

# Altivar® 61/71

## Adjustable Speed Drives

### Spare Parts Kits

Instruction Bulletin

30072-452-72

Rev. 01, 10/2009

Retain for future use.



#### For Frame Size 6:

ATV61HD18M3X, ATV61HD22M3X, ATV61HD22N4  
ATV71HD18M3X, ATV71HD22M3X, ATV71HD22N4



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## Hazard Categories and Special Symbols

The following symbols and special messages may appear in this document or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

A lightning bolt or ANSI man symbol in a “Danger” or “Warning” safety label on the equipment indicates an electrical hazard which, as indicated below, can or will result in personal injury if the instructions are not followed.

The exclamation point symbol in a safety message in a manual indicates potential personal injury hazards. Obey all safety messages introduced by this symbol to avoid possible injury or death.

Symbol	Name
	Lightning Bolt
	ANSI Man
	Exclamation Point

<b>⚠ DANGER</b>
<b>DANGER</b> indicates an imminently hazardous situation which, if not avoided, <b>will result in</b> death or serious injury.

<b>⚠ WARNING</b>
<b>WARNING</b> indicates a potentially hazardous situation which, if not avoided, <b>can result in</b> death or serious injury.

<b>⚠ CAUTION</b>
<b>CAUTION</b> indicates a potentially hazardous situation which, if not avoided, <b>can result in</b> minor or moderate injury.

<b>CAUTION</b>
<b>CAUTION</b> , used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, <b>can result in</b> property damage.

## Product Support

For support and assistance, contact the Product Support Group. The Product Support Group is staffed from Monday through Friday, 8:00 am until 6:00 pm 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: 888-SquareD (888-778-2733)  
 E-Mail: [drive.products.support@us.schneider-electric.com](mailto:drive.products.support@us.schneider-electric.com)  
 Fax: 919-217-6508

## Before You Begin

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

The word “drive” as used in this bulletin refers to the controller portion of the adjustable speed drive as defined in the National Electrical Code (NEC).

### **⚠ DANGER**

#### **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Read and understand this manual before installing or operating the Altivar 61 or 71 drive. Installation, adjustment, repair, and maintenance must be performed by qualified personnel.
- The user is responsible for compliance with all international and national electrical code requirements with respect to grounding of all equipment.
- Many parts of this drive, 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 drive:
  - Disconnect all power, including external control power that may be present.
  - Place a “DO NOT TURN ON” label on all power disconnects.
  - Lock all power disconnects in the open position.
  - **WAIT 15 MINUTES** to allow the DC bus capacitors to discharge. Then follow the “Bus Voltage Measurement Procedure” on page 9 to verify that the DC voltage is less than 42 V. The 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 drive.

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

## Introduction

This instruction bulletin contains replacement procedures for the Altivar® 61 (ATV61) and Altivar® 71 (ATV71) spare parts kits identified in Table 1. Read and understand the instructions in this document and other referenced documents before installing the kits.

**Table 1: Altivar® 61 and 71 Spare Parts Kits<sup>1</sup>**

Kit Catalog No.	Description	For Use on Drive:
VX4A1106	Filter Board	ATV61HD18M3X ATV61HD22M3X ATV71HD18M3X ATV71HD22M3X
VX4A1107	Filter Board	ATV61HD22N4 ATV71HD22N4
VX5A1HD18M3X	Power Board	ATV61HD18M3X ATV71HD18M3X
VX5A1HD22M3X	Power Board	ATV61HD22M3X ATV71HD22M3X
VX5A1HD22N4	Power Board	ATV61HD22N4 ATV71HD22N4
VZ3N1206	Power Terminal Block	ATV61HD18M3X ATV61HD22M3X ATV71HD18M3X ATV71HD22M3X ATV61HD22N4 ATV71HD22N4
VZ3N1301	Wire Kit	ATV61HD18M3X ATV61HD22M3X ATV71HD18M3X ATV71HD22M3X
VZ3N1302	Wire Kit	ATV61HD22N4 ATV71HD22N4

<sup>1</sup> For kit contents, refer to document 30072-452-44.

## Related Documentation

For drive installation instructions, refer to the following documents:

- *Altivar® 61 Installation Manual 0.5 to 100 HP*, module no. 1760643.
- *Supplementary Instructions to ATV61 Variable Speed Drives Installation Manual—Low Horsepower*, document no. 30072-452-63.
- *Altivar® 61 Installation Manual 75 to 900 HP*, module no. 1760655.
- *Supplementary Instructions to ATV61 Variable Speed Drives Installation Manual—High Horsepower*, document no. 30072-452-49.
- *Altivar® 71 Installation Manual 0.5 to 100 HP*, module no. 1755843.
- *Altivar® 71 Installation Manual 75 to 700 HP*, module no. 1755849.
- *Altivar® 71 Drive Controllers Errata to Bulletin atv71e\_installation\_manual\_en\_v3*, document no. 30072-452-25.

All documentation referenced in this bulletin is provided with the drive or on the CD-ROM included with the spare parts kits. You can also download the documentation from the Technical Library at [www.schneider-electric.us](http://www.schneider-electric.us).

## Receiving, Handling, and Storage

### Electrostatic Precautions

#### **⚠ CAUTION**

##### **STATIC SENSITIVE COMPONENTS**

Circuit boards and option cards can be damaged by static electricity. Observe the electrostatic precautions below when handling controller circuit boards or testing components.

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

Observe the following precautions for handling static-sensitive components:

- Keep static-producing material such as plastic, upholstery, and carpeting out of the immediate work area.
- Store static-sensitive components in protective packaging when they are not installed in the drive.
- When handling a static-sensitive component, wear a conductive wrist strap connected to the component or drive through a minimum of 1 megohm resistance.
- Avoid touching exposed conductors and component leads with skin or clothing.

### Inspecting the Spare Part Kits

After receiving the ATV61/ATV71 spare parts kit:

- Ensure that the catalog number printed on the kit label is the same as that on the packing slip and corresponding purchase order. Contact your Schneider Electric representative if there are any errors.
- Remove the kit from its packaging and inspect it for damage. If any damage is found, notify the carrier and your Schneider Electric representative.
- To store the kit, replace any static-sensitive parts in their protective packaging and store them at -25 to +70 °C (-13 to +158 °F).

#### **⚠ WARNING**

##### **DAMAGED EQUIPMENT**

Do not install or operate any equipment that appears damaged.

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

## Preliminary Recommendations

Before beginning the installation procedures, read and understand all the information in this section.

### Qualified Personnel

For the protection of personnel and equipment, a qualified person must perform the procedures detailed in this instruction bulletin.

A qualified person is one who has skills and knowledge related to the construction and operation of this electrical equipment and the installation, and has received safety training to recognize and avoid the hazards involved. Refer to the most current release of NFPA 70E<sup>®</sup>, "Standard for Electrical Safety in the Workplace," for safety training requirements.

In addition, the person must be:

- Able to read, interpret, and follow the instructions and precautions in this instruction bulletin and the other documentation referenced.
- Able to use the required tools listed in this instruction bulletin in a safe and correct manner.

### Working Procedures

Observe the following working procedures:

- Use only the components provided with the kits listed in Table 1 on page 6. Do not attempt to repair the drive with other spare parts or equipment.
- If the part being replaced includes labels, ensure that the labels are applied to the replacement part. If the labels are not available in the kit, contact your Schneider Electric representative.
- Mount the spare parts only in the locations specified in the installation procedures.
- Route and position the wires as shown in the instructions. Use the wires and cables provided with the spare parts kits or with the drive. Do not modify the wires and cables. Do not route wires and cables outside of the drive enclosure.
- Install the insulator as specified on pages 12, 28, and 45 of the installation procedures.
- Observe the hardware and torque requirements specified in the installation procedures. Do not substitute hardware. Carefully segregate and label all removed hardware and parts for use in reassembly of the drive.
- Mount all panels and covers as specified in the installation procedures.

### Tools Required

- Flathead screw driver, 2.5 mm width
- Needle-nose pliers
- Torque wrench, 0–5 N•m (0–45 lb-in)
- Voltmeter, 1–1000 Vdc
- Allen wrench, 3 mm
- Driver bits:
  - T-20 Torx<sup>®</sup> driver
  - Size 1 magnetic tip Phillips<sup>®</sup> driver
  - Size 2 magnetic tip Phillips<sup>®</sup> driver



## Installation Procedures

### Power Removal and Bus Voltage Measurement

#### **⚠ DANGER**

##### **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

Read and understand the precautions in “Before You Begin” starting on page 5 before performing this procedure.

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

The DC bus voltage can exceed 1,000 Vdc. Use a properly rated voltage-sensing device when performing this procedure. To measure the DC bus voltage:

1. Disconnect all power.
2. Wait 15 minutes to allow the DC bus to discharge.
3. Measure the voltage of the DC bus between the PA/+ and PC/- terminals to ensure that the voltage is less than 42 Vdc. These terminals are clearly labeled on each drive.
4. If the DC bus capacitors do not discharge completely, contact your local Schneider Electric representative. Do not repair or operate the drive.

#### **⚠ CAUTION**

##### **IMPROPER DRIVE OPERATION**

- If the drive is not turned on for a long period, the performance of its electrolytic capacitors will be reduced.
- If the drive is stopped for a prolonged period, turn the drive on every two years for at least 5 hours to restore the performance of the capacitors, then check its operation.
- Do not connect the drive directly to line voltage. Increase the voltage gradually using an adjustable AC source.

