP / Modbus TCP Dual Port

Mod G13 provides a factory installed plug-in Ethernet IP card (VW3A3720). Connect to the Ethernet IP card with two RJ-45 ports.

Mod C14: I/O Extension Card

Mod C14 provides a factory installed I/O expansion card (VW3A3203). The card expands the available I/O with an additional six logic inputs, two logic outputs, and two analog inputs.

Mod D14: Relay Output Card

Mod D14 provides a factory installed relay output card (VW3A3204). The card adds three normally open contacts that may be assigned within drive logic.

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Section 5— Component Locations, and Dimensions

Component Locations

Figure 10 – Wall-Mounted Enclosures

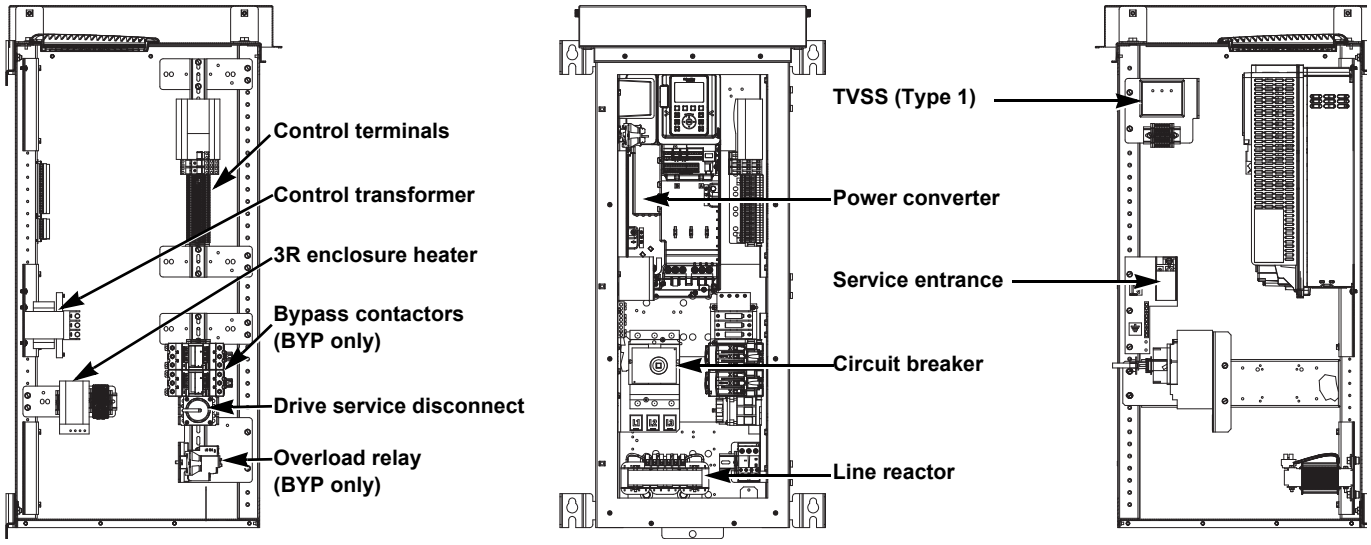

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Figure 11 – Floor-Mounted Enclosures

75–125 hp (55–90 kw) @ 460 V, ND
60–100 hp (45–75 kw) @ 460 V, HD
40–60 hp (30–45 kw) @ 230 V, ND
30–50 hp (22–37 kw) @ 230 V, HD

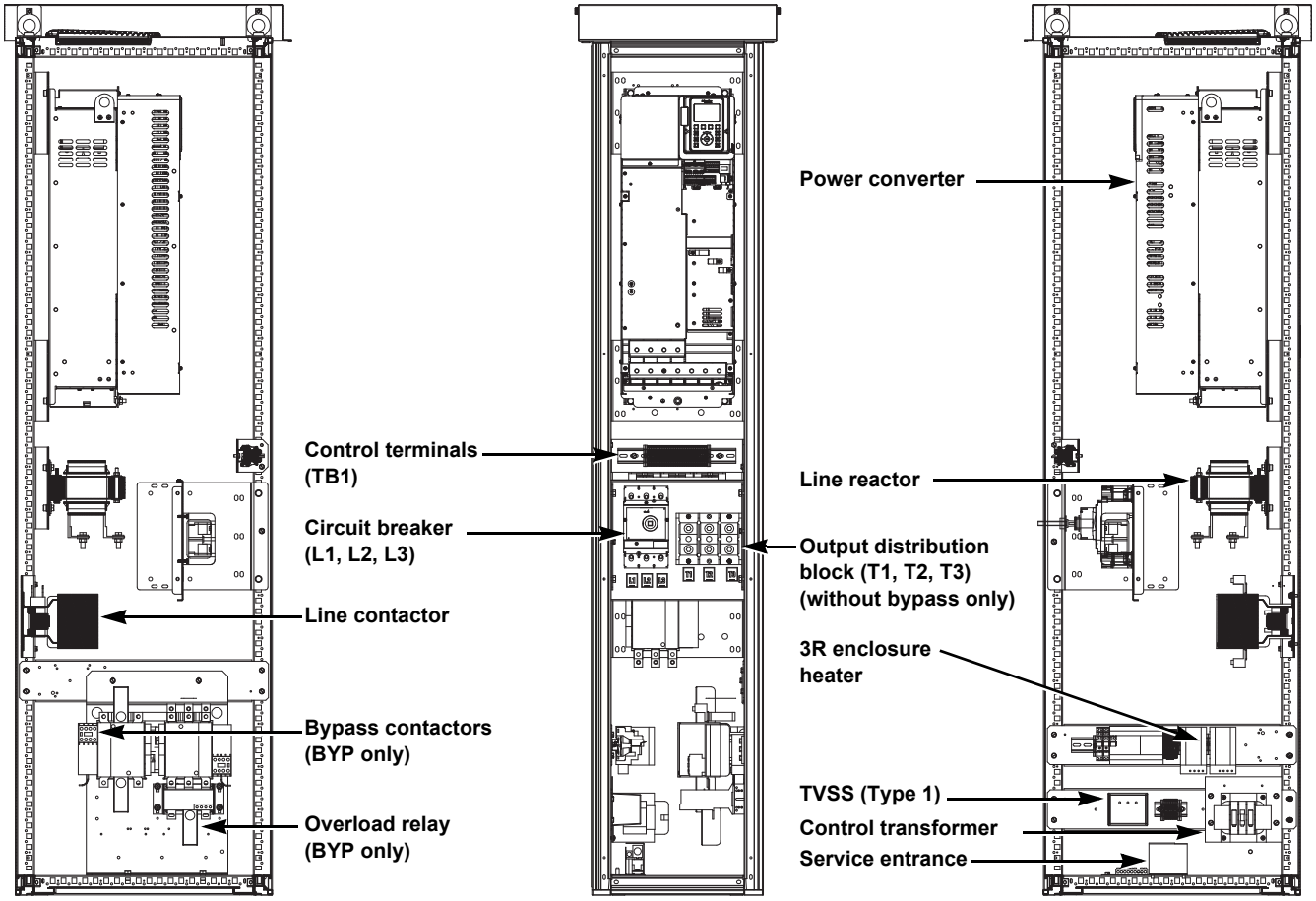

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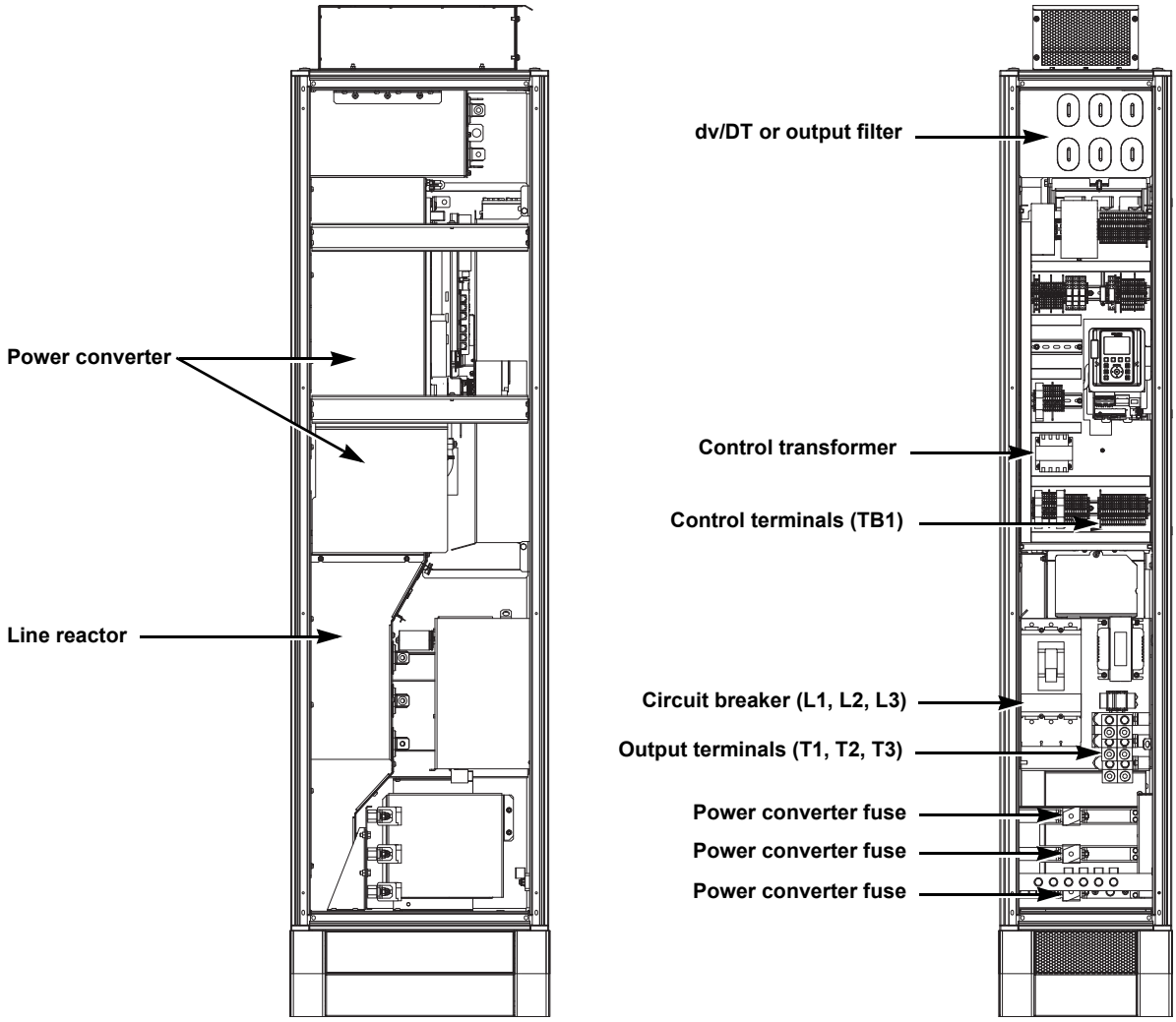
Figure 12 – Floor-Mounted Enclosures

150–250 hp (110–160 kw) @ 460 V, ND
125–200 hp (90–130 kw) @ 460 V, HD



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Dimensions

Figure 13 – 600 mm Enclosure: Standard Drive without Harmonic Filter, Types 1 and 12

1–15 hp (0.75–11 kw) @ 460 V, ND
0.5–10 hp (0.37–7.5 kw) @ 460 V, HD
1–7.5 hp (0.75–5.5kw) @ 230 V, ND
0.5–5 hp (0.4–4 kw) @ 230 V, HD

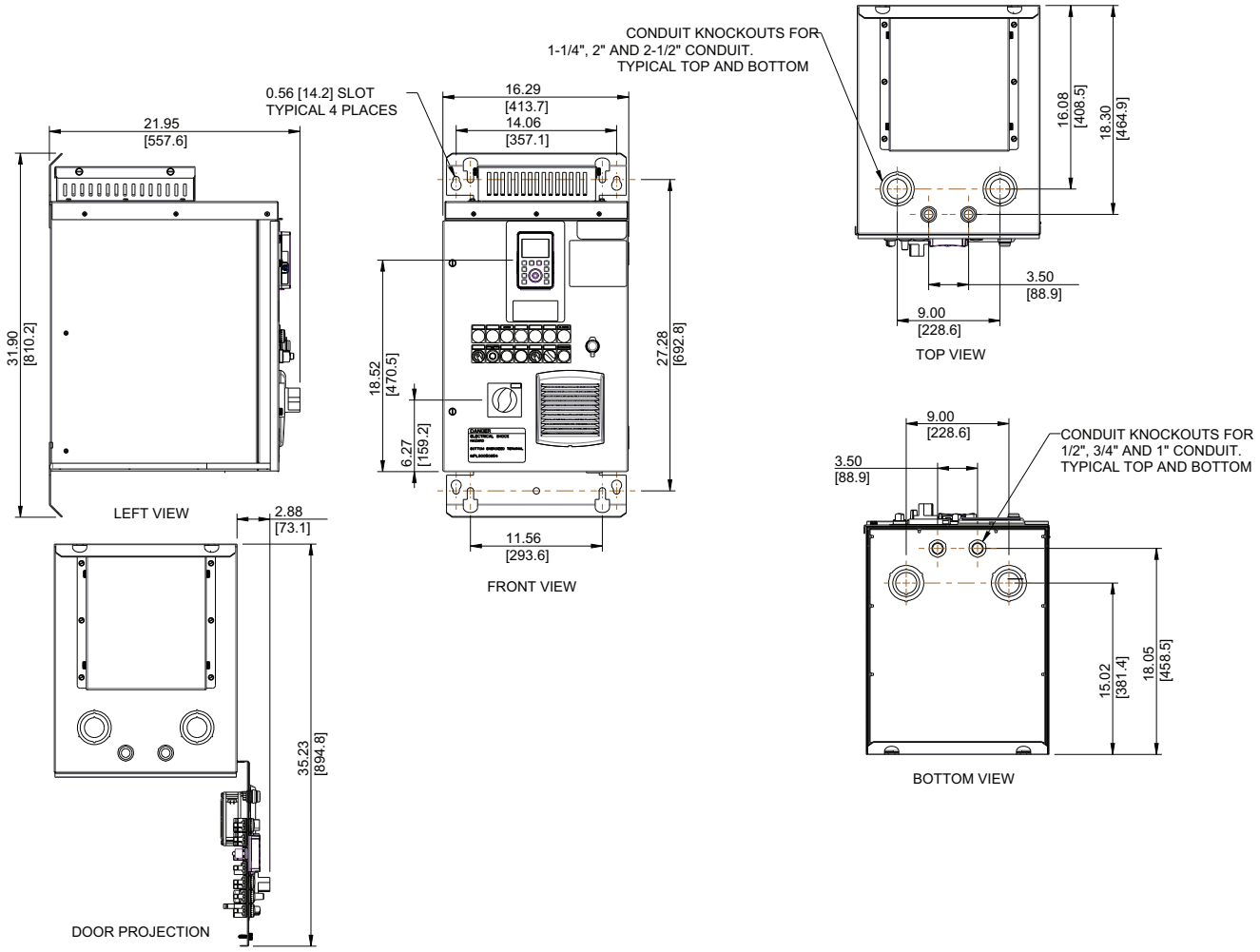

Figure 14 – 600 mm Enclosure: Standard Drive without Harmonic Filter, Type 3R

1–15 hp (0.75–11 kw) @ 460 V, ND
0.5–10 hp (0.37–7.5 kw) @ 460 V, HD
1–7.5 hp (0.75–5.5kw) @ 230 V, ND
0.5–5 hp (0.4–4 kw) @ 230 V, HD