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

## Discharging Stored Energy in Capacitors

### **⚠ DANGER**

#### **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- When the controller is damaged, voltage may remain on certain energy storage capacitors after de-energization of the controller and discharge of the main capacitor bank.
- Before working on or near assemblies containing energy storage capacitors, verify that the capacitor voltages are less than 42 Vdc.
- The following assemblies have energy-storing capacitors:
  - Filter board
- Always check for the presence of voltage using a voltmeter set to the 1000 Vdc scale. When voltage is present, allow the voltmeter to discharge the capacitor's stored charge.

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

Capacitors are used throughout the drives as energy storage devices. Some of the capacitors can store potentially lethal amounts of energy during normal controller operation.

When power is removed from an undamaged controller, the stored energy in these capacitors is automatically discharged to nonhazardous levels. However, the discharge mechanisms in a damaged controller may not be operating properly, and stored energy may be present on printed circuit boards.

**Do not** touch traces on printed circuit boards, such as the filter board, unless you have first checked for voltage with a voltmeter!

To discharge line filter board capacitors, use a voltmeter set to the 1000 Vdc scale. It will take approximately 6.6 minutes for a 10 megohm input impedance voltmeter to discharge a 10 microfarad capacitor from 700 V to less than 42 V. It will take approximately 40 seconds for a 1 megohm input impedance voltmeter to discharge a 10 microfarad capacitor from 700 V to less than 50 V.

### **⚠ DANGER**

#### **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Do not use a voltmeter to discharge stored energy on the DC bus capacitors.
- If the energy on the DC bus capacitors remains greater than 42 Vdc after 15 minutes, contact Product Support.

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

## Replacing Filter Boards VX4A1106 and VX4A1107

**IMPORTANT:** Label and retain all removed hardware and cables for use in reassembly.

### **⚠ DANGER**

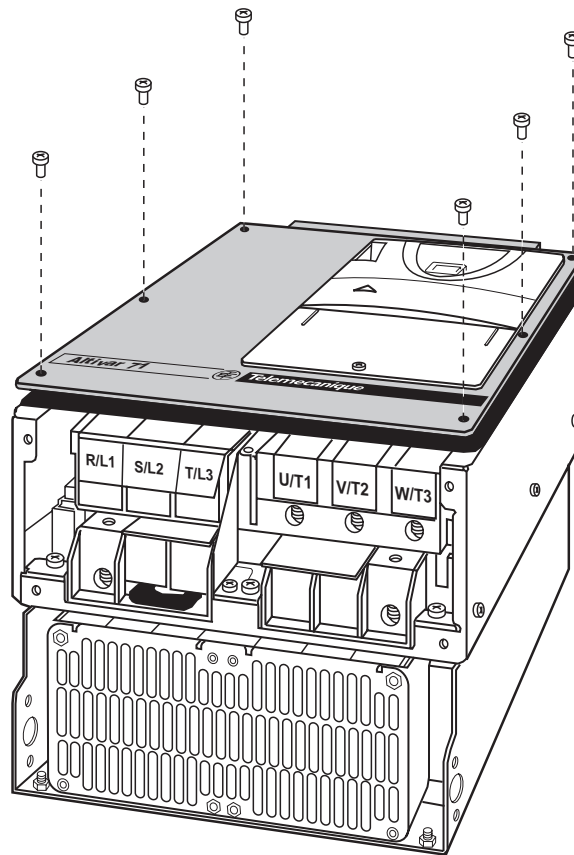
#### **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Read and understand the precautions in “Before You Begin” starting on page 5 before performing this procedure.
- Before working on this equipment, turn off all power supplying it and perform the DC bus voltage measurement procedure on page 9.

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

1. Using a size 2 Phillips driver, remove six screws and take off the front cover of the drive. See Figure 1.

**Figure 1: Front Cover Removal/Replacement**



2. Remove the filter board as follows. See Figure 2 on page 13.

## **⚠ DANGER**

### **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- When the controller is damaged, voltage may remain on certain energy storage capacitors after de-energization of the controller and discharge of the main capacitor bank.
- Before working on or near assemblies containing energy storage capacitors, verify that the capacitor voltages are less than 42 Vdc.
- The following assemblies have energy-storing capacitors:
  - Filter board. See Figure 2 on page 13.
- Always check for the presence of voltage using a voltmeter set to the 1000 Vdc scale. When voltage is present, allow the voltmeter to discharge the capacitor's stored charge. Refer to "Discharging Stored Energy in Capacitors" on page 10.

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

- Gently bend back the insulator which is over the filter board.
  - Using a 3 mm Allen wrench, remove the bottom three screws securing the filter board at input terminals L1, L2, and L3.
  - Using a T-20 Torx driver, remove the top two screws securing the filter board to the middle crossbrace.
  - Remove the filter board from the drive.
3. Install the new filter board as follows. See Figure 2 on page 13.
    - Position the filter board between the middle crossbrace and input terminals L1, L2, and L3.
    - Using a T-20 Torx driver, install the top 2 screws securing the filter board to the middle crossbrace. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).
    - Using a 3 mm Allen wrench, install the three screws at input terminals L1, L2, and L3. Tighten the screws to 2.1–2.7 N•m (18.6–23.9 lb-in).
  4. Reinstall the insulator as follows. See Figure 2 on page 13.

## **⚠ DANGER**

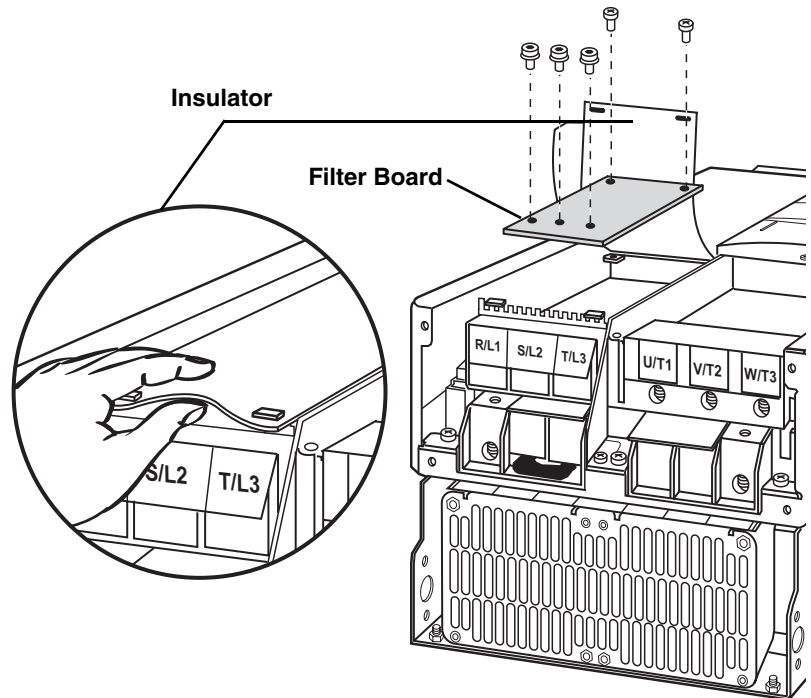
### **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Install the insulator as shown in Figure 2 on page 13.
- Before installing the insulator, ensure that it has no tears or cracks. If the insulator is damaged, contact your Schneider Electric representative.
- Do not install a damaged insulator.

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

- Ensure that the insulator is tucked under the left side of the drive cabinet, and that it completely covers the filter board.
- Secure the two slots in the insulator over the retaining tabs on the terminal block.

**Figure 2: Filter Board Removal/Replacement**



5. Replace the front cover on the drive. Using a size 2 Phillips driver, secure the front cover with 6 screws. See Figure 1 on page 11. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).

## Replacing Power Boards VX5A1HD18M3X, VX5A1HD22M3X, and VX5A1HD22N4

**IMPORTANT:** Label and retain all removed hardware and cables for use in reassembly.

**NOTE:** The two front screws (A) in the top panel are longer than the two back screws (B).

### **⚠ DANGER**

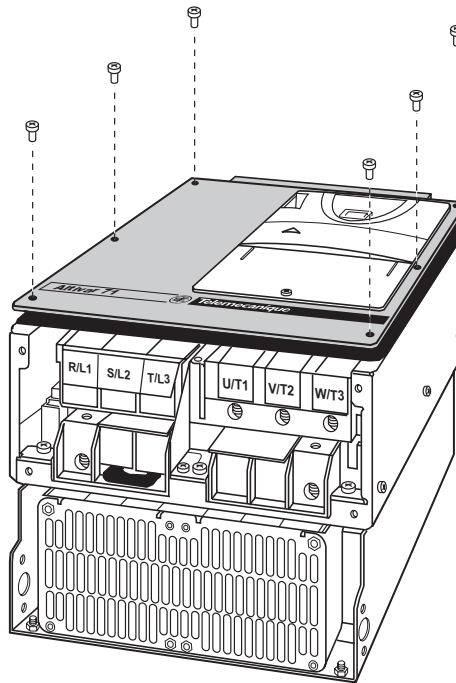
#### **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Read and understand the precautions in “Before You Begin” starting on page 5 before performing this procedure.
- Before working on this equipment, turn off all power supplying it and perform the DC bus voltage measurement procedure on page 9.