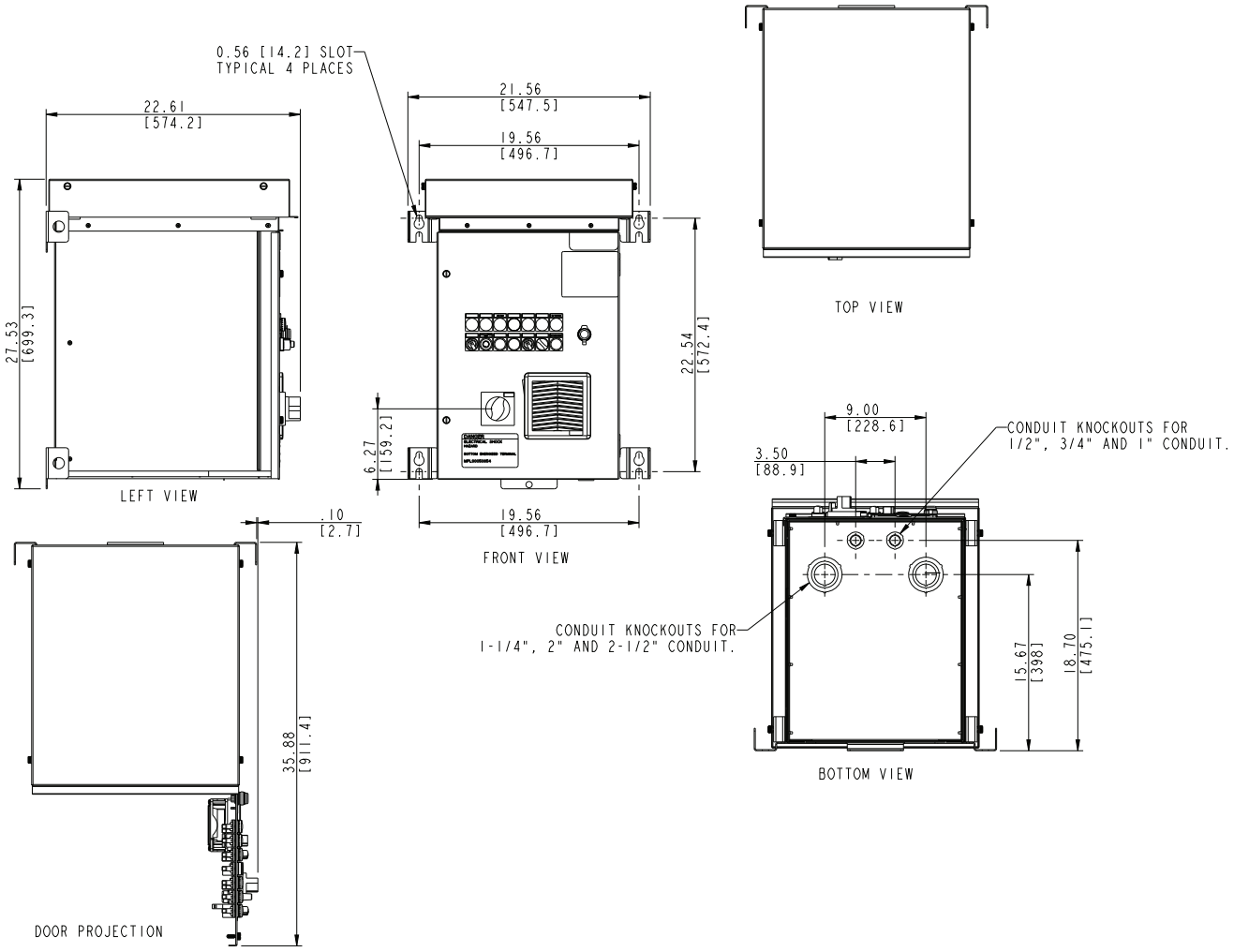

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Figure 15 – 1000 mm Enclosure: Standard Drive without Harmonic Filter, Types 1 and 12

20–30 hp (15–22 kw) @ 460 V, ND
15–25 hp (11–18.5 kw) @ 460 V, HD
10–15 hp (7.5–11 kw) @ 230 V, ND
7.5–10 hp (5.5–7.5 kw) @ 230 V, HD

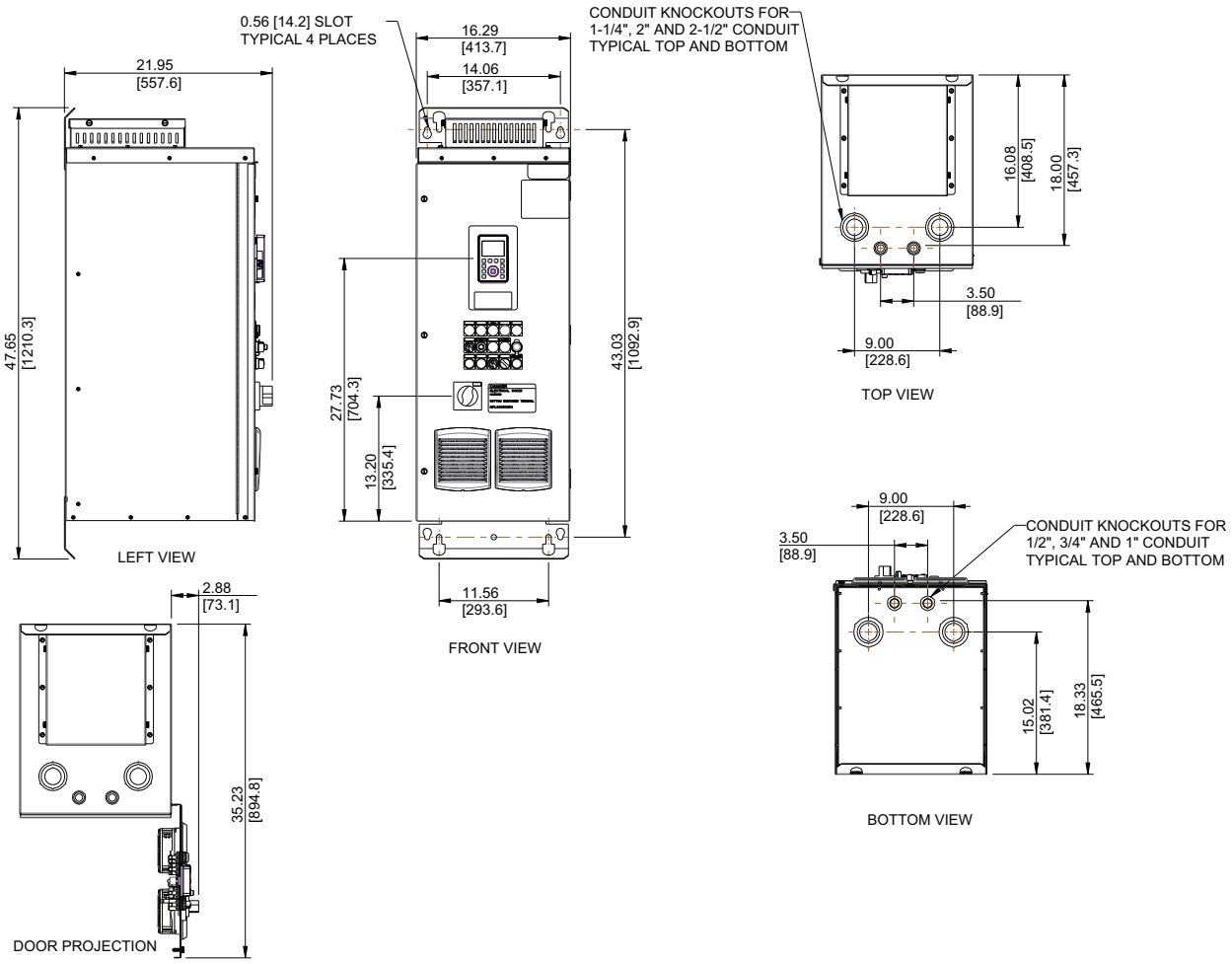

Figure 16 – 1000 mm Enclosure: Standard Drive without Harmonic Filter, Type 3R

20–30 hp (15–22 kw) @ 460 V, ND
15–25 hp (11–18.5 kw) @ 460 V, HD
10–15 hp (7.5–11 kw) @ 230 V, ND
7.5–10 hp (5.5–7.5 kw) @ 230 V, HD

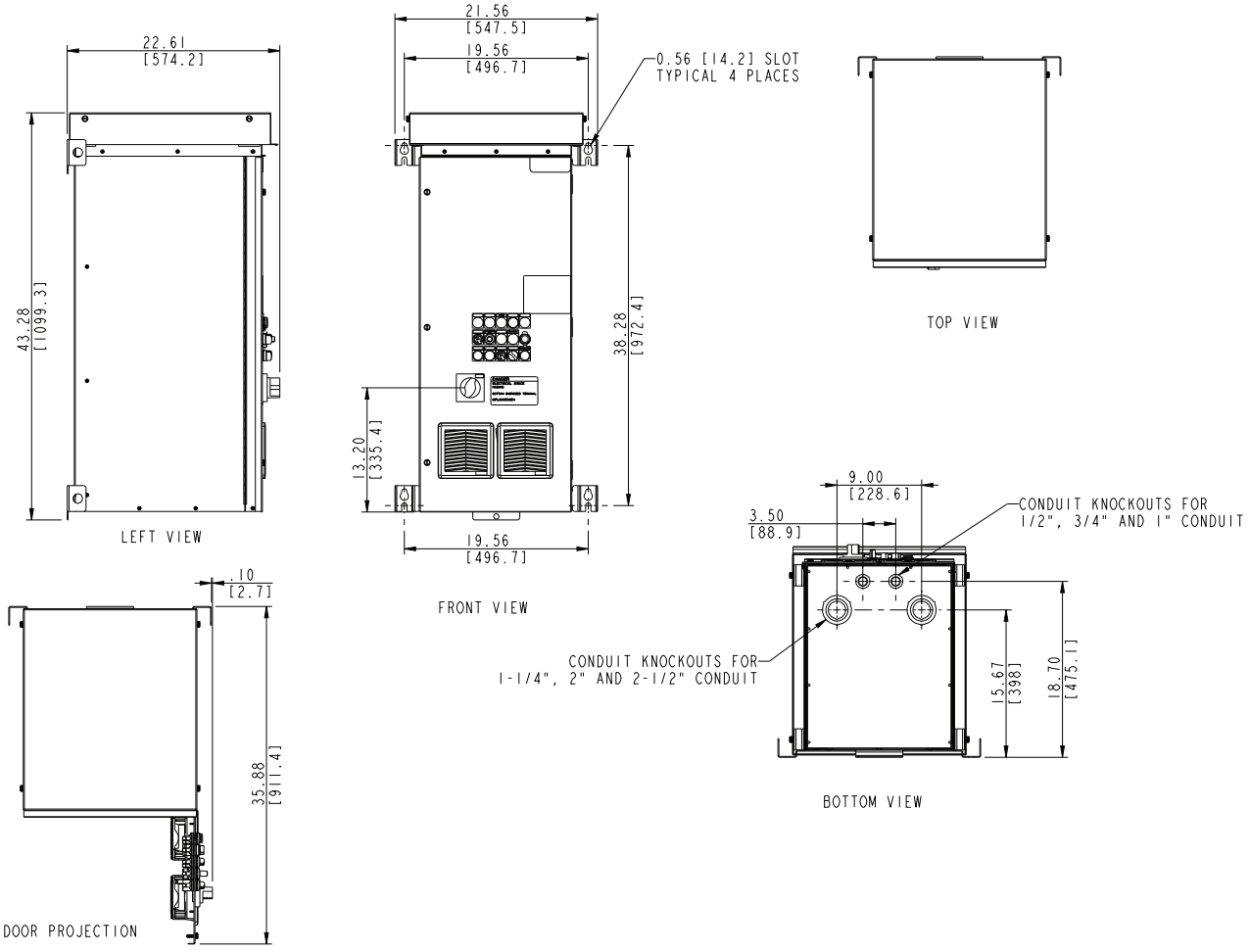

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Figure 17 – 1200 mm Enclosure: Standard Drive without Harmonic Filter, Types 1 and 12

40–60 hp (30–45 kw) @ 460 V, ND
30–50 hp (22–37 kw) @ 460 V, HD
20–30 hp (15–22 kw) @ 230 V, ND
15–25 hp (11–19 kw) @ 230 V, HD

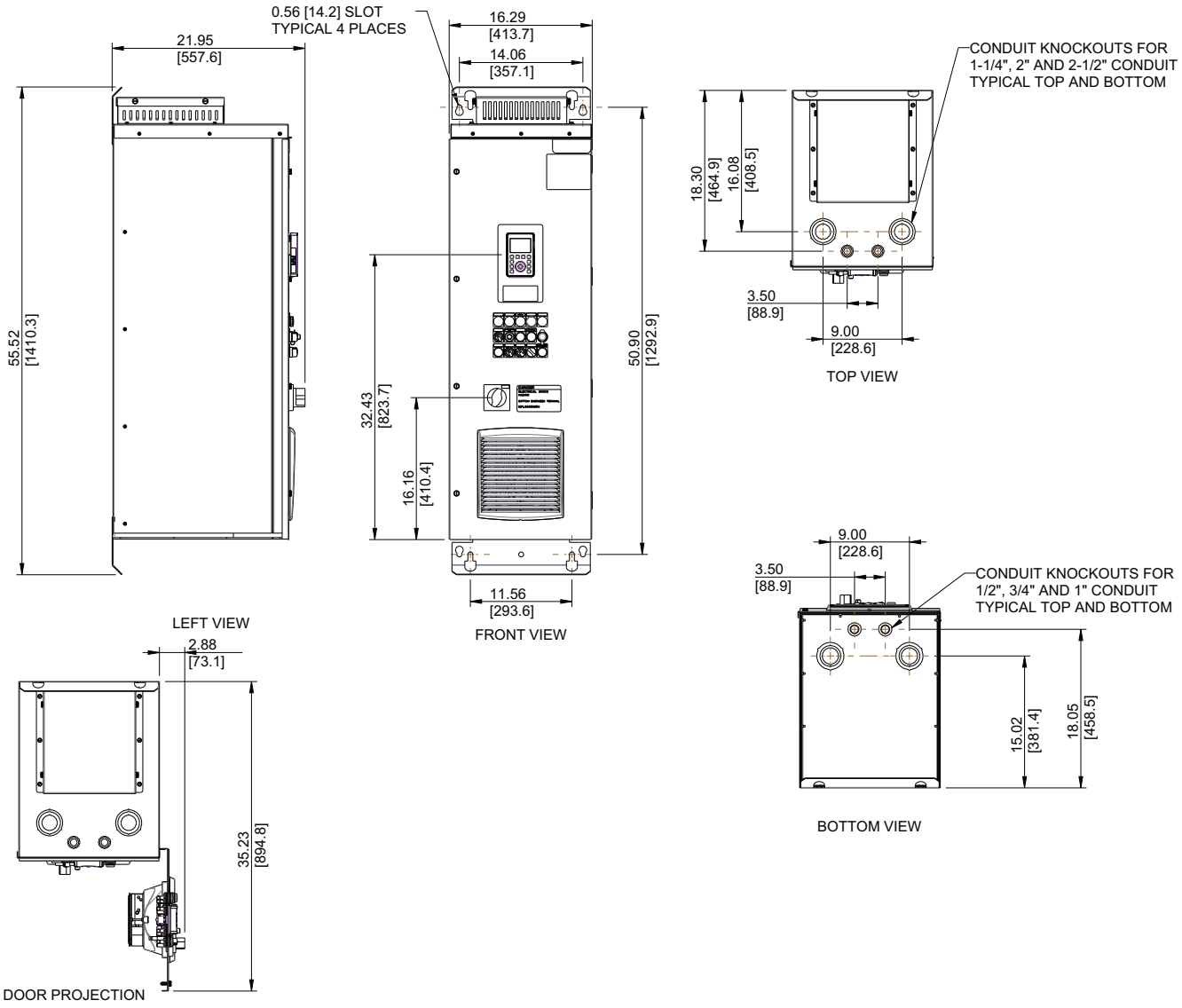

Figure 18 – 1200 mm Enclosure: Standard Drive without Harmonic Filter, Type 3R

40–60 hp (30–45 kw) @ 460 V, ND
30–50 hp (22–37 kw) @ 460 V, HD
20–30 hp (15–22 kw) @ 230 V, ND
15–25 hp (11–19 kw) @ 230 V, HD

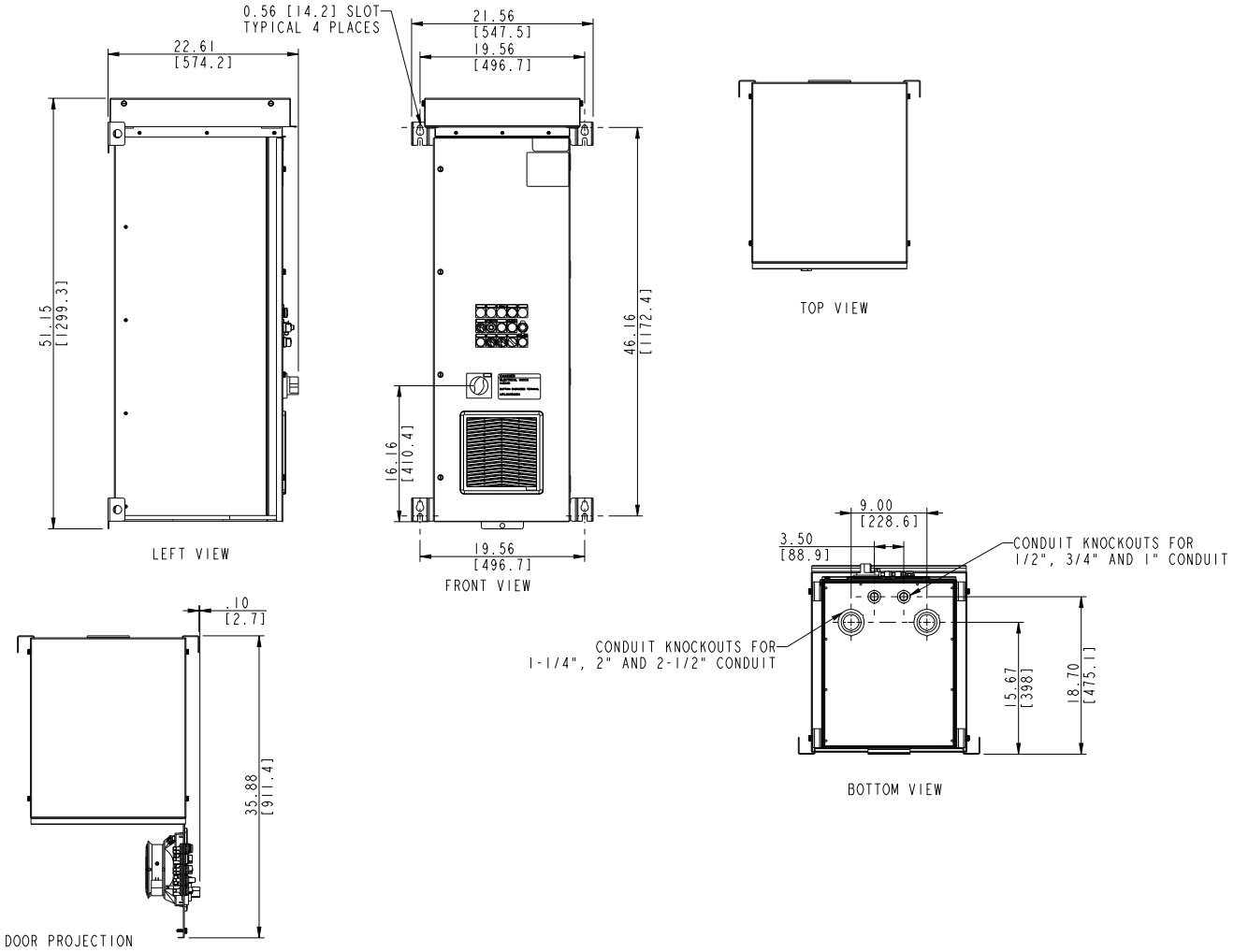

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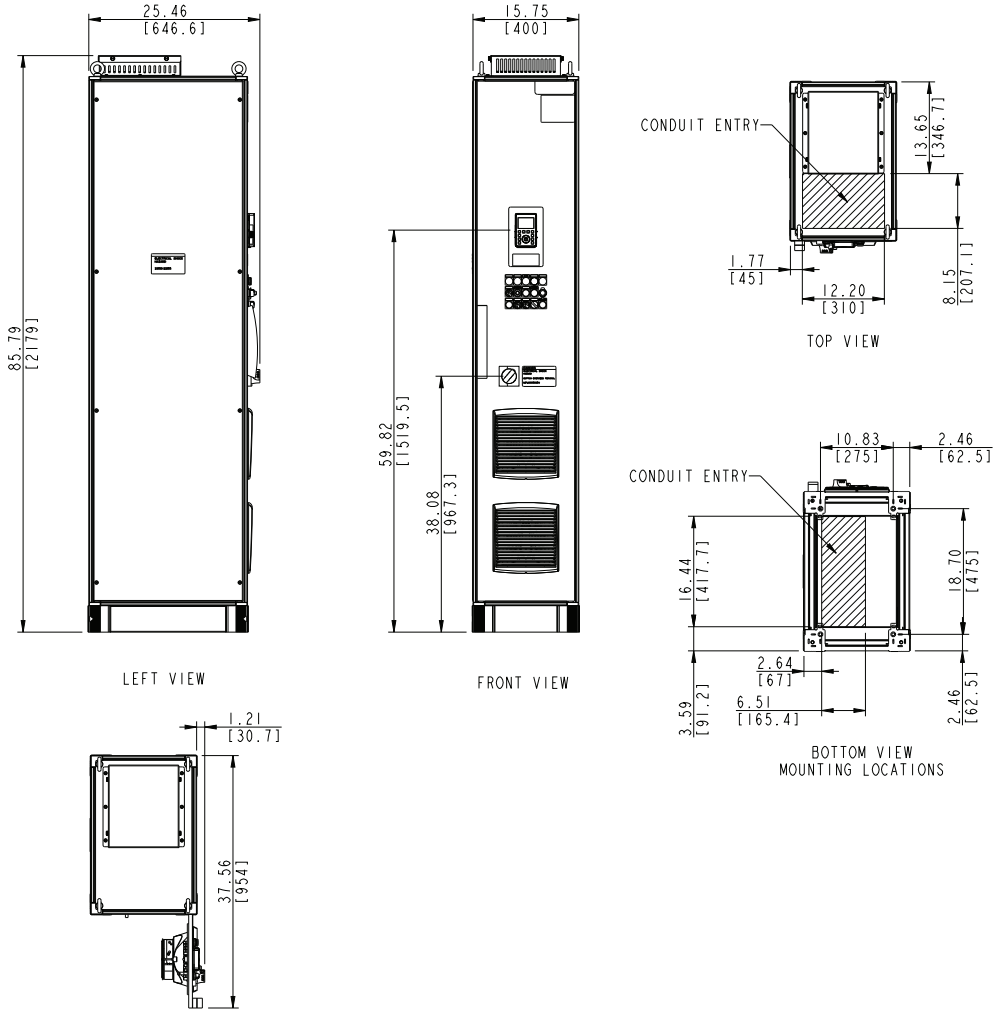
Figure 19 – 2000 mm Enclosure, Standard Drive without Harmonic Filter, Type 1

75–125 hp (55–90 kw) @ 460 V, ND
60–100 hp (45–75 kw) @ 460 V, HD
40–60 hp (30–45 kw) @ 230 V, ND
30–50 hp (22–37 kw) @ 230 V, HD



NOTE: Harmonic Filter M09 is available from 40–100 hp HD and 40–125 hp ND @ 460 V. Adding the harmonic filter requires a floor standing unit 31.5 in. (800 mm) wide, with the same depth and height as shown above.

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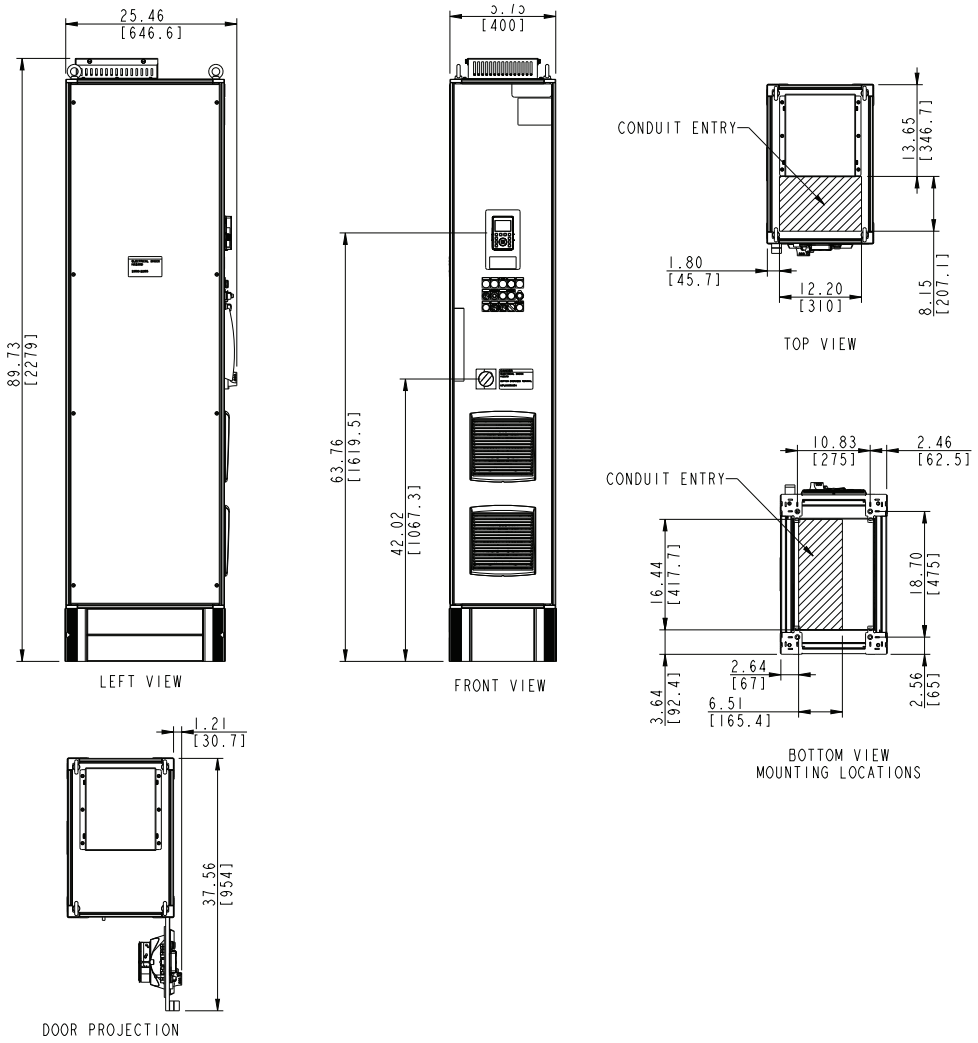
Figure 20 – 2000 mm Enclosure, Standard Drive without Harmonic Filter, Type 12

75–125 hp (55–90 kw) @ 460 V, ND
60–100 hp (45–75 kw) @ 460 V, HD
40–60 hp (30–45 kw) @ 230 V, ND
30–50 hp (22–37 kw) @ 230 V, HD



NOTE: Harmonic Filter M09 is available from 40–100 hp HD and 40–125 hp ND @ 460 V. Adding the harmonic filter requires a floor standing unit 31.5 in. (800 mm) wide, with the same depth and height as shown above.

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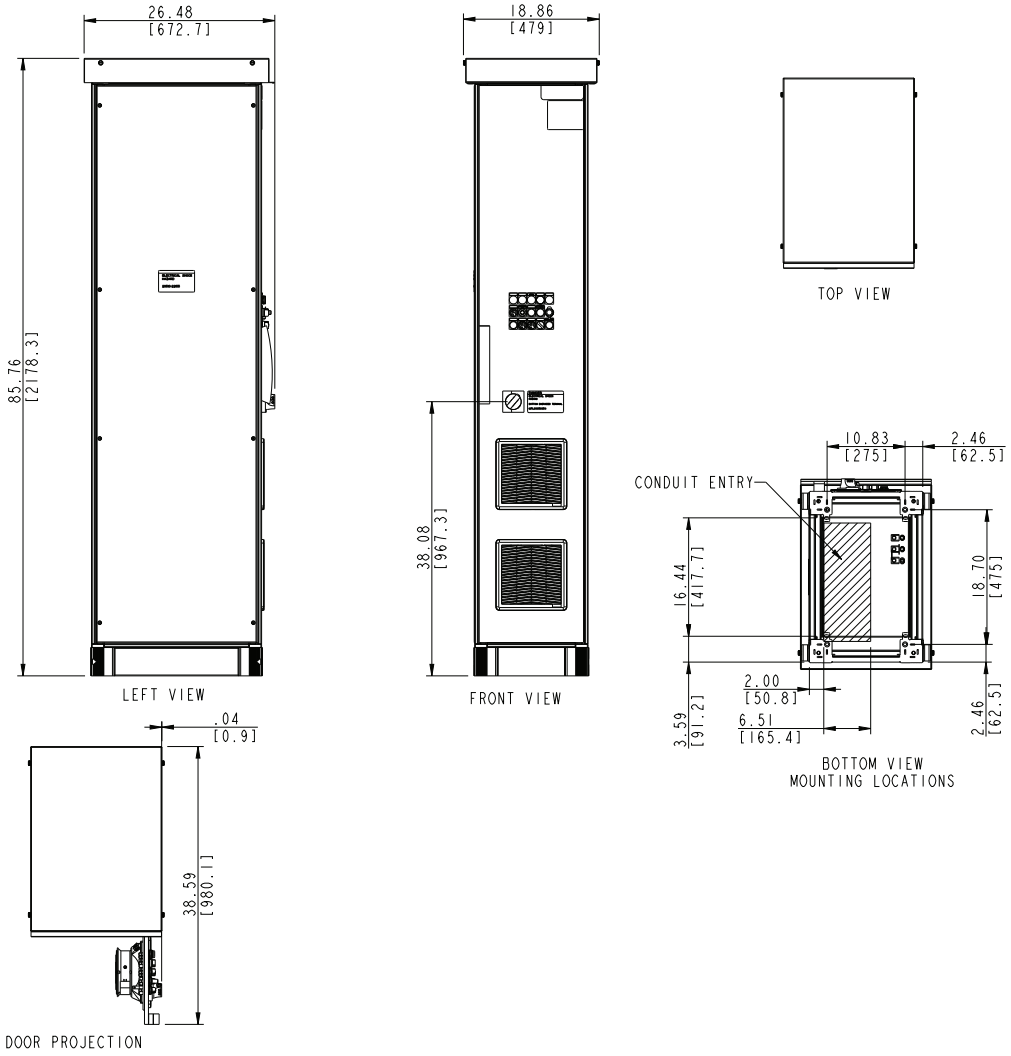
Figure 21 – 2000 mm Enclosure, Standard Drive without Harmonic Filter, Type 3R

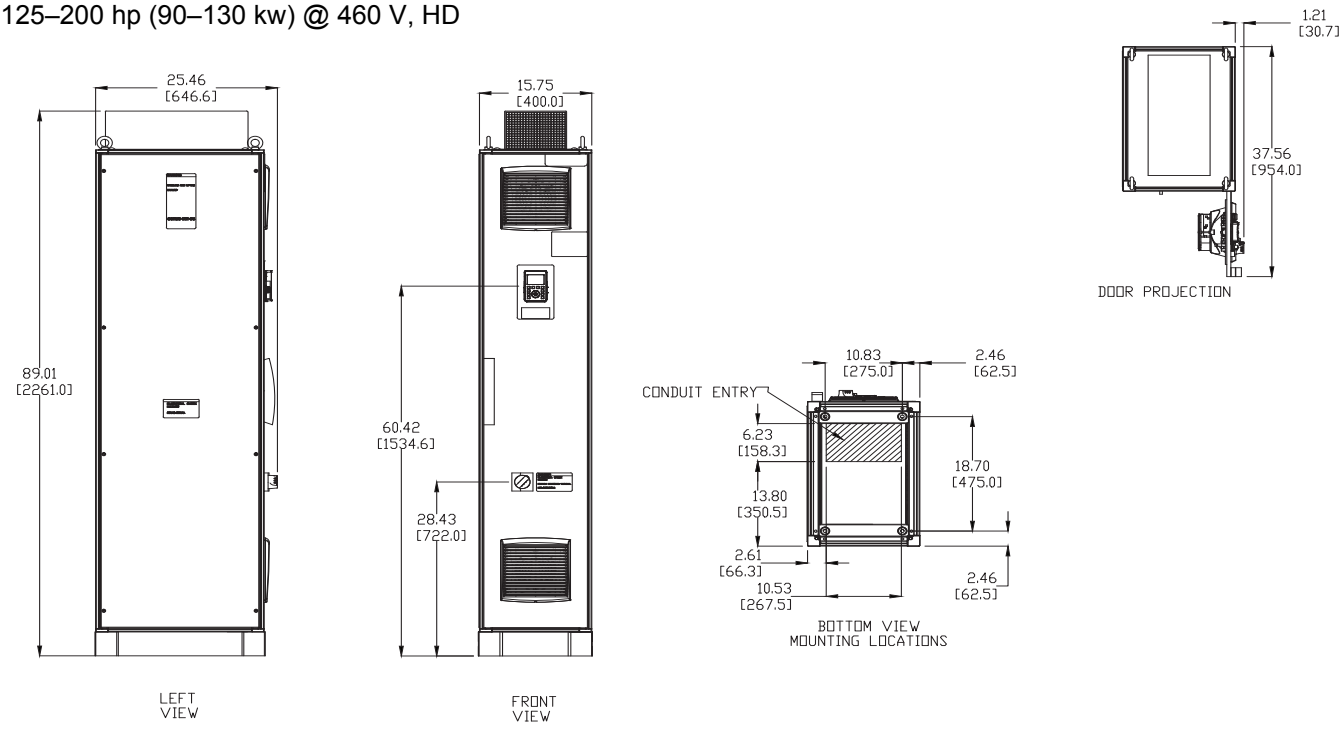
75–125 hp (55–90 kw) @ 460 V, ND
60–100 hp (45–75 kw) @ 460 V, HD
40–60 hp (30–45 kw) @ 230 V, ND
30–50 hp (22–37 kw) @ 230 V, HD



NOTE: Harmonic Filter M09 is available from 40–100 hp HD and 40–125 hp ND @ 460 V. Adding the harmonic filter requires a floor standing unit 31.5 in. (800 mm) wide, with the same depth and height as shown above.