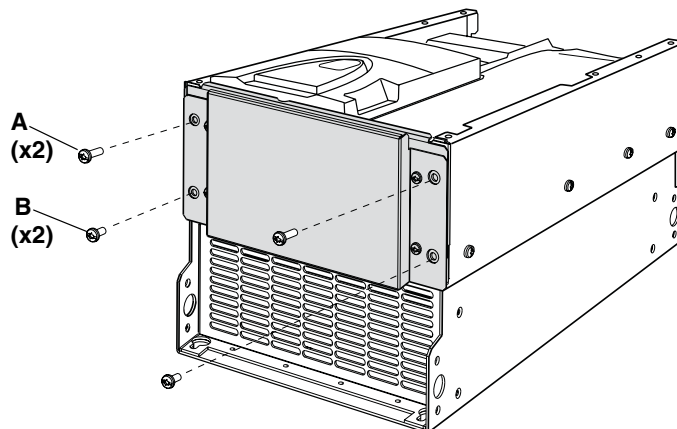
**Failure to follow these instructions will result in death or serious injury.**

1. Using a size 2 Phillips driver, remove six screws and take off the front cover. See Figure 3.
2. Using a T-20 Torx driver, remove four screws and take off the top panel. See Figure 4.

**Figure 3: Front Cover Removal**

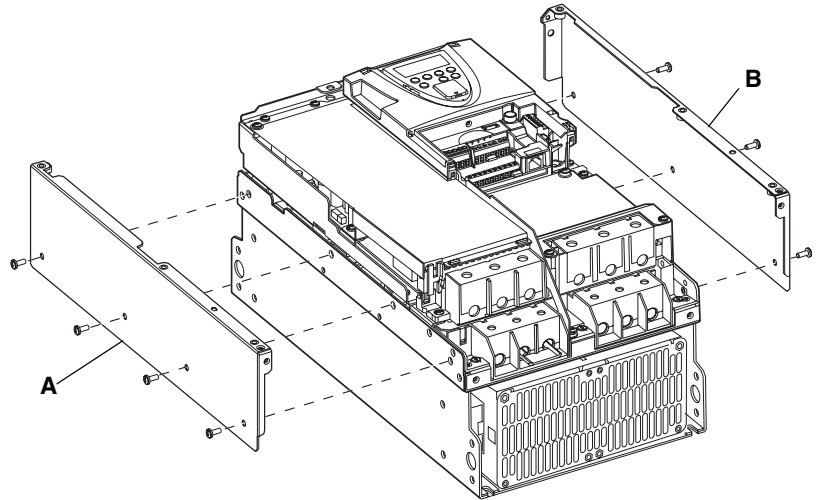


**Figure 4: Top Panel Removal**



3. Using a T-20 Torx driver, remove the left and right side panels as follows. See Figure 5.
  - Remove four screws and take off the left side panel (A).
  - Remove three screws and take off the right side panel (B).

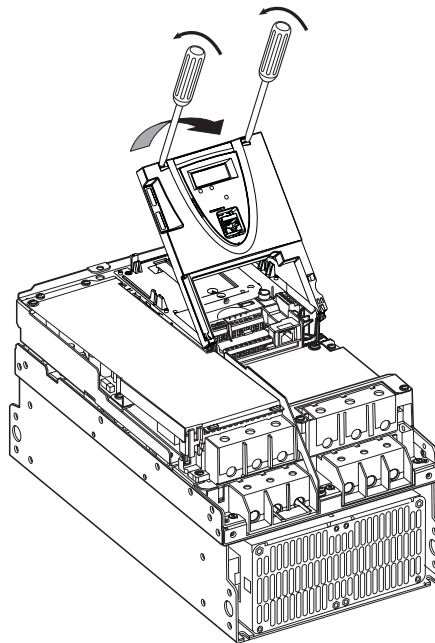
**Figure 5: Side Panel Removal**



### Remove the Control Module

4. Using two small flathead screwdrivers, gently pull forward the retaining snaps on the control module cover and lift the cover off the control module. See Figure 6.

**Figure 6: Control Module Cover Removal**



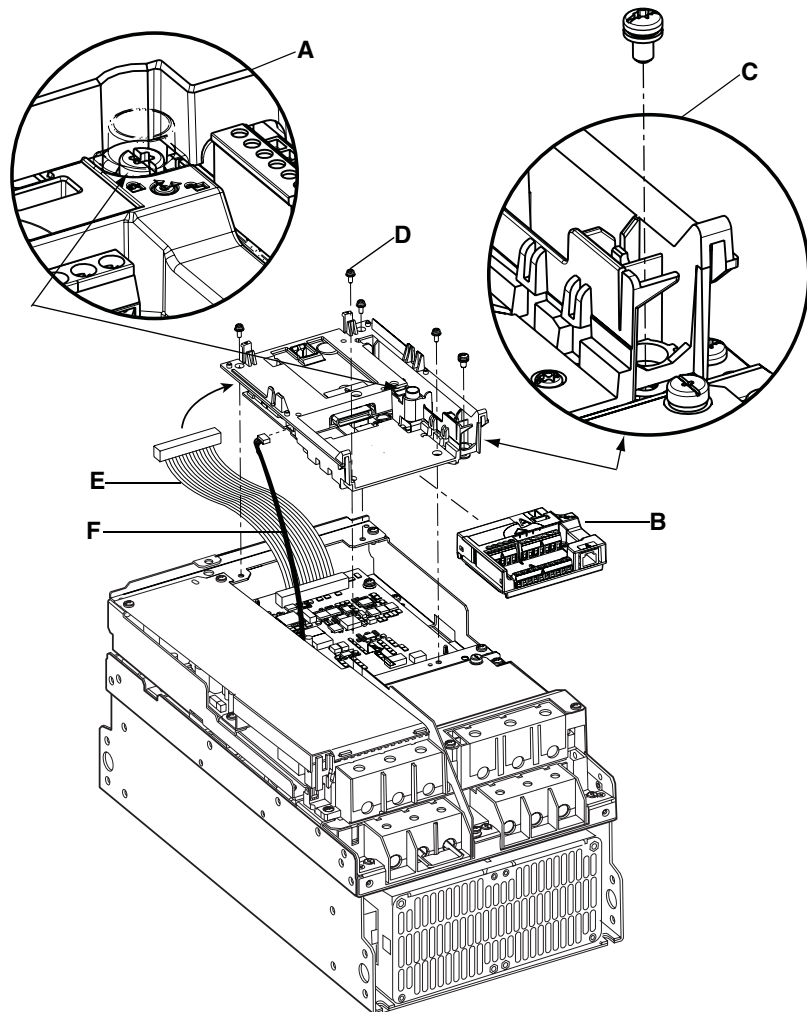
**Table 2: Control Module Wiring**

Wire No. <sup>1</sup>	Description	To:	Terminal No.
E100	40-pin	Power board	<b>S100</b>
E101	4-pin	Power board	<b>S103</b>

<sup>1</sup> See the wiring table and schematic on pages 50 and 51 for complete drive wiring. Wire numbers are given for cross referencing the wires with the wiring table and the schematic. The numbers do not appear on the wires.

5. Remove the control module from the drive as follows. See Figure 7.
  - Using a T-20 Torx driver, loosen the spring-loaded screw (A) on the right side of the control module.
  - Slide the control terminal board (B) down, and remove it from the control module.
  - Using a size 2 Phillips driver, remove one screw (C) from the bottom right of the control module.
  - Using a size 1 Phillips driver, remove the four screws (D) securing the control module to the frame crossbraces, and take the control module out of the drive.
  - Carefully remove the 40-pin ribbon connector (E) from the top of the control module and the 4-pin connector (F) from the left side of the control module.

**Figure 7: Control Module Removal**





## Remove the Filter Board

**NOTE:** The drive frame is braced by two horizontal bars, one at the top and one in the middle. Note the positions of the two crossbraces before beginning this step.

6. Remove the filter board as follows. See Figure 8 on page 18.

### DANGER

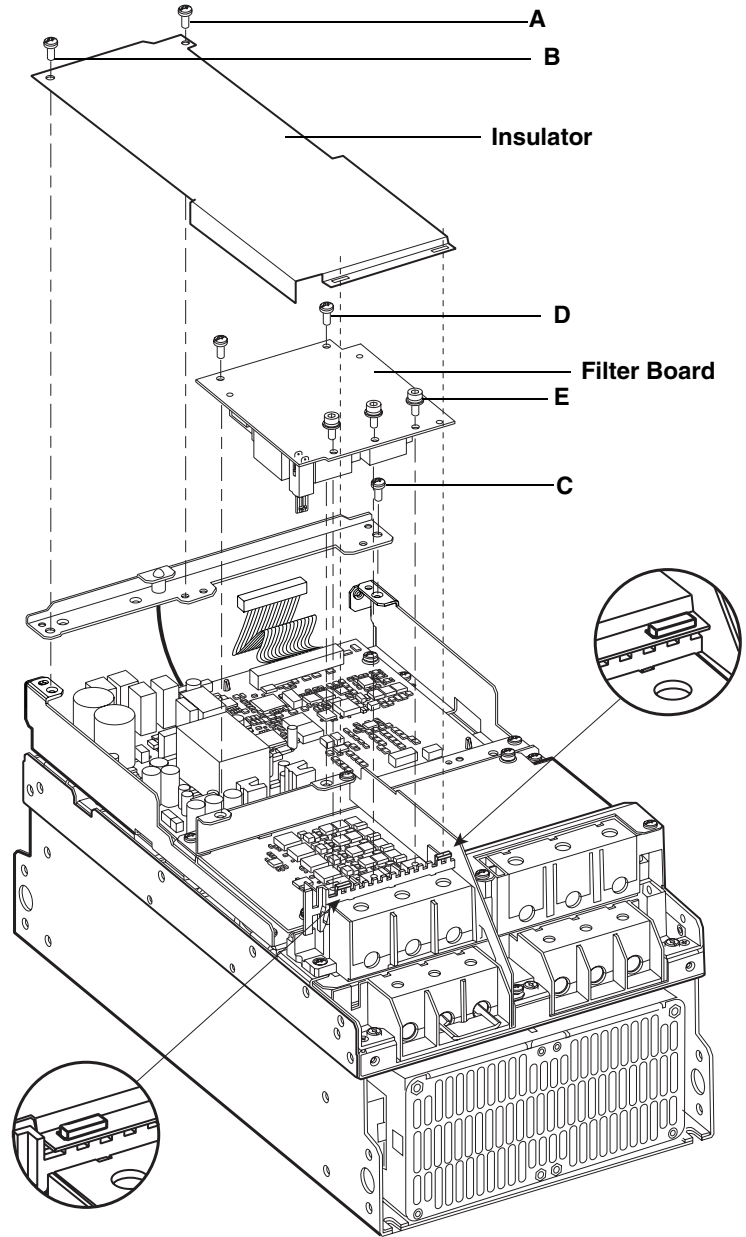
#### HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- When the controller is damaged, voltage may remain on certain energy storage capacitors after de-energization of the controller and discharge of the main capacitor bank.
- Before working on or near assemblies containing energy storage capacitors, verify that the capacitor voltages are less than 42 Vdc.
- The following assemblies have energy-storing capacitors:
  - Filter board. See Figure 8 on page 18.
- Always check for the presence of voltage using a voltmeter set to the 1000 Vdc scale. When voltage is present, allow the voltmeter to discharge the capacitor's stored charge. Refer to "Discharging Stored Energy in Capacitors" on page 10.

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

- Using a T-20 Torx driver, remove the two screws (**A** and **B**) securing the insulator to the drive frame, and remove the insulator.  
**NOTE:** Removing the left screw (**B**) also releases the left side of the top crossbrace.
- Using a T-20 Torx driver, remove the remaining screw from the right side of the top crossbrace (**C**), and set the crossbrace on top of the controller. It is not necessary to remove the LED connection.
- Using a T-20 Torx driver, remove the top two screws (**D**) securing the filter board to the middle crossbrace.
- Using a 3 mm Allen wrench, remove the bottom three screws (**E**) securing the filter board at input terminals L1, L2, and L3.

Figure 8: Filter Board Removal

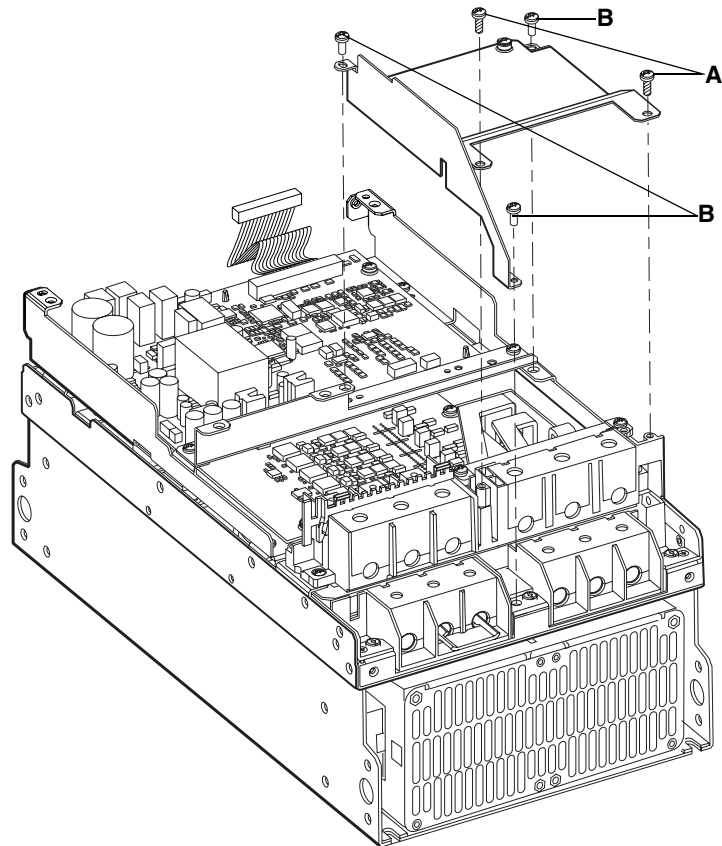


### Remove the Bus Bar Cover Plate

**NOTE:** The two screws (A) over the terminal block screw into plastic and have coarser threads than the three screws (B) that attach the cover plate to the drive frame.

7. Remove the bus bar cover plate as follows. See Figure 9.
  - Using a T-20 Torx driver, remove the two screws (A) securing the cover plate to the power terminal block.
  - Using a T-20 Torx driver, remove the three screws (B) securing the cover plate to the middle crossbrace and the drive frame.

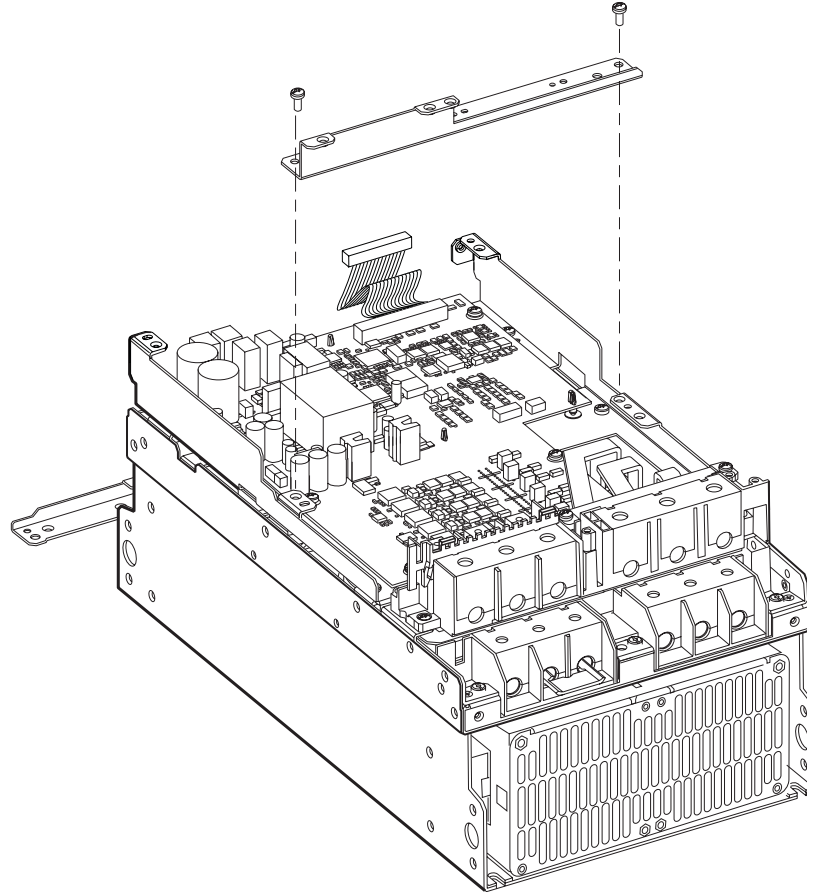
**Figure 9: Bus Bar Cover Plate Removal**



### Remove the Middle Crossbrace

- Using a T-20 Torx driver, remove two screws from the crossbrace in the middle of the drive and remove the crossbrace from the controller. See Figure 10.

**Figure 10: Crossbrace Removal**

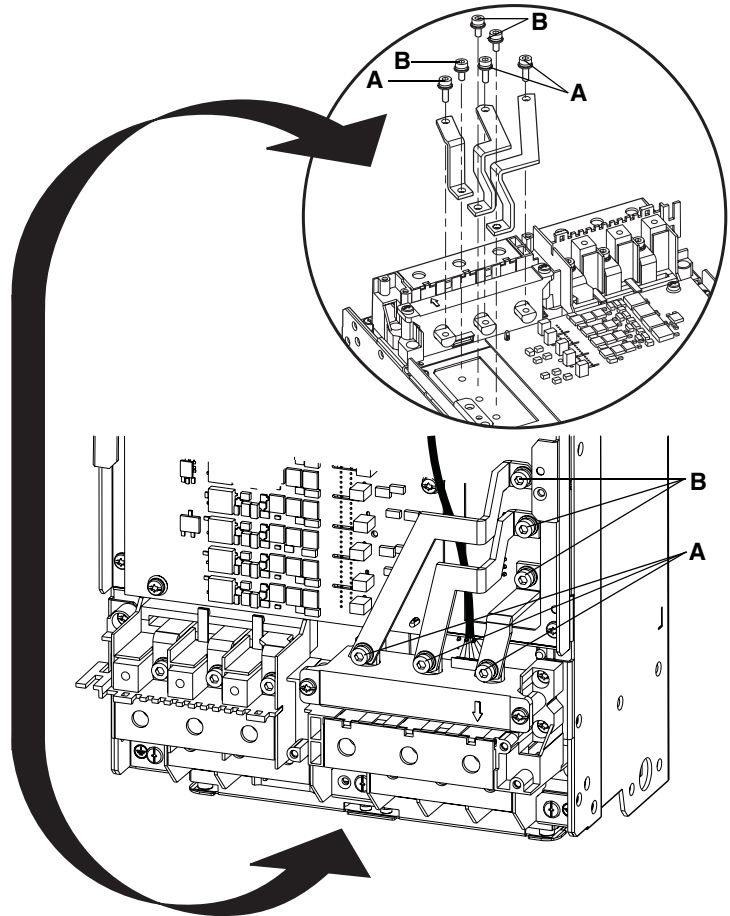


### Remove the Output Bus Bars

**NOTE:** The bottom screws (**A**) at output terminals T1, T2, and T3 are longer than the top screws (**B**) at the bus board.