Figure 22 – 2000 mm Enclosure, Standard Drive without Harmonic Filter, Type 1

150–250 hp (110–160 kw) @ 460 V, ND
125–200 hp (90–130 kw) @ 460 V, HD



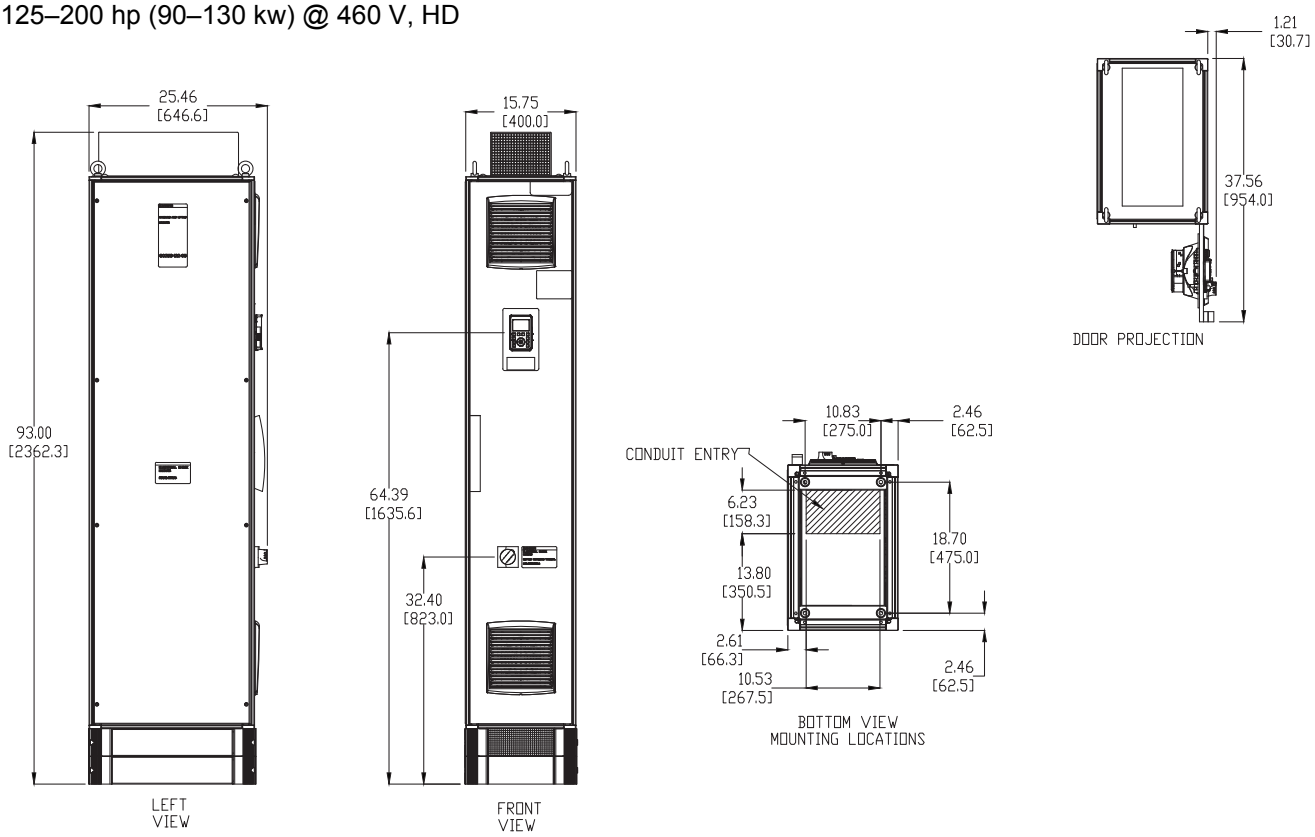
NOTE:

- Harmonic Filter M09 is available from 125–200 hp HD and 150–250 hp ND @ 460 V. Adding the harmonic filter requires a floor standing unit of 31.5–39.4 in. (800–1000 mm) wide, with the same depth and height as shown above.
- Bypass Y10 is available from 125–200 hp HD and 150–250 hp ND @ 460 V. Adding the bypass requires a floor standing unit of 31.5–39.4 in. (800–1000 mm) wide, with the same depth and height as shown above.
- Top entry cubicle MOD U14 requires a floor standing unit of 27.6 in. (700 mm) wide, with the same depth and height as shown above.
- Other options and combinations of these options can affect the enclosure width.

ENGLISH

Figure 23 – 2000 mm Enclosure, Standard Drive without Harmonic Filter, Type 12

150–250 hp (110–160 kw) @ 460 V, ND
125–200 hp (90–130 kw) @ 460 V, HD

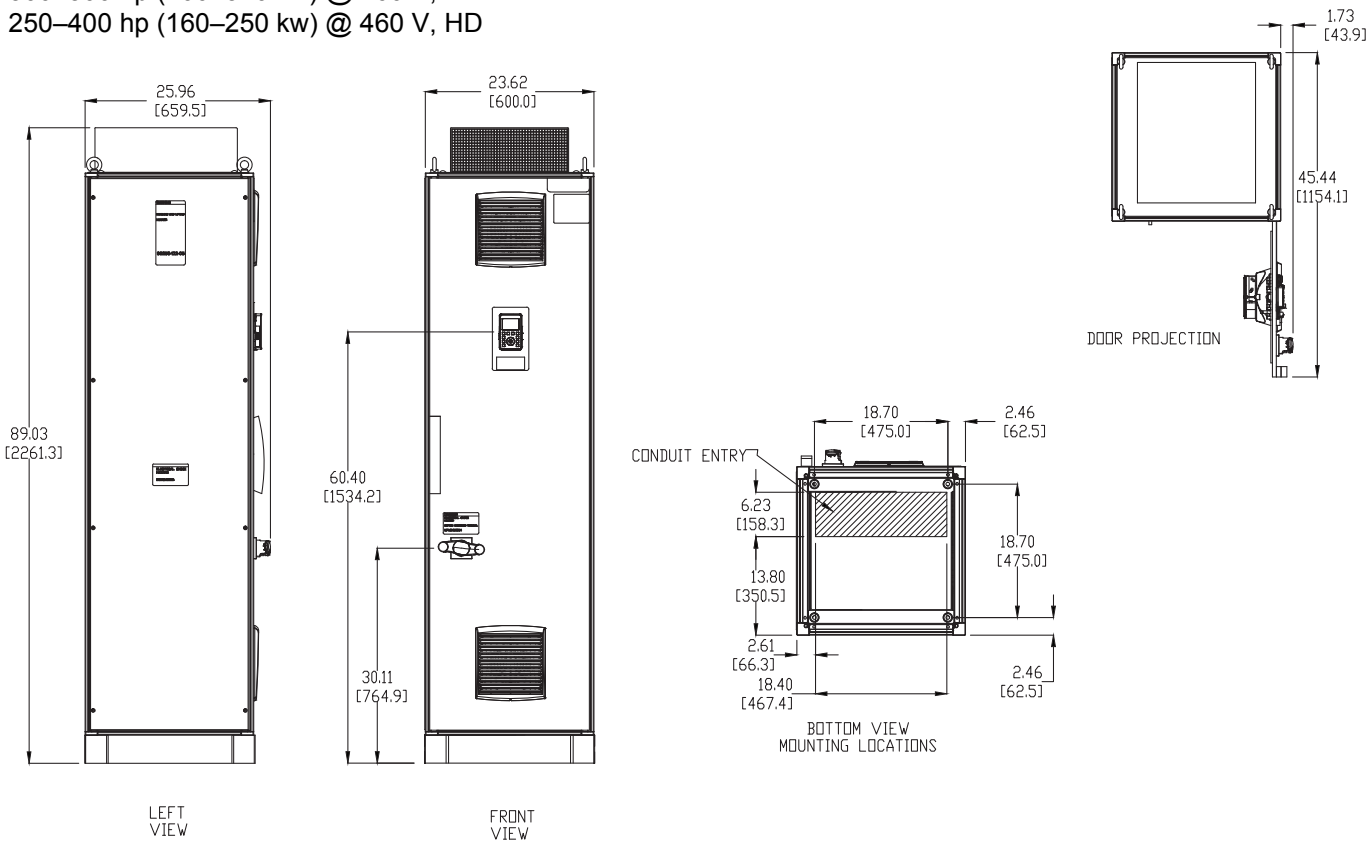


NOTE:

- Harmonic Filter M09 is available from 125–200 hp HD and 150–250 hp ND @ 460 V. Adding the harmonic filter requires a floor standing unit of 31.5–39.4 in. (800–1000 mm) wide, with the same depth and height as shown above.
- Bypass Y10 is available from 125–200 hp HD and 150–250 hp ND @ 460 V. Adding the bypass requires a floor standing unit of 31.5–39.4 in. (800–1000 mm) wide, with the same depth and height as shown above.
- Top entry cubicle MOD U14 requires a floor standing unit of 27.6 in. (700 mm) wide, with the same depth and height as shown above.
- Other options and combinations of these options can affect the enclosure width.

Figure 24 – 2000 mm Enclosure, Standard Drive without Harmonic Filter, Type 1

300–500 hp (200–310 kw) @ 460 V, ND
250–400 hp (160–250 kw) @ 460 V, HD



NOTE:

- Harmonic Filter M09 is available from 250–400 hp HD and 300–500 hp ND @ 460 V. Adding the harmonic filter requires a floor standing unit of 47.3–63 in. (1200–1600 mm) wide, with the same depth and height as shown above.
- Top entry cubicle MOD U14 requires a floor standing unit of 35.3 in. (900 mm) wide, with the same depth and height as shown above.
- Other options and combinations of these options can affect the enclosure width.

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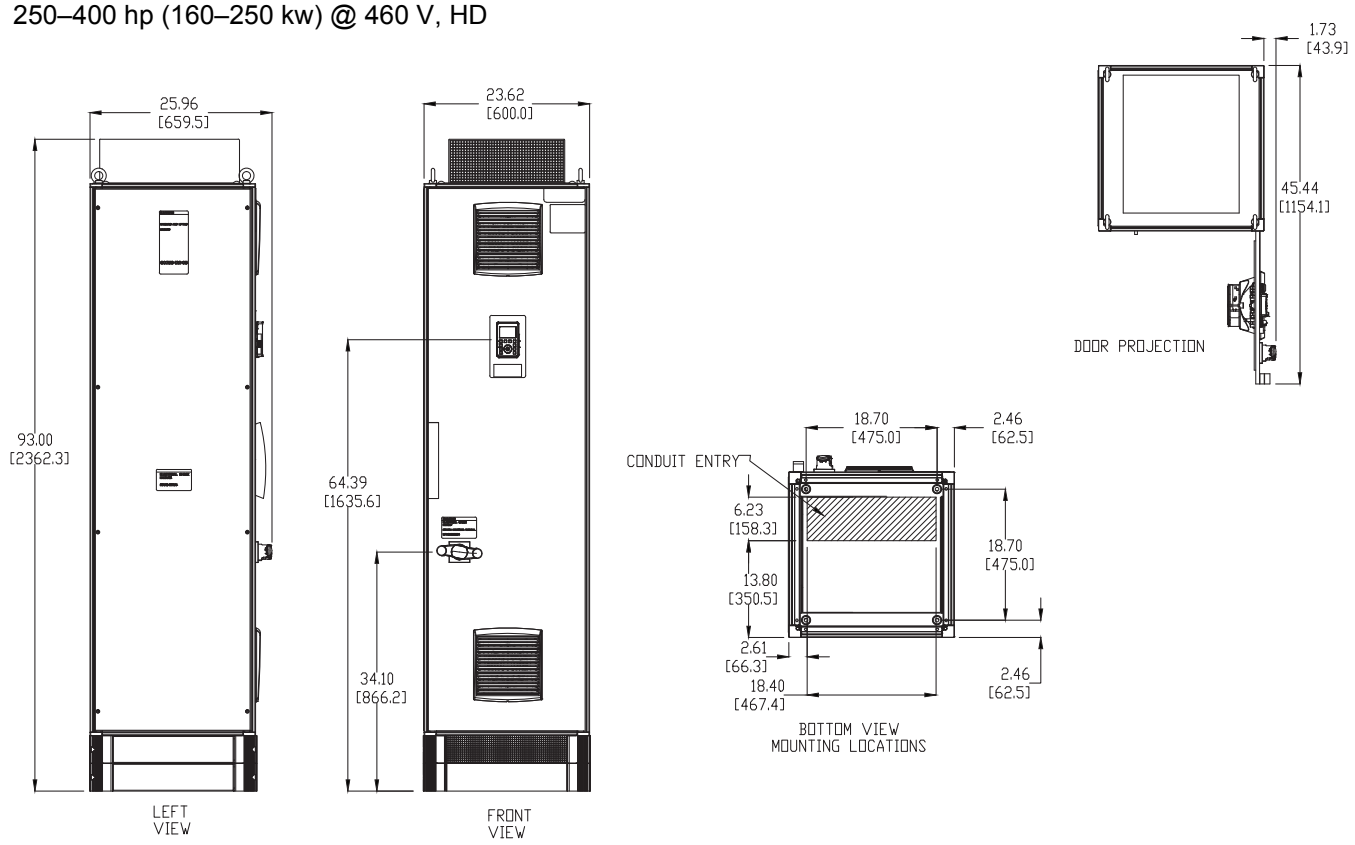
Figure 25 – 2000 mm Enclosure, Standard Drive without Harmonic Filter, Type 12

300–500 hp (200–310 kw) @ 460 V, ND
250–400 hp (160–250 kw) @ 460 V, HD



NOTE:

- Harmonic Filter M09 is available from 250–400 hp HD and 300–500 hp ND @ 460 V. Adding the harmonic filter requires a floor standing unit of 47.3–63 in. (1200–1600 mm) wide, with the same depth and height as shown above.
- Top entry cubicle MOD U14 requires a floor standing unit of 35.3 in. (900 mm) wide, with the same depth and height as shown above.
- Other options and combinations of these options can affect the enclosure width.

Figure 26 – 2000 mm Enclosure, Standard Drive without Harmonic Filter, Type 1

600–700 hp (400–500 kw) @ 460 V, ND
500–600 hp (310–400 kw) @ 460 V, HD

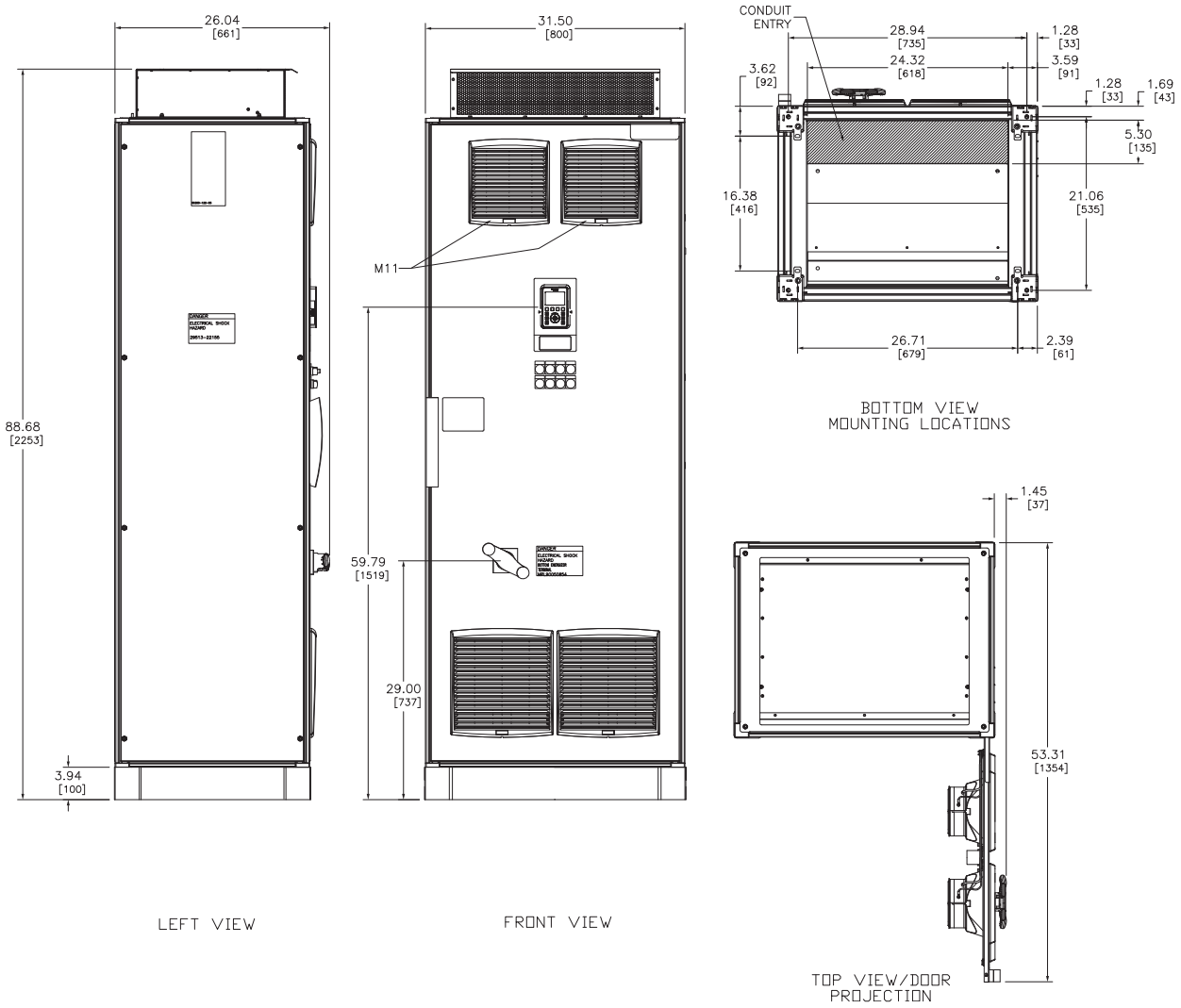


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Figure 27 – 2000 mm Enclosure, Standard Drive without Harmonic Filter, Type 12

600–700 hp (400–500 kw) @ 460 V, ND
500–600 hp (310–400 kw) @ 460 V, HD

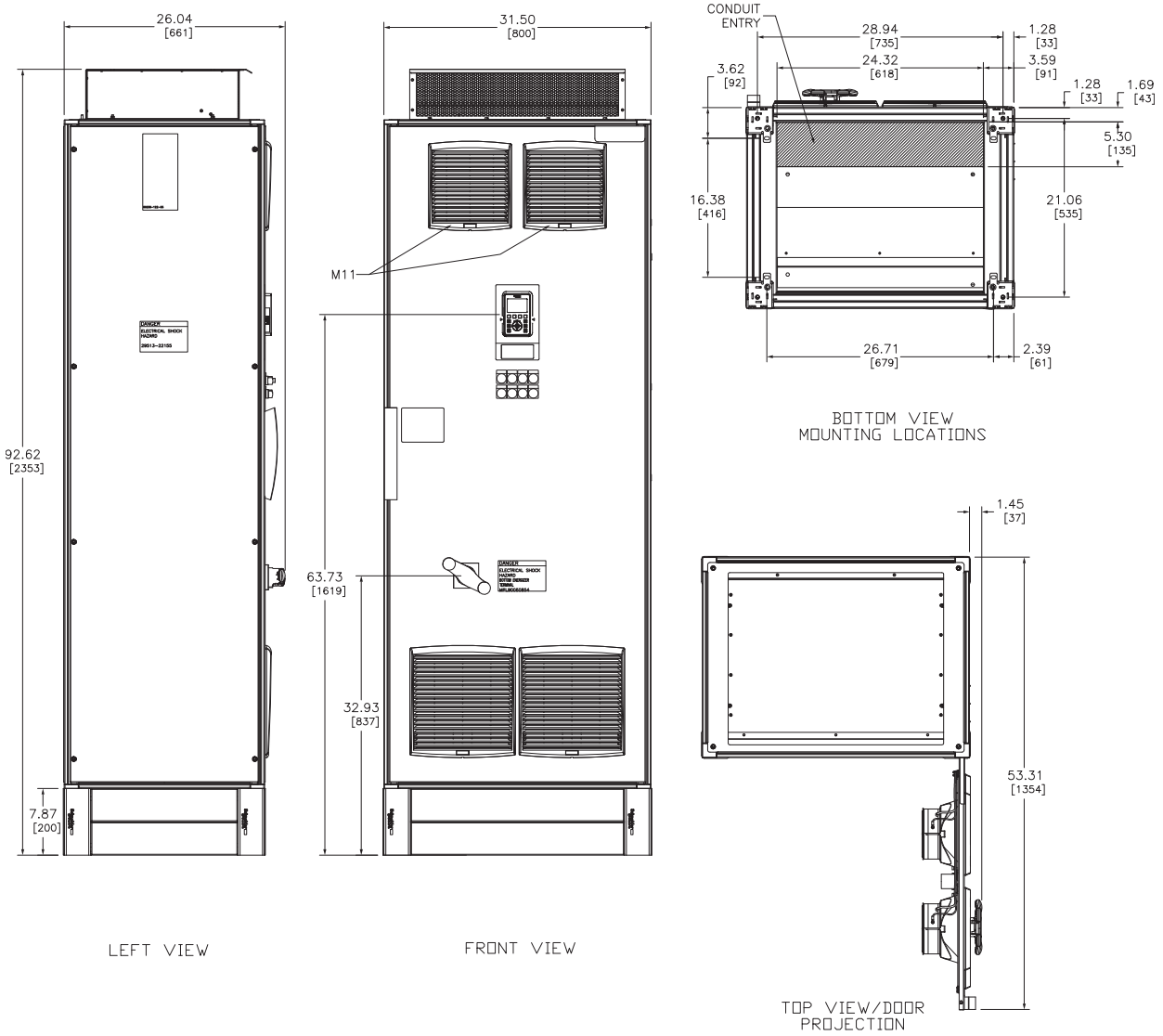

Table 22 – Overall Dimensions

hp (Normal Duty)	230 V	460 V	Width		Depth		Height	
			mm	in.	mm	in.	mm	in.
1–7.5	X		413.7	16.29	557.8	21.95	810.2	31.90
1–15		X	413.7	16.29	557.8	21.95	810.2	31.90
10–15	X		413.7	16.29	557.8	21.95	1210.3	47.65
20–30		X	413.7	16.29	557.8	21.95	1210.3	47.65
20–30	X		413.7	16.29	557.8	21.95	1410.3	55.52
40–60		X	413.7	16.29	557.8	21.95	1410.3	55.52
40–60	X		400	15.75	646.6	25.46	2179	85.8
75–125		X	400	15.75	646.6	25.46	2179	85.8
150–250		X	400	15.75	646.6	25.46	2362.2	93
300–500		X	600	23.62	646.6	25.46	2362.2	93
600–700		X	800	31.50	646.6	25.46	2362.2	93
900		X	1200	47.24	646.6	25.46	2362.2	93

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Section 6— Renewable Parts and Maintenance

Renewable Parts

Schneider Electric provides a limited number of renewable parts for the ATV660 Process drive. Before replacing any parts, consult your local field sales representative. Renewable parts must be installed by qualified personnel familiar with the equipment being replaced.

Table 23 – Renewable Parts

Description	Catalog Number
Ethernet IP / Modbus TCP [1]	VW3A3720
Profinet I/O [1]	VW3A3627
Profibus DP [1]	VW3A3607
CANopen 2XRJ45 [1]	VW3A3608
DeviceNet [1]	VW3A3609
CANopen SUB-D9 [1]	VW3A3618
CANopen open style with screw terminals [1]	VW3A3628
Extended I/O module [1]	VW3A3203
Extended relay module [1]	VW3A3204
AC coil for LC1F150	LX1FF095
AC coil for LC1F185	LX1FG095
AC coil for LC1F265	LX1FH1272
AC coil for LC1F330	LX1FH1272
AC coil for LC1F400	LX1FJ110
Pilot light, red Power On	ZB5AV04 Red pilot light head
	ZB5AV6 Mounting collar with light module
	25501-00003 LED
	65170-166-24 Power On legend plate
	ZBZ32 Legend plate holder
Pilot light, yellow Auto Mode Tripped	ZB5AV05 Amber pilot light head
	ZB5AV6 Mounting collar with light module
	25501-00004 LED
	65170-166-39 Trip legend plate
	or 65170-166-08 Auto legend plate
	ZBZ32 Legend plate holder
Pilot light, green AFC Run	ZB5AV03 Green pilot light head
	ZB5AV6 Mounting collar with light module
	25501-00005 LED
	65170-166-42 AFC Run legend plate
	ZBZ32 Legend plate holder
Pilot light mounting collar with light module	ZB5AV6
Pilot light mounting collar with light module, and 1 N.O. and 1 N.C. contact for p-t-t	ZB5AW065

1 Field replacement of option boards resets the power converter to the factory defaults. You must reconfigure it per the elementary diagram provided.

Table 23 – Renewable Parts *(continued)*

Description	Catalog Number
Hand-Off-Auto selector switch assembly	ZB5AD3 Three-position selector switch
	ZB5AZ009 Mounting collar
	(2) ZBE205 Contact blocks (1 N.C. and 1 N.O.)
	65170-166-17 Hand-Off-Auto legend plate
	ZBZ32 Legend plate holder
Speed potentiometer	ATVPOT25K Speed potentiometer assembly
Stop/Start push buttons	ZB5AA2 Black push button
	ZB5AA4 Red push button
	ZB5AZ101 Mounting collar w/ contact block (1 N.O.)
	ZB5AZ102 Mounting collar w/ contact block (1 N.C.)
	65170-166-31 Start legend plate
	65170-166-09 Stop legend plate
	(2) ZBZ32 Legend plate holders
Fan with filter, 170 mm x 150 mm, 115 Vac 460 V / 1–30 hp ND, 1–25 hp HD, Type 1 & 12 230 V / 1–15 hp ND, 1–10 hp HD, Type 1 & 12	NSYCVF85M115PF
Fan with filter, 270 mm x 250 mm, 115 Vac 460 V / 40–120 hp ND, 30–100 hp HD, Type 1 & 12 230 V / 20–60 hp ND, 15–50 hp HD, Type 1 & 12	NSYCVF300M115PF
Fan filter, 170 mm x 150 mm 460 V / 1–30 hp ND, 1–25 hp HD 230 V / 1–15 hp ND, 1–10 hp HD	NSYCAF125
Fan filter, 270 mm x 250 mm 460 V / 40–900 hp ND, 30–700 hp HD 230 V / 20–60 hp ND, 15–50 hp HD	NSYCAF223
Enclosure grill filter, 270 mm x 250 mm 460 V / 150–250 hp ND, 125–200 hp HD	NSYCAF223
Power electronic fan kit, 48 Vdc 460 V / 150–900 hp ND 125–700 hp HD	VX5VPM001
Enclosure door fan, 270 mm x 250 mm, 48 Vdc 460 V / 150–900 hp ND 125–700 hp HD	VX5VPM002
Door fan, 320 mm x 320 mm (when supplied)	11677154055
Door fan filter, 320 mm x 320 mm, pack of 5	18611600037
Roof fan, 470 mm x 470 mm (when supplied)	11681152055
Roof fan filter, 470 mm x 470 mm, pack of 20	18611600039
Advanced drive keypad	VW3A1111
Remote keypad adapter	VW3A1112

Shading designates renewable parts that are only available through Schneider Electric Services. Contact Schneider Electric for these parts.