9. Remove the three output bus bars from the bottom right of the drive as follows. See Figure 11.
  - Using a 3 mm Allen wrench, remove the three screws (**A**) at output terminals T1, T2, and T3.
  - Using a 3 mm Allen wrench, remove the three screws (**B**) securing the bus bars to the bus board.

Figure 11: Output Bus Bar Removal



**Remove the Power Board Connections**

**Table 3: Power Board Wiring**

Wire No. <sup>1</sup>	Terminal No.	Description	To:
E109	S202	2-pin	Bus board
E106	S201	9-pin	Bus board
E112	S104	6-pin	SCR <sup>2</sup> L1, L2, L3
E111	S101	3-pin	Bus board
E104	S120	2-pin	Main fan connector
E101	S103	4-pin	Control module
E102	S200	2-pin	LED
E110	S500	6-pin	Power terminal block
E105	S400	4-pin	Bus board

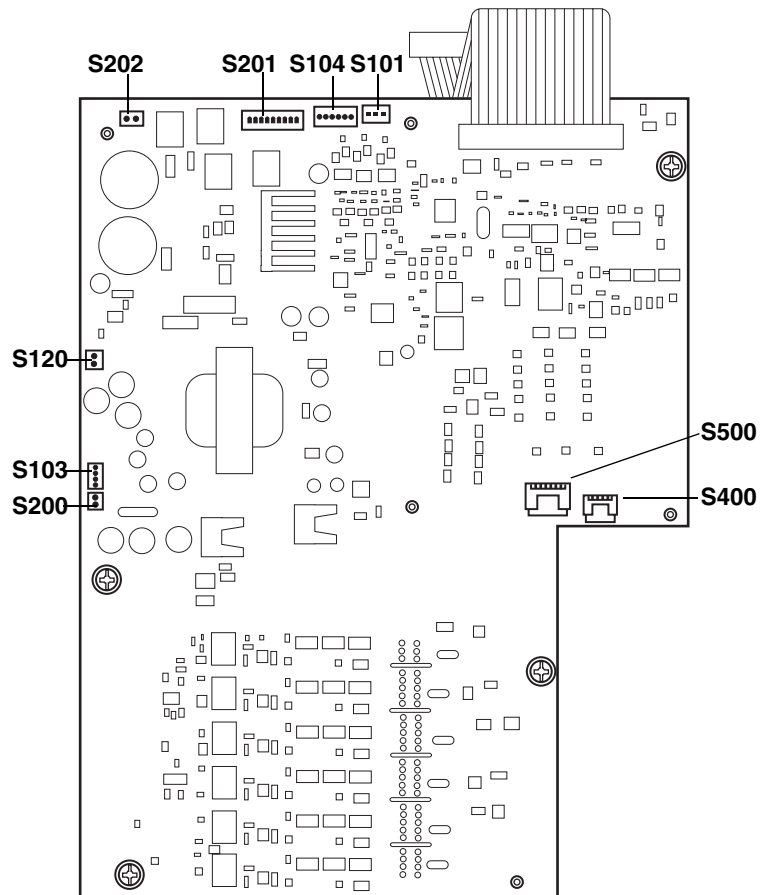
<sup>1</sup> See the wiring table and schematic on pages 50 and 51 for complete drive wiring. Wire numbers are given for cross referencing the wires with the wiring table and the schematic. The numbers do not appear on the wires.

<sup>2</sup> SCR: Silicon controlled rectifiers

10. Using needle-nose pliers, carefully remove the following connections from the power board that you are replacing. See Table 3 and Figure 12 for connector locations.

- At the top of the board, from left to right remove: the 2-pin connector from terminal S202, the 9-pin connector from terminal S201, the 6-pin connector from terminal S104, and the 3-pin connector from terminal S101.
- At the left side of the board, from top to bottom remove: the 2-pin connector from terminal S120, the 4-pin connector from terminal S103, and the 2-pin connector from terminal S200.
- At the right side of the board, from left to right remove: the 6-pin connector from terminal S500 and the 4-pin connector from terminal S400.

**Figure 12: Power Board Connections**



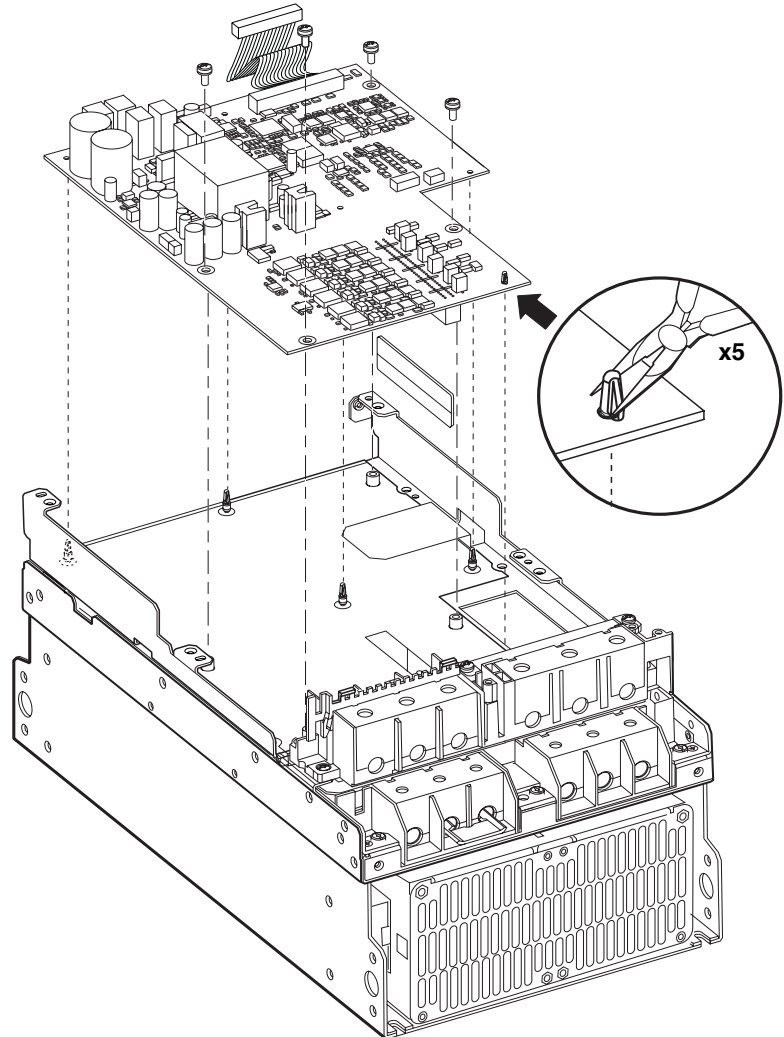
**NEXT STEP:** If you are also replacing the power terminal blocks, skip to “Replacing Power Terminal Block VZ3N1206” on page 33. If you are not replacing the power terminal block, continue with Step 11 on page 23.

## Remove the Power Board

11. Remove the power board that you are replacing as follows. See Figure 13.

- Using a size 2 Phillips driver, remove the four screws securing the power board to the power board mounting plate.
- Using needle-nose pliers, gently compress the five plastic mounting posts, one at a time, while lifting the power board off the posts.
- Remove the power board from the drive.

**Figure 13: Power Board Replacement**



**Install the New Power Board**

**Table 4: Power Board Wiring**

Wire No. <sup>1</sup>	Terminal No.	Description	To:
E109	S202	2-pin	Bus board
E106	S201	9-pin	Bus board
E112	S104	6-pin	SCR <sup>2</sup> L1, L2, L3
E111	S101	3-pin	Bus board
E104	S120	2-pin	Main fan connector
E101	S103	4-pin	Control module
E102	S200	2-pin	LED
E110	S500	6-pin	Power terminal block
E105	S400	4-pin	Bus board

<sup>1</sup> See the wiring table and schematic on pages 50 and 51 for complete drive wiring. Wire numbers are given for cross referencing the wires with the wiring table and the schematic. The numbers do not appear on the wires.

<sup>2</sup> SCR: Silicon controlled rectifiers.