Table 23 – Renewable Parts *(continued)*

Description	Catalog Number
ATV600 control block, all ratings	VX4B600100
RFI filter board, 460 V /150–900 hp ND 125–700 hp HD	VX4FPMC1180N4
Inverter board, 460 V / 150 hp (110 kW)	VX4IPMC11N4
Inverter board, 460 V / 200 hp (132 kW)	VX4IPMC13N4
Inverter board, 460 V / 250 hp (160 kW)	VX4IPMC16N4
Power board, 460 V / 150–900 hp ND, 125–700 hp HD	VX4PPMC1180N4
Supply board, 460 V / 110–630 kW 460 V / 150–900 hp ND, 125–700 hp HD	VX4XPMC1180N4
Connection cables, CMP6 to CMI1	VX5XPM001
DC supply for fans, 48 Vdc	VX5XPM002
Inverter Brick 460 V / 150–250 hp	VX5IBPMC1116N4
Rectifier Brick 460 V / 150–250 hp	VX5RBPMC1116N4
Fuse set, 3 pcs, 250 A, URD30 460 V / 125 hp HD, 150 hp ND, 250 hp HD, 300 hp ND	VX5FUPM0250
Fuse set, 3 pcs, 315 A, URD30 460 V / 150 hp HD, 200 hp ND, 300 hp HD, 400 hp ND, 500 hp HD, 600 hp ND	VX5FUPM0315
Fuse set, 3 pcs, 350 A, URD30 460 V / 200 hp HD, 250 hp ND, 400 hp HD, 500 hp ND, 600 hp HD, 700 hp ND, 700 hp HD, 900 hp ND	VX5FUPM0350
Primary control fuses standard 460 V, Type 1 and 12	25430-20100 (no bypass 125 hp and lower, bypass 15 hp and lower) 25430-20250 (bypass 20–125 hp) 25430-20320 (any 150–500 hp) 25430-20700 (any 600–900 hp)
Secondary control fuses standard 460 V, Type 1 and 12	25430-20140 (no bypass 125 hp and lower, bypass 15 hp and lower) 25430-20350 (bypass 20–125 hp) 25430-20400 (any 150–250 hp) 25430-20700 (any 300–500 hp) 25430-21000 (any 600–900 hp)
Primary control fuses standard 460 V with Mod K14 (additional 150 VA), Type 1 and 12	25430-20250 (no bypass 125 hp and lower, bypass 15 hp and lower) 25430-20500 (bypass 20–125 hp) 25430-20320 (any 150–250 hp and 900 hp) 25430-20700 (any 300–500 hp) 25430-21000 (any 600–900 hp)

Table 23 – Renewable Parts *(continued)*

Description	Catalog Number
Secondary control fuses standard 460 V with Mod K14 (additional 150 VA), Type 1 and 12	25430-20350 (no bypass 125 hp and lower, bypass 15 hp and lower) 25430-20700 (bypass 20–125 hp) 25430-20400 (any 150–250 hp) 25430-20700 (any 300–500 hp) 25430-21000 (any 600–900 hp) 25430-20500 (900 hp)
Primary control fuses standard 460 V, Type 3R	25430-20500 (any 125 hp and lower)
Secondary control fuses standard 460 V, Type 3R	25430-20700 (any 125 hp and lower)
Primary control fuses standard 460 V with Mod K14 (additional 150 VA), Type 3R	25430-20500 (no bypass 125 hp and lower bypass 60 hp and lower) 25430-20800 (bypass 70–125hp)
Secondary control fuses standard 460 V with Mod K14 (Additional 150 VA), Type 3R	25430-20700 (no bypass 125 hp and lower, bypass 60 hp and lower) 25430-21000 (bypass 70–125 hp)
Primary control fuses standard 230 V, Type 1 and 12	25430-20200 (no bypass, bypass 15 hp and lower) 25430-20500 (bypass 20 hp and up)
Secondary control fuses standard 230 V, Type 1 and 12	25430-20140 (no bypass, bypass 15 hp and lower) 25430-20350 (bypass 20 hp and up)
Primary control fuses standard 230 V with Mod K14 (additional 150 VA), Type 1 and 12	25430-20500 (no bypass 60 hp and lower bypass 7.5 hp and lower) 25430-20350 (bypass 10 hp and up)
Secondary control fuses standard 230 V with Mod K14 (additional 150 VA), Type 1 and 12	25430-20350 (no bypass 60 hp and lower bypass 7.5 hp and lower) 25430-20700 (bypass 10 hp and up)
Primary control fuses standard 230 V, Type 3R	25430-20350 (any 60 hp and lower)
Secondary control fuses standard 230 V, Type 3R	25430-20700 (any 60 hp and lower)
Primary control fuses standard 230 V with Mod K14 (additional 150 VA), Type 3R	25430-20350 (no bypass 60 hp and lower, bypass 30 hp and lower)
Secondary control fuses standard 230 V with Mod K14 (additional 150 VA), Type 3R	25430-20700 (no bypass 60 hp and lower, bypass 30 hp and lower) 25430-21000 (bypass 40 hp and up)
Power converter normal duty 1h p, 230 V	ATV630U07M3
Power converter normal duty 2 hp, 230 V	ATV630U15M3
Power converter normal duty 3 hp, 230 V	ATV630U22M3
Power converter normal duty 5 hp, 230 V	ATV630U40M3
Power converter normal duty 7.5 hp, 230 V	ATV630U55M3
Power converter normal duty 10 hp, 230 V	ATV630U75M3
Power converter normal duty 15 hp, 230 V	ATV630D11M3
Power converter normal duty 20 hp, 230 V	ATV630D15M3
Power converter normal duty 25 hp, 230 V	ATV630D18M3
Power converter normal duty 30 hp, 230 V	ATV630D22M3

Table 23 – Renewable Parts *(continued)*

Description	Catalog Number
Power converter normal duty 40 hp, 230 V	ATV630D30M3
Power converter normal duty 50 hp, 230 V	ATV630D37M3
Power converter normal duty 60 hp, 230 V	ATV630D45M3
Power converter heavy duty 1 hp, 230 V	ATV630U15M3
Power converter heavy duty 2 hp, 230 V	ATV630U22M3
Power converter heavy duty 3 hp, 230 V	ATV630U30M3
Power converter heavy duty 5 hp, 230 V	ATV630U55M3
Power converter heavy duty 7.5 hp, 230 V	ATV630U75M3
Power converter heavy duty 10 hp, 230 V	ATV630D11M3
Power converter heavy duty 15 hp, 230 V	ATV630D15M3
Power converter heavy duty 20 hp, 230 V	ATV630D18M3
Power converter heavy duty 25 hp, 230 V	ATV630D22M3
Power converter heavy duty 30 hp, 230 V	ATV630D30M3
Power converter heavy duty 40 hp, 230 V	ATV630D37M3
Power converter heavy duty 50 hp, 230 V	ATV630D45M3
Power converter normal duty 1 hp, 460 V	ATV630U07N4
Power converter normal duty 2 hp, 460 V	ATV630U15N4
Power converter normal duty 3 hp, 460 V	ATV630U22N4
Power converter normal duty 5 hp, 460 V	ATV630U40N4
Power converter normal duty 7.5 hp, 460 V	ATV630U55N4
Power converter normal duty 10 hp, 460 V	ATV630U75N4
Power converter normal duty 15 hp, 460 V	ATV630D11N4
Power converter normal duty 20 hp, 460 V	ATV630D15N4
Power converter normal duty 25 hp, 460 V	ATV630D18N4
Power converter normal duty 30 hp, 460 V	ATV630D22N4
Power converter normal duty 40 hp, 460 V	ATV630D30N4
Power converter normal duty 50 hp, 460 V	ATV630D37N4
Power converter normal duty 60 hp, 460 V	ATV630D45N4
Power converter normal duty 75 hp, 460 V	ATV630D55N4
Power converter normal duty 100 hp, 460 V	ATV630D75N4
Power converter normal duty 125 hp, 460 V	ATV630D90N4
Power converter heavy duty 1 hp, 460 V	ATV630U15N4
Power converter heavy duty 2 hp, 460 V	ATV630U22N4
Power converter heavy duty 3 hp, 460 V	ATV630U30N4
Power converter heavy duty 5 hp, 460 V	ATV630U55N4
Power converter heavy duty 7.5 hp, 460 V	ATV630U75N4
Power converter heavy duty 10 hp, 460 V	ATV630D11N4
Power converter heavy duty 15 hp, 460 V	ATV630D15N4
Power converter heavy duty 20 hp, 460 V	ATV630D18N4
Power converter heavy duty 25 hp, 460 V	ATV630D22N4
Power converter heavy duty 30 hp, 460 V	ATV630D30N4
Power converter heavy duty 40 hp, 460 V	ATV630D37N4
Power converter heavy duty 50 hp, 460 V	ATV630D45N4

Table 23 – Renewable Parts *(continued)*

Description	Catalog Number
Power converter heavy duty 60 hp, 460 V	ATV630D55N4
Power converter heavy duty 75 hp, 460 V	ATV630D75N4
Power converter heavy duty 100 hp, 460 V	ATV630D90N4

Maintenance Intervals

Table 24 – Recommended Maintenance Intervals[1]

Component	Interval:	
	In Operating Hours	In Years
Power part fan	35,000	4
Enclosure door fan	35,000	4
Filter mats	—	Clean once every six months, replace all every four years.

[1] Intervals are from date of commissioning and may vary depending on the ambient conditions.

Servicing the Front Fan Filters (without Rain Hood)

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E®, CSA Z462, NOM-029-STPS, and other applicable regulations defining safe electrical work practices.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

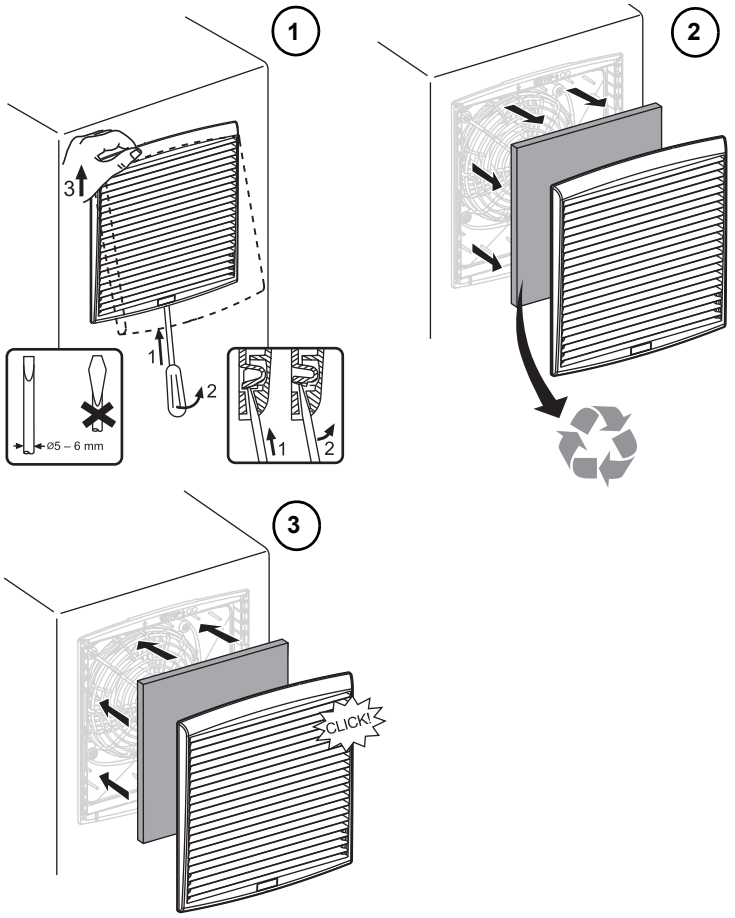
The ATV660 process drive includes filtered forced air ventilation that prevents excess dust or debris from entering the enclosure. The filters require periodic maintenance and replacement. Replacement or cleaning of filters is suggested once every six months at minimum, but the frequency may increase depending on a number of environmental factors. Select a maintenance cycle that is appropriate for your installation conditions.

1. Remove all power from the enclosed drive.
2. Turn the circuit breaker and handle assembly to the Off position and open the enclosure door.
3. Test for the absence of voltage.

   NOTE: Verify that the voltage tester is functioning properly before and after testing for the absence of voltage.

4. Unlock the air outlet grill with a flat head screwdriver and lift the grill to the top. See Figure 28.
5. Remove the grill and filter mat. Discard the filter mat.
6. Press the air outlet grill and the new filter mat into the cut out until it locks with an audible noise.

Figure 28 – Changing Front Filters



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Servicing the Exhaust Fan Filter

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E®, CSA Z462, NOM-029-STPS, and other applicable regulations defining safe electrical work practices.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

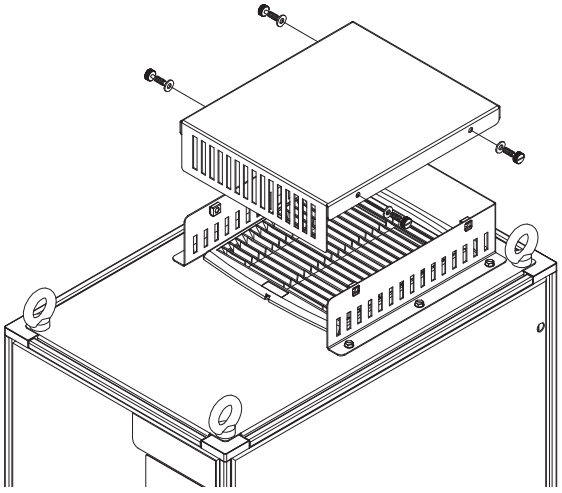
Service of the exhaust filter is typically not required unless environmental conditions are especially dusty or the equipment has not been operated for an extended period of time. To access the exhaust fan filter:

1. Remove all power from the enclosed drive.
2. Turn the circuit breaker and handle assembly to the Off position and open the enclosure door.
3. Test for the absence of voltage.

   NOTE: Verify that the voltage tester is functioning properly before and after testing for the absence of voltage.
4. For Type 3R equipment, refer to “Accessing the Lifting Brackets” on page 21 and follow the instructions for removing the rain hood.

   For Type 12 equipment, remove the vent grill as illustrated in Figure 29.
5. Service (clean or replace) the exhaust fan filter following the instructions on page 68 for the front filters. Always replace the rain hood or top cover and thumb screws after cleaning or replacing the filter.

Figure 29 – Accessing the Exhaust Fan Filters on Type 12 Equipment



Replacing the Door Fans

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E®, CSA Z462, NOM-029-STPS, and other applicable regulations defining safe electrical work practices.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

1. Remove all power from the enclosed drive.
2. Turn the circuit breaker and handle assembly to the Off position and open the enclosure door.
3. Test for the absence of voltage.

   NOTE: Verify that the voltage tester is functioning properly before and after testing for the absence of voltage.
4. Remove the grounding cable and disconnect the fan's power supply. See Figure 30 on page 72.
5. Remove two screws, lift the grill from the fan, and remove the fan from the housing. Discard the fan but save the grill and screws to reinstall with the new fan.
6. Position the new fan so that the direction arrows point to the fan housing. Affix the fan and grill to the housing using the two screws. See Figure 31 on page 72.
7. Reconnect the fan's power supply and the grounding cable.

Figure 30 – Removing the Door Fan

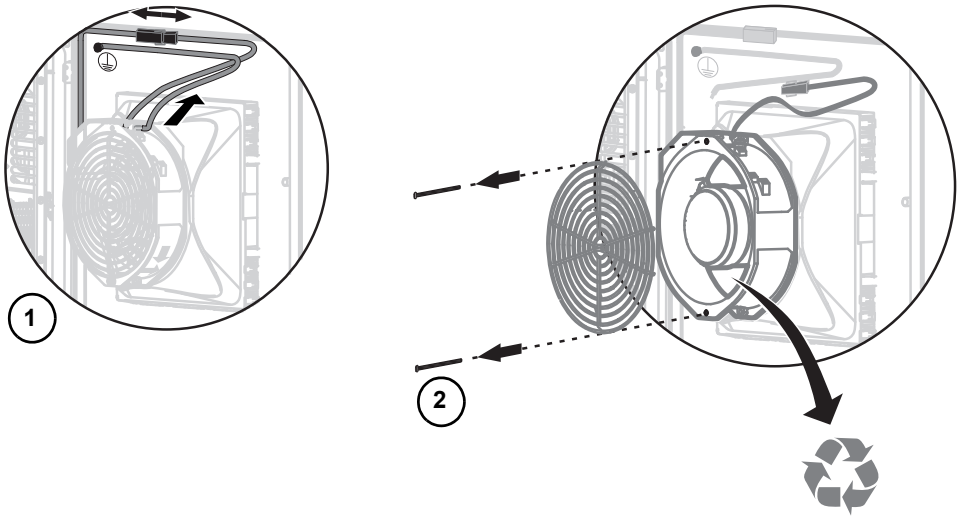
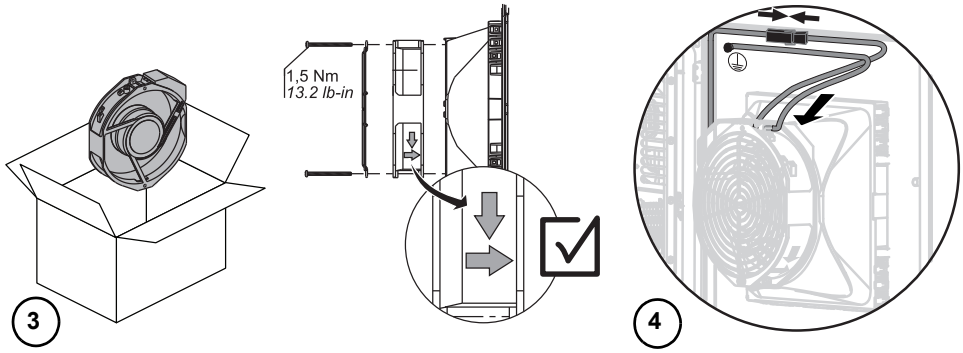


Figure 31 – Installing the New Door Fan



Replacing the Power Fan

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E®, CSA Z462, NOM-029-STPS, and other applicable regulations defining safe electrical work practices.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

To replace the power fan on 150 hp devices and higher (see Figure 32 on page 74):

1. Remove all power from the enclosed drive.
2. Turn the circuit breaker and handle assembly to the Off position and open the enclosure door.
3. Test for the absence of voltage.

   NOTE: Verify that the voltage tester is functioning properly before and after testing for the absence of voltage.
4. Loosen the screws from the fan's protective cover, if provided.
5. Disconnect the power cable from the fan and the protective cover. Loosen the Torx® screw from the cover.
6. Swivel the fan cover forward and remove it from the anchorage. Press the power cable, including the grommet, through the middle hole in the fan cover. Remove the fan cover.
7. Loosen the two M6 Torx screws at the fan housing.
8. After loosening the Torx screws, pull the fan to the front.
9. Install the new fan by following the preceding steps in reverse order. Secure the fan with the two M6 Torx screws. Torque the screws to 49 lb-in (5.5 N•m).

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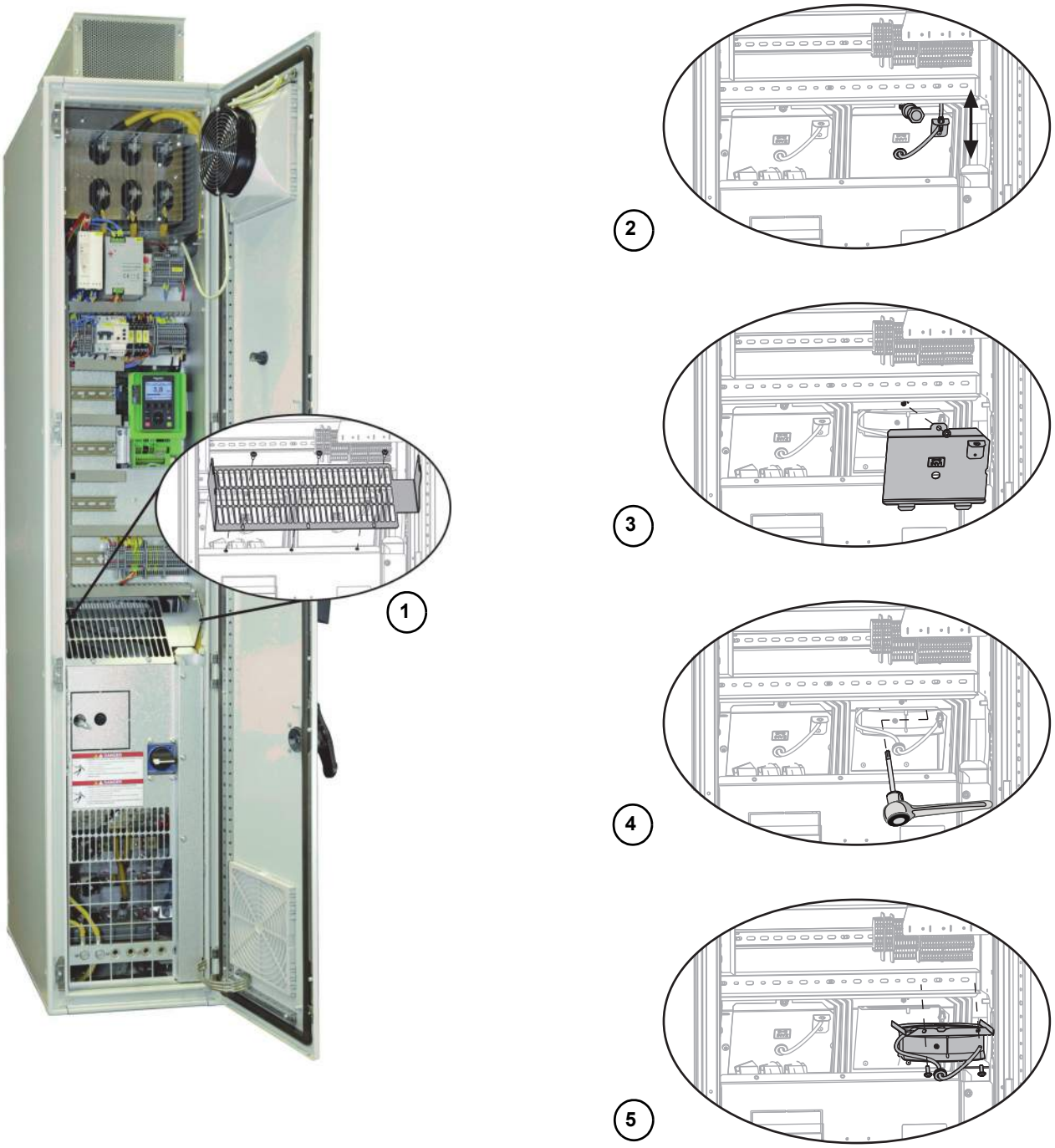
Figure 32 – Installing the Power Fan



Technical Support

For product post sale technical support please contact the Drive Products Support Group between the hours of 8:00 am and 8:00 pm Eastern time.

EMERGENCY technical phone support is available for inoperable machinery 24 hours a day, 365 days a year.

Toll free	1-888-778-2733 Option # 1 (Technical Support) and then Option # 4 (AC Drives and Soft Starters)
E-mail	drive.products.support@schneider-electric.com
Fax	919-217-6508

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Appendix A—Zelio™ Smart Relay Ladder Logic

The Zelio Smart Relay controls the power converter's output contactor and the bypass contactor when Bypass (Mod Y10) is selected. Figure 33 on pages 78–79 contains a diagram of the default Zelio Smart Relay program and Table 25 is a timing chart.

Custom requests may result in a program that differs from the one illustrated in Figure 33. If you have requested custom programming, review the drawings supplied with the process drive.

Table 25 – Zelio Smart Relay Ladder Logic Timers

Timer	Description	Function	Time (s)
T1	Power on delay	A: Active, control held down	6.0
T2	Open delay	C: Off delay	2.0
T3	AFC run delay	A: Active, control held down	5.0
T4	AFC contactor time delay	A: Active, control held down	3.0
T5	Bypass contactor time delay	A: Active, control held down	3.0
T6	Drive trip signal delay	A: Active, control held down	2.0
T7	Start with Line contactor	B: On pulse one shot	6.0

ENGLISH

Figure 33 – Zelio Smart Relay Program

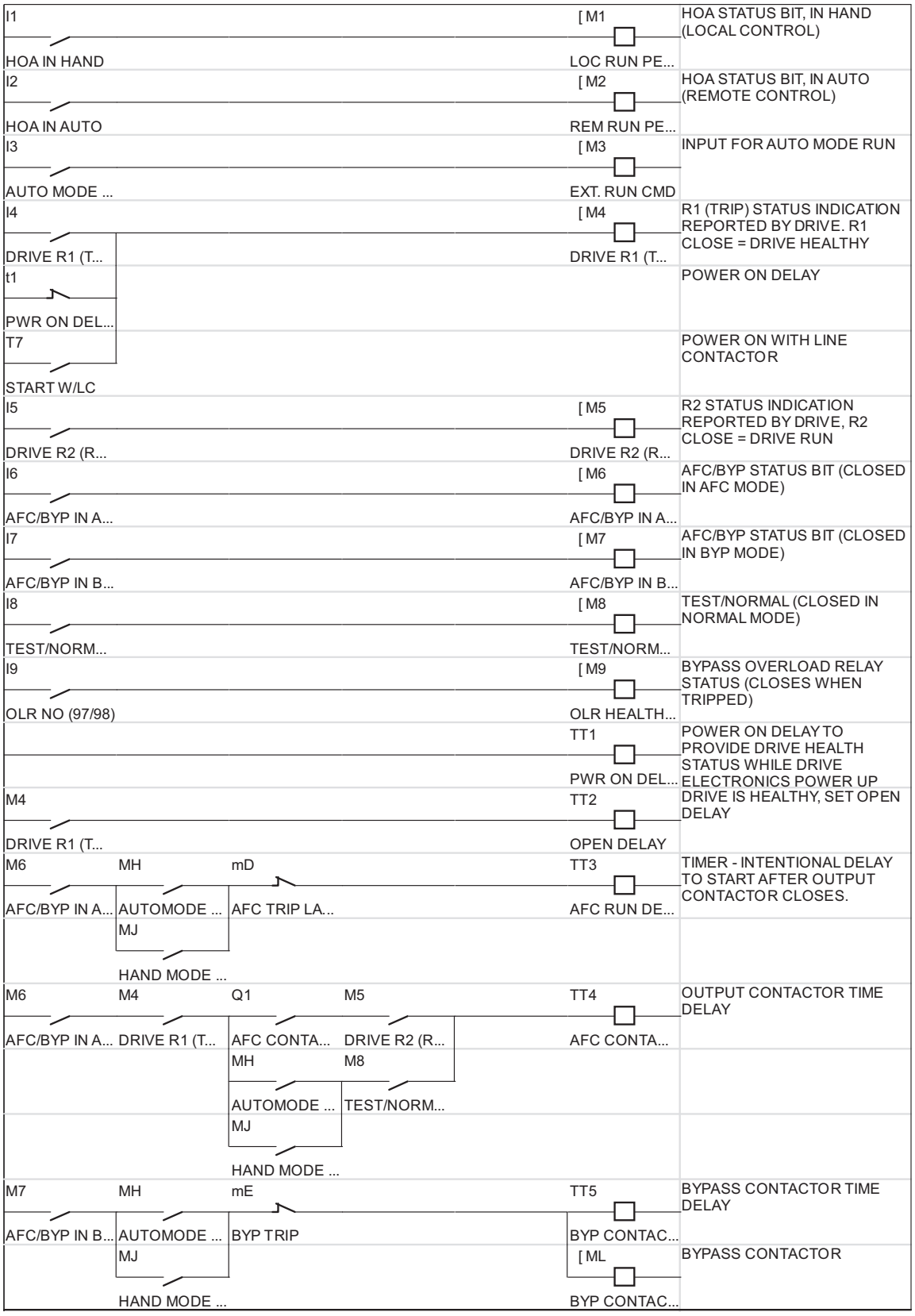
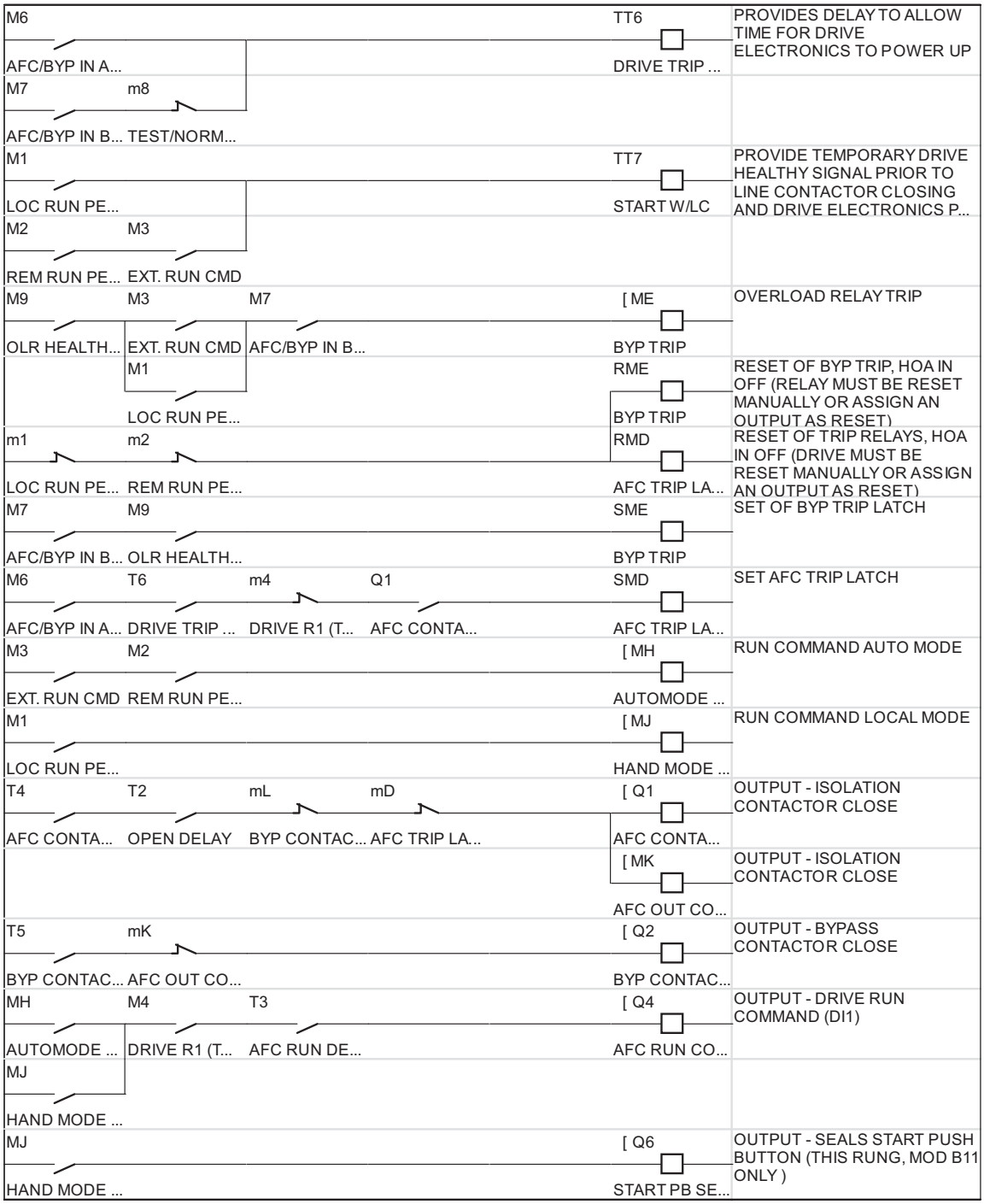


Figure 33 – Zelio Smart Relay Program (continued)



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NHA91297 Rev. 02, 08/2016
Replaces NHA91297 Rev. 01, 03/2016

MANUAL TRANSFER SWITCH

30–1200 A Safety Switches Maintenance Instructions
Instrucciones de servicio de mantenimiento para los interruptores de seguridad de 30 a 1 200 A
Directives d'entretien pour interrupteurs de sécurité, 30 à 1 200 A

Class Clase Classe
3100

Retain for future use. / Conservar para uso futuro. / À conserver pour usage ultérieur.

INTRODUCTION

Safety switches are properly lubricated at the factory. However, periodic cleaning and lubrication may be required. The maintenance interval between lubrications depends on the amount of switch usage and the ambient operating conditions. The maximum maintenance interval should not exceed one year for mechanical or current-carrying parts.

For additional information, refer to publication NFPA-70B, “Recommended Practice for Electrical Equipment Maintenance”.

Unusual Performance Conditions

Contact Square D for information regarding performance under unusual conditions. Examples of unusual conditions are shown in Table 1 below:

INTRODUCCIÓN

Los interruptores de seguridad han sido lubricados correctamente en la fábrica; sin embargo, es necesario realizar limpieza y lubricación periódicamente. El intervalo de servicio de mantenimiento entre lubricaciones depende del uso del interruptor y de las condiciones ambientales de funcionamiento. El intervalo de servicio de mantenimiento máximo no debe exceder un año para las piezas mecánicas o conductoras de corriente.

Si desea obtener información adicional, consulte la publicación NFPA-70B, “Recomended Practice for Electrical Equipment Maintenance” (prácticas recomendadas de servicio de mantenimiento para el equipo eléctrico).

Condiciones de funcionamiento poco comunes

Póngase en contacto con Square D para obtener información con respecto al funcionamiento de este equipo bajo condiciones poco comunes. La tabla 1 muestra ejemplos de condiciones poco comunes:

INTRODUCTION

Les interrupteurs de sécurité sont lubrifiés de façon appropriée à l'usine. Toutefois, un nettoyage et une lubrification périodiques peuvent être nécessaires. L'intervalle d'entretien entre les lubrifications dépend de la fréquence d'utilisation de l'interrupteur et des conditions ambiantes de fonctionnement. L'intervalle d'entretien maximum ne doit pas dépasser un an pour les pièces mécaniques ou porteuses de courant.

Pour avoir d'autres renseignements, se reporter à la publication NFPA-70B, « Recommended Practice for Electrical Equipment Maintenance » (Pratique recommandée pour l'entretien des appareils électriques).