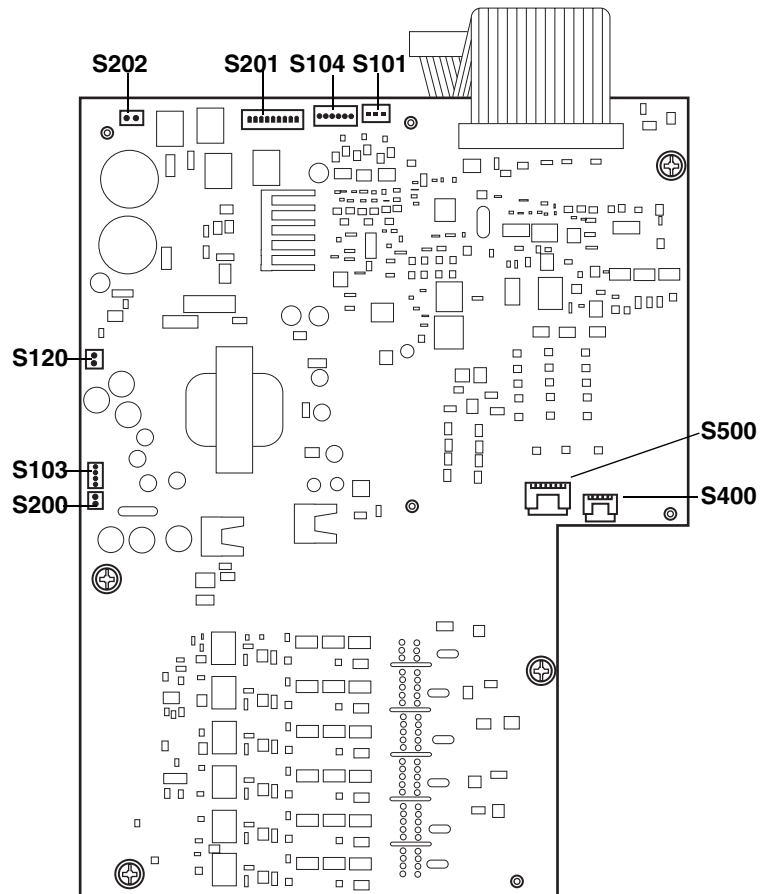
12. Install the new power board as follows. See Figure 13.

- Position the power board over the five plastic mounting posts on the power board mounting plate, and gently push the board down over the posts until it is securely seated.
- Using a size 2 Phillips driver, install the four power board mounting screws. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).

13. Install the following connections on the new power board. Refer to Table 4 and Figure 14 for connector locations.

- At the top of the board, from left to right install: the 2-pin connector at terminal S202, the 9-pin connector at terminal S201, the 6-pin connector at terminal S104, and the 3-pin connector at terminal S101.
- At the left side of the board, from top to bottom install: the 2-pin connector at terminal S120, the 4-pin connector at terminal S103, and the 2-pin connector at terminal S200.
- At the right side of the board, from left to right install: the 6-pin connector at terminal S500 and the 4-pin connector at terminal S400.

**Figure 14: Power Board Connections**





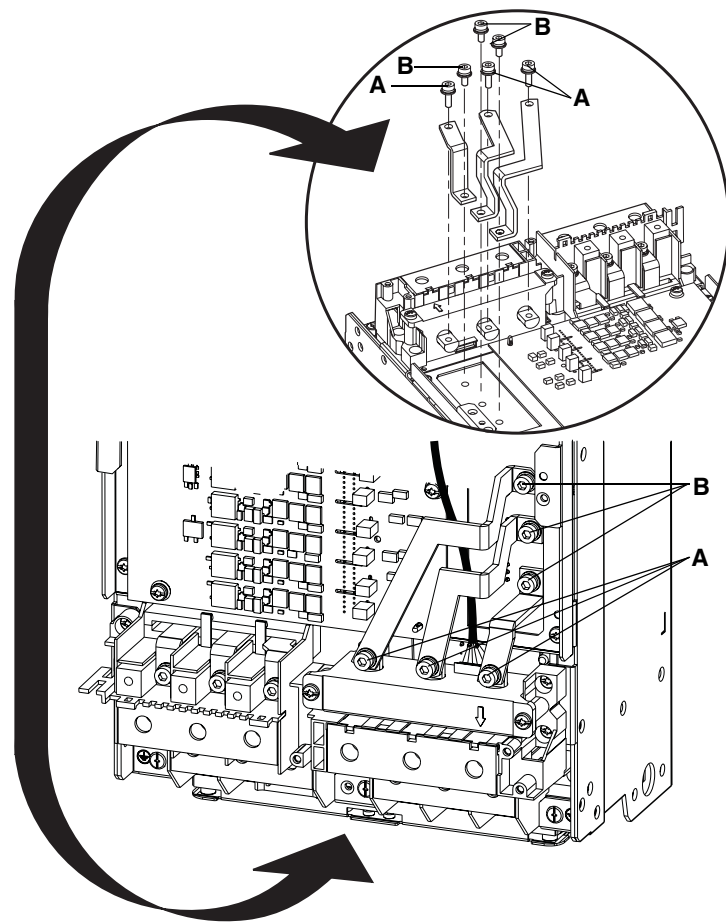
## Replace the Output Bus Bars

14. Replace the output bus bars at the bottom right of the drive as follows. See Figure 15.

**NOTE:** Note the differences in the six screws securing the output bus bars. The bottom screws (**A**) at output terminals T1, T2, and T3 are longer than the top screws (**B**) at the bus board.

- Using a 3 mm Allen wrench, install the three bus bars on the bus board and secure them with three screws (**B**). Tighten the screws to 2.6–3.3 N•m (23–29.2 lb-in).
- Using a 3 mm Allen wrench, secure the bus bars to output terminals T1, T2, and T3 and secure them with three screws (**A**). Tighten the screws to 2.1–2.7 N•m (18.6–23.9 lb-in).

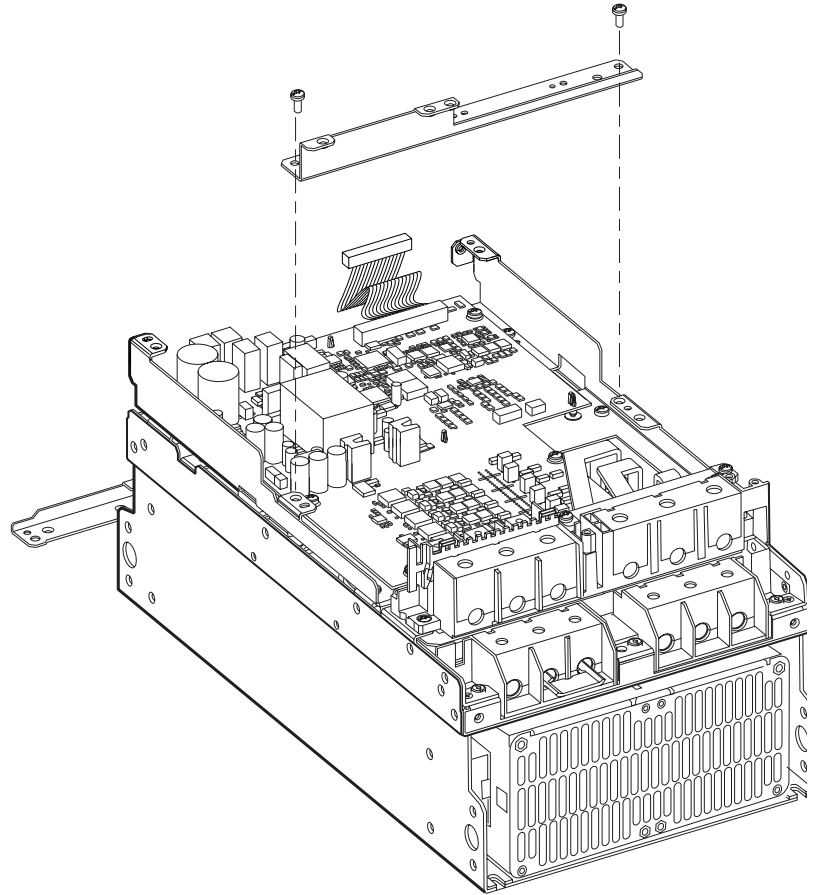
Figure 15: Output Bus Bar Replacement



### Replace the Middle Crossbrace

15. Position the middle crossbrace on the drive frame. See Figure 16. Using a T-20 Torx driver, install the two mounting screws at the right and left sides of the crossbrace. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).

**Figure 16: Crossbrace Replacement**



## Replace the Bus Bar Cover Plate

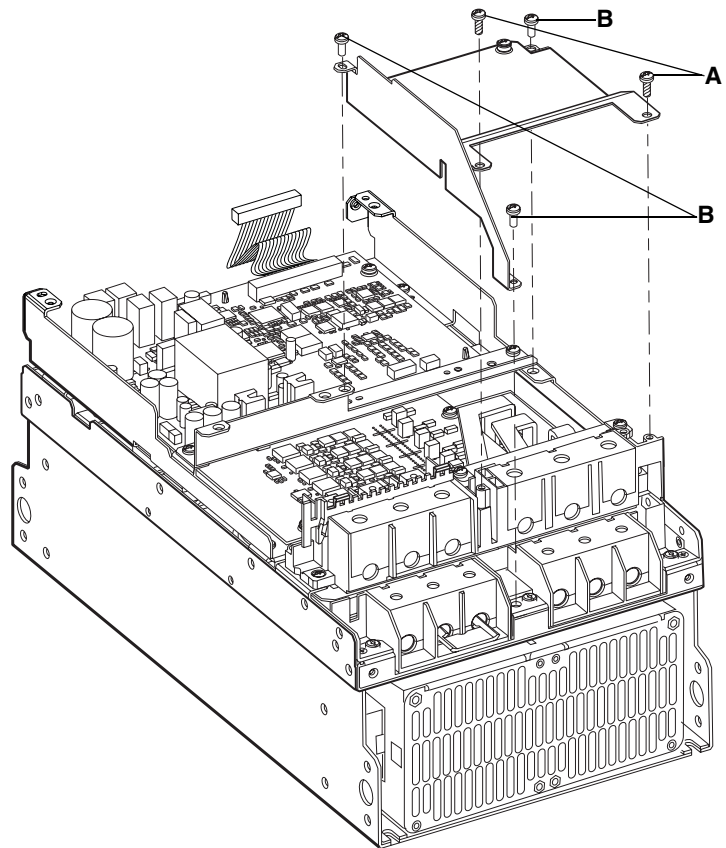
16. Reinstall the bus bar cover plate at the bottom right of the drive as follows. See Figure 17.