Conditions de performance inhabituelles

Contacter Square D pour avoir des informations sur la performance dans des conditions inhabituelles. Des exemples de conditions inhabituelles sont données au tableau 1 ci-dessous :

Table / Tabla / Tableau 1 : Unusual Conditions / Condiciones poco comunes / Conditions inhabituelles

• Ambient temperatures below -22 °F (-30 °C) or above 104 °F (40 °C) /	• Temperatura ambiente inferior a -30 °C (-22 °F) o superior a 40 °C (104 °F) /	• Températures ambiantes inférieures à -30 °C (-22 °F) ou supérieures à 40 °C (104 °F)
• Altitudes over 6600 ft (2012 m) /	• Altitudes de más de 2 012 m (6 600 pies) /	• Altitudes dépassant 2 012 m (6 600 pieds)
• Corrosive or explosive environments /	• Entornos corrosivos o explosivos /	• Environnements corrosifs ou explosifs
• Abnormal vibration, shock, or tilting /	• Vibración, sacudidas o inclinaciones anormales /	• Vibrations, chocs ou inclinaison anormaux
• Unusual operating duties /	• Servicio de funcionamiento poco común /	• Facteurs de fonctionnement inhabituels

⚠ DANGER / PELIGRO / DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Never operate energized switch with door open.
- Turn off switch before removing or installing fuses or making load side connections.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm switch is off.
- Turn off power supplying switch before doing any other work on or inside switch.
- Do not use renewable link fuses in fused switches.

Failure to follow these instructions will result in death or serious injury.

PELIGRO DE DESCARGA ELÉCTRICA, EXPLOSIÓN O DESTELLO POR ARQUEO

- Utilice equipo de protección personal (EPP) apropiado y siga las prácticas de seguridad eléctrica establecidas por su Compañía, consulte la norma 70E de NFPA.
- Solamente el personal eléctrico especializado deberá instalar y prestar servicio de mantenimiento a este equipo.
- Nunca haga funcionar el interruptor energizado con la puerta abierta.
- Desconecte el interruptor antes de retirar o instalar los fusibles o realizar las conexiones del lado de carga.
- Siempre utilice un dispositivo detector de tensión nominal adecuado en todos los clips para fusibles en los lados de línea y carga para confirmar la desenergización del interruptor.
- Desenergice el interruptor antes de realizar cualquier otro trabajo dentro o fuera de él.
- No use fusibles renovables en los interruptores fusibles.

El incumplimiento de estas instrucciones podrá causar la muerte o lesiones serias.

RISQUE D'ÉLECTROCUTION, D'EXPLOSION OU D'ÉCLAIR D'ARC

- Portez un équipement de protection personnelle (ÉPP) approprié et observez les méthodes de travail électrique sécuritaire. Voir NFPA 70E.
- Seul un personnel qualifié doit effectuer l'installation et l'entretien de cet appareil.
- Ne faites jamais fonctionner l'interrupteur sous tension avec la porte ouverte.
- Mettez L'inerrupteur hors tension avant d'enlever ou d'installer des fusibles ou de faire des faccordements sur le côté charge.
- Utilisez toujours un dispositif de détection de tension ayant une valeur nominale appropriée sur tous les porte-fusibles du côté ligne et charge pour s'assurer que l'interrupteur soit hors tension.
- Coupez l'alimentation de l'interrupteur avant d'y faire tout autre travail.
- N'utilisez pas de fusibles renouvelables dans les interrupteurs à fusibles..

Si ces directives ne sont pas respectées, cela entraînera la mort ou des blessures graves.

ANNUAL MAINTENANCE PROCEDURES

1. Turn off power supplying the switch before performing any work on or inside the switch.
2. Open the switch blades by moving the operating handle to the OFF (**O**) position.
3. Lock out or tag the switch, per local procedures.
4. Open the enclosure door.
5. Always use a properly rated voltage sensing device at all line and load-side lugs (teminals) to confirm power is off.

   NOTE: Do not remove any parts from the switch or operating mechanism unless specifically instructed to do so in the following procedures. Vacuum any loose material from inside the switch. Wipe internal parts and the inside of the enclosure with a damp, lint-free cloth.
6. Visually inspect the switch for loose parts or hardware:

   a. Retighten the hardware as needed. Refer to the wiring diagram.
   b. Do not re-energize the switch if any worn or damaged parts are found. Replace them before re-energizing the switch.

PROCEDIMIENTOS DE SERVICIOS DE MANTENIMIENTO ANUALES

1. Desenergice el interruptor antes de realizar cualquier trabajo dentro o fuera de él.
2. Abra las cuchillas del interruptor moviendo la palanca de funcionamiento a la posición de abierto (**O**).
3. Bloquee o etiquete el interruptor de acuerdo con los procedimientos locales.
4. Abra la puerta del gabinete.
5. Siempre utilice un dispositivo detector de tensión nominal adecuado en todas las zapatas (terminales) del lado de línea y carga para confirmar la desenergización del equipo.

   NOTA: No retire ninguna pieza del interruptor ni del mecanismo de funcionamiento a no ser que se le indique eso específicamente en los siguientes procedimientos. Aspire el material suelto que se encuentra dentro del interruptor. Limpie las piezas internas y el interior del gabinete con una tela húmeda sin pelusas.
6. Realice una inspección visual al interruptor para ver si encuentra piezas o herrajes sueltos:

   a. Vuelva a apretar los herrajes a medida que sea necesario. Consulte el diagrama de cableado.
   b. No vuelva a energizar el interruptor si encuentra piezas desgastadas o dañadas; sustitúyalas antes de volver a energizar el interruptor.

PROCÉDURES D'ENTRETIEN ANNUEL

1. Couper l'alimentation de l'interrupteur avant d'effectuer tout travail sur ou à l'intérieur de l'interrupteur.
2. Ouvrir les lames de l'interrupteur en plaçant la manette de fonctionnement sur la position d'ARRÊT (**O**).
3. Verrouiller ou étiqueter l'interrupteur, selon les procédures locales.
4. Ouvrir la porte du coffret.
5. Toujours utiliser un dispositif de détection de tension à valeur nominale appropriée sur toutes les cosses (bornes) du côté ligne et charge pour s'assurer que l'interrupteur est hors tension.

   REMARQUE : Ne retirer aucune pièce de l'interrupteur ou du mécanisme de fonctionnement sauf en cas d'instruction précise de le faire dans les procédures suivantes. Évacuer à l'aspirateur tous corps étrangers se trouvant à l'intérieur de l'interrupteur. Essuyer les pièces internes et l'intérieur du coffret à l'aide d'un chiffon mouillé, non pelucheux.
6. Inspecter visuellement l'interrupteur pour voir s'il y a des pièces ou de la quincaillerie désserrée :

   a. Resserrer la quincaillerie au besoin. Se reporter au schéma de câblage.
   b. Ne pas remettre l'interrupteur sous tension en présence de pièces usées ou abîmées. Les remplacer avant de remettre l'interrupteur sous tension.

Parts Removal

1. Remove the arc supressor(s) or arc shield(s) from the switches by loosening the fastener(s) holding the suppressor(s) / shield(s) in place. See Figures 1 and 2.

Desmontaje de piezas

1. Retire el o los supresores o protectores de arco de los interruptores aflojando los sujetadores que los sostienen en su lugar. Vea las figuras 1 y 2.

Démontage des pièces

1. Retirer le ou les suppresseurs ou blindages d'arc des interrupteurs en desserrant les attaches qui les maintiennent en place. Voir les figures 1 et 2.

CAUTION / PRECAUCIÓN / ATTENTION

HAZARD OF EQUIPMENT DAMAGE

Do not disassemble the switch line base assembly or remove the blade rotor when cleaning the line-side jaw or the switch blade. See Figure 3 on page 4.

Failure to follow this instruction can result in equipment damage.

PELIGRO DE DAÑO AL EQUIPO

No desmonte el ensamble de la base de línea del interruptor o retire el rotor de cuchilla al limpiar la mordaza del lado de línea o la cuchilla del interruptor, vea la figura 3 en la página 4.

El incumplimiento de esta instrucción puede causar daño al equipo.

RISQUE DE DOMMAGES MATÉRIELS

Ne démontez pas l'assemblage de la base de ligne de l'interrupteur ou ne retirez pas le rotor à lame lorsque vous nettoyez la mâchoire côté ligne ou la lame de l'interrupteur. Voir la figure 3 à la page 4.

Si cette précaution n'est pas respectée, cela peut entraîner des dommages matériels.

2. Remove old grease and other contaminants from the line-side jaws and switchblades with a clean, lint-free cloth. If the lubricant has dried, remove it with CRC®-type HF Contact Cleaner, or equivalent, sprayed on a cloth.
3. Relubricate the cleaned areas with a thin film of Dow Corning® BG20 grease only.

   NOTE: Do not substitute any other lubricant. Other lubricants may not be suitable for electrical applications and could alter the performance of the switch. Dow Corning BG20 is available from Square D (part number SWLUB).
4. Exercise the operating mechanism to ensure proper operation by opening and closing the switch five times with the door closed. Open the switch blades.

2. Retire la grasa vieja y otros contaminantes de la mordaza del lado de línea y cuchillas del interruptor con una tela limpia sin pelusas. Si el lubricante se ha secado, retírelo con un limpiador de contacto CRC® tipo HF o uno equivalente, rociado en un pedazo de tela.
3. Vuelva a lubricar las áreas limpiadas con una capa delgada de grasa Dow Corning® BG20 solamente.

   NOTA: No utilice otro tipo de lubricante; es posible que no sean adecuados para aplicaciones eléctricas y pueden alterar el funcionamiento del interruptor. La grasa Dow Corning BG20 se encuentra disponible de Square D (número de pieza SWLUB).
4. Realice una prueba al mecanismo de funcionamiento y asegúrese de que funciona correctamente abriendo y cerrando el interruptor cinco veces con la puerta cerrada. Abra las cuchillas del interruptor.

2. Retirer toute graisse ancienne et autres polluants des mâchoires côté ligne et des lames de l'interrupteur à l'aide d'un chiffon propre et non pelucheux. Si le lubrifiant a séché, l'enlever avec un nettoyant pour contact CRC® de type HF ou l'équivalent, vaporisé sur un chiffon.
3. Relubrifier les zones propres avec une fine pellicule de graisse Dow Corning® BG20 uniquement.

   REMARQUE : Ne substituer aucun autre lubrifiant. D'autres lubrifiants pourraient ne pas convenir pour des applications électriques et pourraient altérer le fonctionnement de l'interrupteur. Le Dow Corning BG20 est disponible chez Square D (n° de pièce SWLUB).
4. Manœuvrer le mécanisme de fonctionnement pour s'assurer qu'il fonctionne correctement, en ouvrant et fermant l'interrupteur cinq fois avec la porte fermée. Ouvrir les lames de l'interrupteur.

FIG. 1 : Examples of Arc Suppressors / Ejemplos de supresores de arco / Exemples de suppresseurs d'arc

FIG. 2 : Examples of Arc Shields / Ejemplos de protectores de arco / Exemples de blindages d'arc

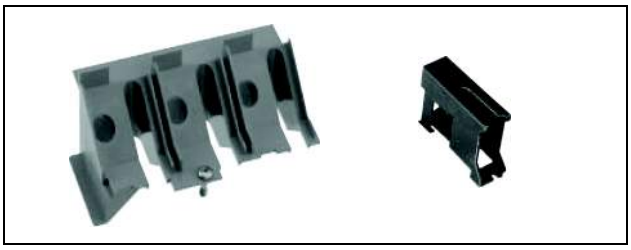


FIG. 3 : Examples of Line Base Assemblies / Ejemplos de ensambles de la base de línea / Exemples d'assemblages de la base de ligne

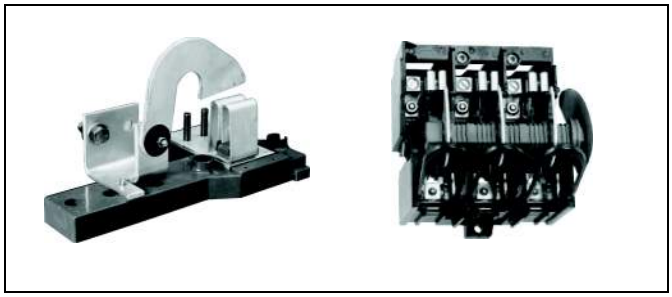
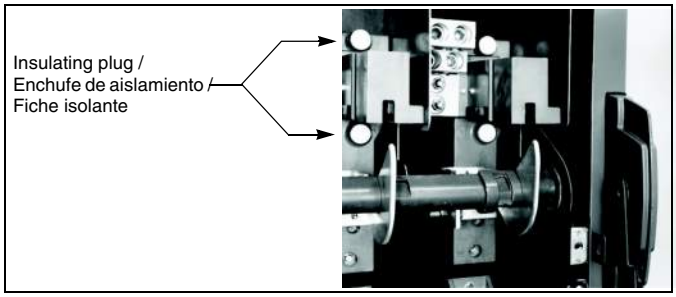


FIG. 4 : Insulating Plugs on Pole Unit / Enchufes de aislamiento en la unidad de polos / Fiches isolantes sur l'unité polaire



Parts Replacement

1. Reinstall the arc suppressor(s) or arc shield(s) according to the torque values in Table 2.
2. Ensure that the two insulating plugs in each phase (400–1200 A only) are firmly seated. See Figure 4.

Colocación de piezas

1. Vuelva a instalar el o los supresores o protectores de arco de acuerdo con los valores de par de apriete mostrados en la tabla 2.
2. Asegúrese de que los dos enchufes de aislamiento en cada fase (de 400 a 1 200 A solamente) estén bien apoyados, vea la figura 4.

Remise en place des pièces

1. Réinstaller le ou les suppresseurs ou blindages d'arc conformément aux valeurs de couple indiquées au tableau 2.
2. S'assurer que les deux fiches isolantes de chaque phase (400 à 1 200 A seulement) sont bien en place. Voir la figure 4.

Table / Tabla / Tableau 2 : Arc Suppressor Screw Torque Values / Valores de par de apriete del tornillo del supresor de arco / Valeurs de couple de serrage des vis des suppresseurs d'arc

Switch Type / Tipo de interruptor / Type d'interrupteur	Torque Value / Valor de par de apriete / Valeur de couple
30–100 A	5–10 lb-in / lbs-pulg / lb-po (0,57–1,13 N•m)
200 A, F Series / Serie F / Série F	10–20lb-in / lbs-pulg / lb-po (1,13–2,26 N•m)
200 A, E Series / Serie E / Série E	20–25 lb-in / lbs-pulg / lb-po (2,26–2,83 N•m)
400–800 A General Duty / 400 a 800 A de uso general / 400 à 800 A, universel	20–25 lb-in / lbs-pulg / lb-po (2,26–2,83 N•m)
400–1200 A Heavy Duty / 400 a 1 200 A de uso pesado / 400 à 1 200 A, service intensif	30–40 lb-in / lbs-pulg / lb-po (3,39–4,52 N•m)

RE-ENERGIZE THE SWITCH

1. Close and latch the door.
2. Turn off all downstream loads.
3. Turn on power supplying the switch.
4. Turn on the switch.
5. Turn on all downstream loads.

RE-ENERGIZACIÓN DEL INTERRUPTOR

1. Cierre y ponga seguro a la puerta.
2. Desconecte todas las cargas descendentes.
3. Energice el interruptor.
4. Coloque el interruptor en la posición de cerrado (I).
5. Conecte todas las cargas descendentes.

REMISE DE L'INTERRUPTEUR SOUS TENSION

1. Fermer la porte de l'interrupteur.
2. Mettre hors tension toutes les charges en aval.
3. Mettre l'interrupteur sous tension.
4. Mettre l'interrupteur en position de marche (I).
5. Mettre sous tension toutes les charges en aval.

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

Solamente el personal especializado deberá instalar, hacer funcionar y prestar servicios de mantenimiento al equipo eléctrico. Schneider Electric no asume responsabilidad alguna por las consecuencias emergentes de la utilización de este material.

Seul un personnel qualifié doit effectuer l'installation, l'utilisation, l'entretien et la maintenance du matériel électrique. Schneider Electric n'assume aucune responsabilité des conséquences éventuelles découlant de l'utilisation de cette documentation.

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