- Position the plate over the middle crossbrace and the power terminal block.

**NOTE:** Note the differences in the five screws that secure the bus bar cover plate. The two screws (**A**) over the terminal block screw into plastic and have coarser threads than the three screws (**B**) that attach the cover plate to the drive frame. Take care not to overtighten these screws or you may strip the threads.

- Using a T-20 Torx driver, install the three screws (**B**) securing the plate to the crossbrace and the drive frame. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).
- Using a T-20 Torx driver, install the two screws (**A**) securing the plate to the power terminal block. Tighten the screws to 1.8–2.2 N•m (15.9–19.5 lb-in).

**Figure 17: Bus Bar Cover Plate Replacement**



## Replace the Filter Board

17. Replace the filter board as follows. See Figure 18 on page 29.
  - Position the filter board between the middle crossbrace and input terminals L1, L2, and L3.
  - Using a T-20 Torx driver, install the top 2 screws (**A**) securing the filter board to the middle crossbrace. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).
  - Using a 3 mm Allen wrench, install the three screws (**B**) at input terminals L1, L2, and L3. Tighten the screws to 2.1–2.7 N•m (18.6–23.9 lb-in).

## Replace the Insulator

18. Reinstall the insulator as follows. See Figure 18 on page 29.

### **⚠ DANGER**

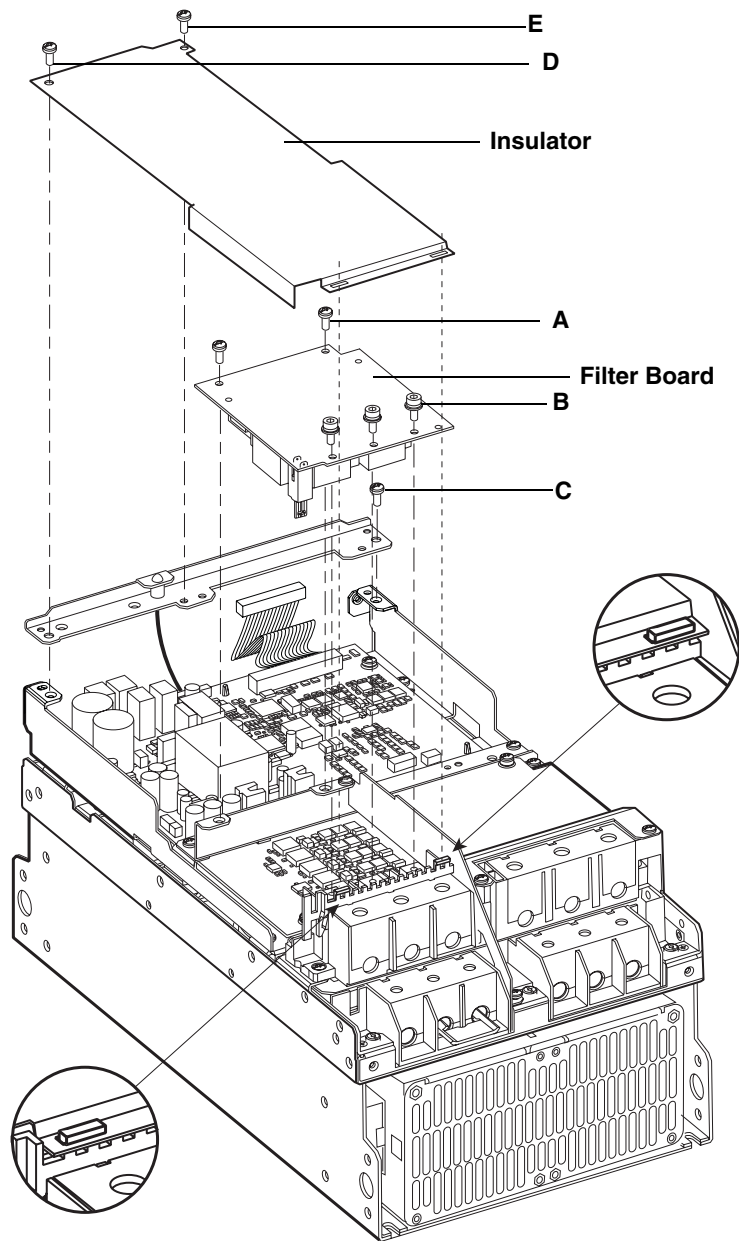
#### **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Install the insulator as shown in Figure 18 on page 29.
- Before installing the insulator, ensure that it has no tears or cracks. If the insulator is damaged, contact your Schneider Electric representative.
- Do not install a damaged insulator.

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

- Tucking the LED wire into the drive, position the right side of the top crossbrace on the drive frame. Using a T-20 Torx driver, install the right mounting screw (**C**), but do not tighten it.
- Position the left side of the top crossbrace and then the left side of the insulator over the drive frame. Using a T-20 Torx driver, secure both the crossbrace and the insulator with one screw (**D**). Tighten the screws at the right and left sides of the crossbrace to 1.1–1.7 N•m (9.7–15.1 lb-in).
- Using a T-20 Torx driver, secure the right side of the insulator to the top crossbrace with one screw (**E**). Tighten the screw to 1.1–1.7 N•m (9.7–15.1 lb-in).
- Ensure that the insulator is tucked under the left side of the drive cabinet, and that it completely covers the filter board.
- Secure the two insulator slots over the retaining tabs on the terminal block.

Figure 18: Filter Board Replacement



## Replace the Control Module

**Table 5: Control Module Wiring**

Wire No. <sup>1</sup>	Description	To:	Terminal No.
E100	40-pin	Power board	<b>S100</b>
E101	4-pin	Power board	<b>S103</b>

<sup>1</sup> See the wiring table and schematic on pages 50 and 51 for complete drive wiring. Wire numbers are given for cross referencing the wires with the wiring table and the schematic. The numbers do not appear on the wires.

19. Reinstall the control module as follows. See Figure 19.

- Carefully plug the 40-pin ribbon cable (A) into the back of the control module, and plug the 4-pin wire connector (B) into the left side of the control module.
- Position the control module over the top and middle crossbraces.
- Using a size 1 Phillips driver, install the four mounting screws (C) securing the control module to the crossbraces. Tighten the screws to 0.49–0.69 N•m (4.3–6.1 lb-in).
- Using a size 2 Phillips driver, install the mounting screw (D) at the bottom right corner of the control module. Tighten the screw to 1.1–1.7 N•m (9.7–15.1 lb-in).
- Slide the control terminal board (F) into the control module. Using a T-20 Torx driver, secure the spring-loaded screw (E) on the right side of the control module. Tighten the screw to 1.1–1.7 N•m (9.7–15.1 lb-in).
- Guide the control module cover into place and gently press it down until the snaps engage. See Figure 20 on page 31.

**Figure 19: Control Module Replacement**

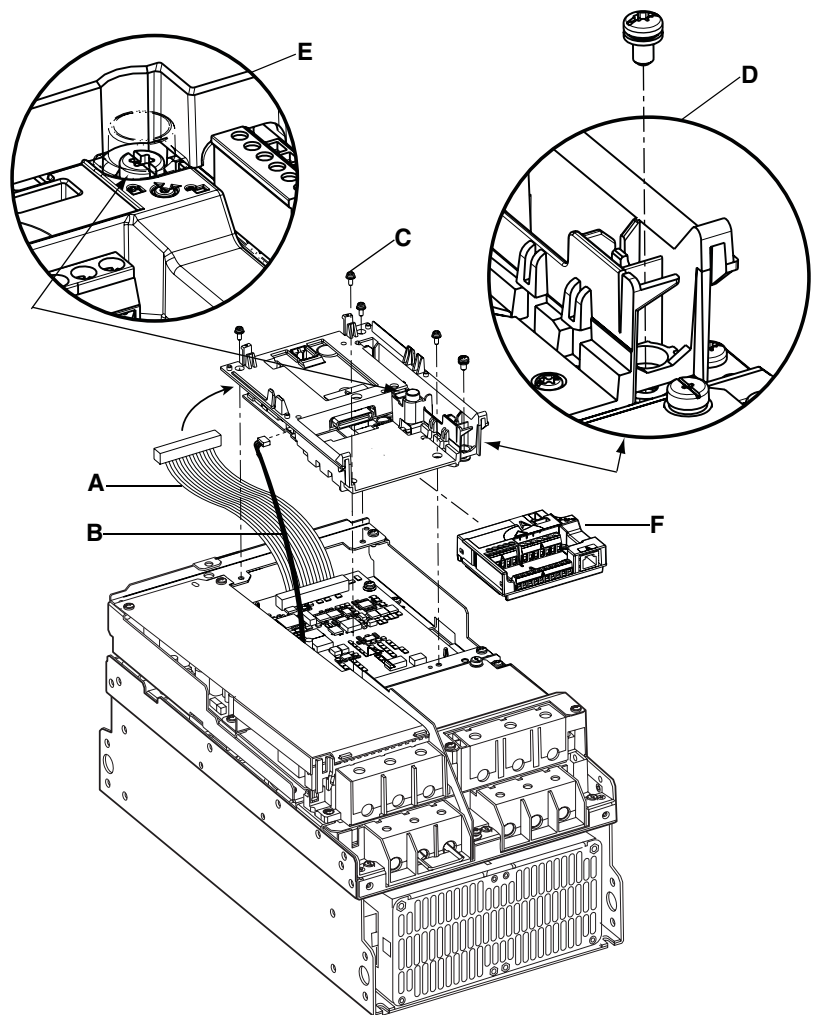
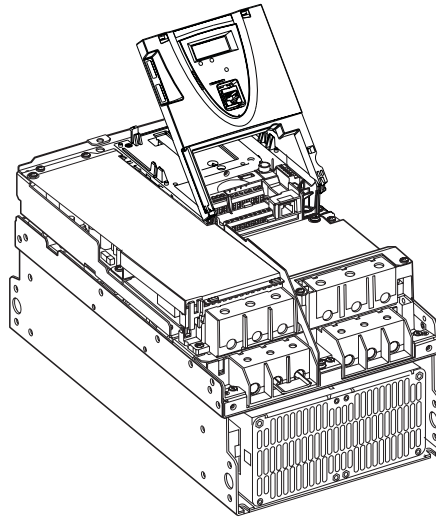


Figure 20: Control Module Cover Replacement

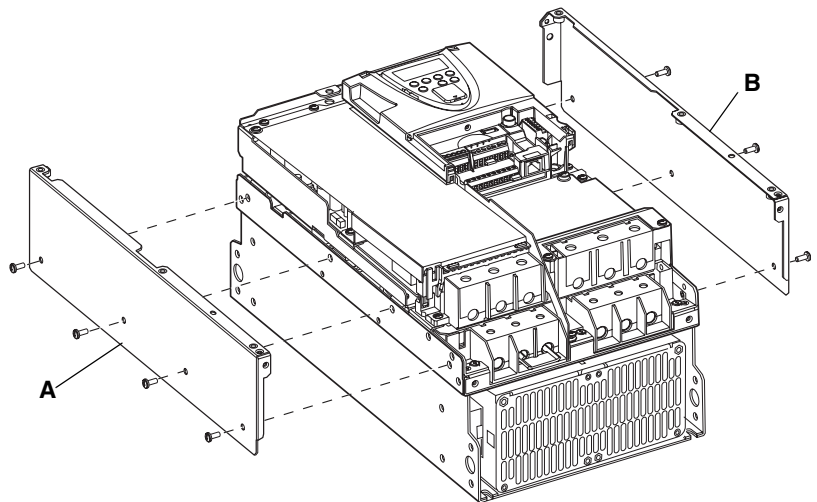


### Replace the Drive Panels and Cover

20. Using a T-20 Torx driver, replace the side panels of the drive as follows. See Figure 21.

- Reinstall the left side panel (A) and secure it with four screws. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).
- Reinstall the right side panel (B) and secure it with three screws. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).

Figure 21: Side Panel Replacement

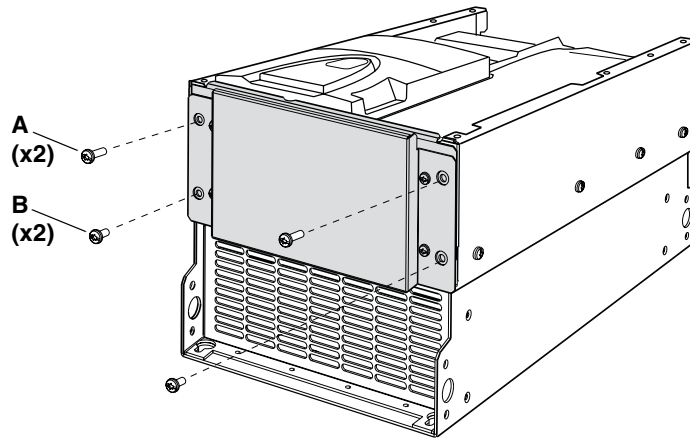


21. Replace the top panel as follows. See Figure 22.

**NOTE:** Note the differences between the top panel hardware. The two front screws (A) are longer than the two back screws (B).

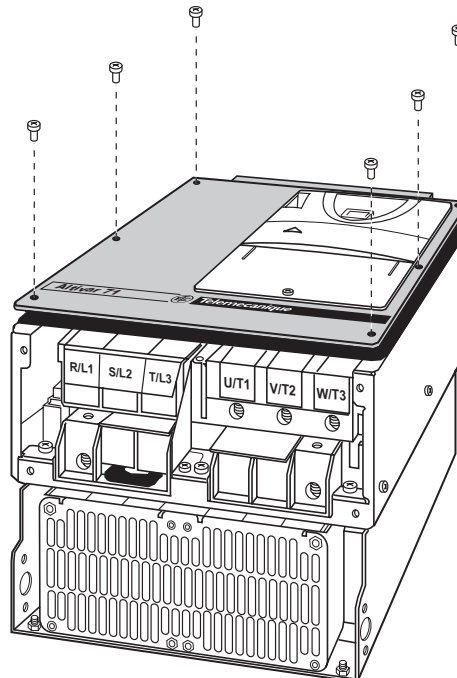
- Position the top panel with the notch for the LED at the front of the drive.
- Using a Torx T-20 driver, secure the top panel with four screws. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).

**Figure 22: Top Panel Replacement**



22. Using a size 2 Phillips driver, install the front cover and secure it with six screws. See Figure 23. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).

**Figure 23: Front Cover Replacement**





## Replacing Power Terminal Block VZ3N1206

**IMPORTANT:** Label and retain all removed hardware and cables for use in reassembly.

### **⚠ DANGER**

#### **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Read and understand the precautions in “Before You Begin” starting on page 5 before performing this procedure.
- Before working on this equipment, turn off all power supplying it and perform the DC bus voltage measurement procedure on page 9.

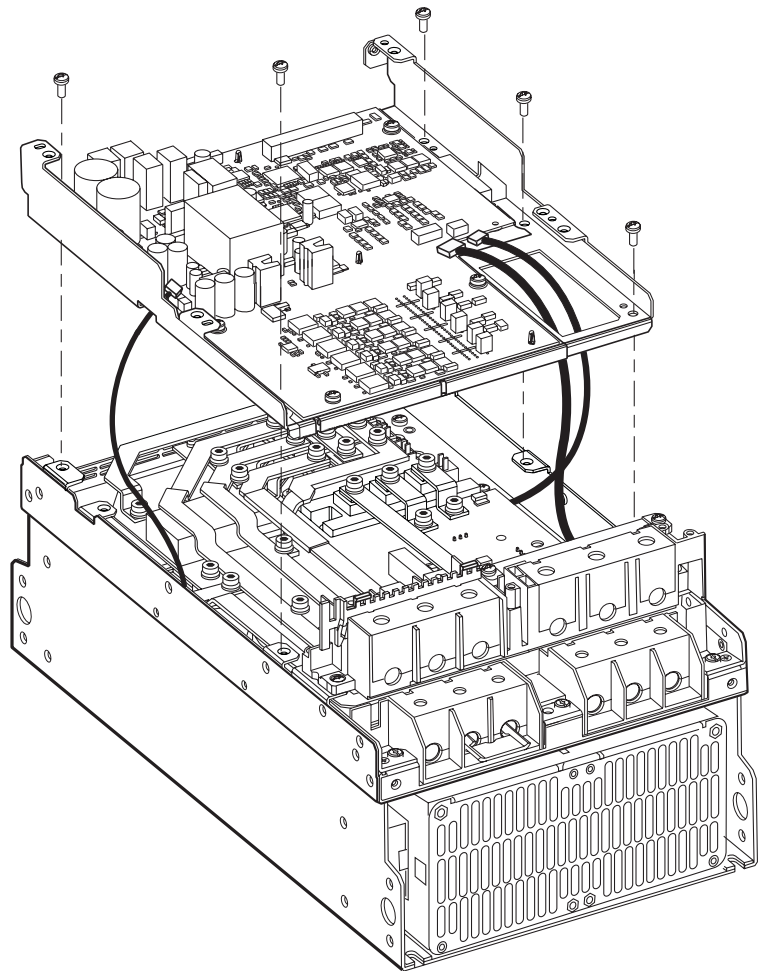
**Failure to follow these instructions will result in death or serious injury.**

Perform Steps 1–10 (pages 14–22) of “Replacing Power Boards VX5A1HD18M3X, VX5A1HD22M3X, and VX5A1HD22N4” before performing the steps in this procedure.

### Remove the Power Board Mounting Plate

1. Using a T-20 Torx driver, remove the 5 screws securing the power board mounting plate, and lift the plate out of the drive. See Figure 24.

**Figure 24: Power Board Mounting Plate Removal**



**Remove the Top Power Terminal Block**

2. **200/240 V units only:** In 200/240 V units, the top power terminal block has a two-piece ferrite core. One piece of the core is in front of the bus bars at input terminals L1, L2, and L3. The other piece is inside the top terminal block. See detail **C** Figure 25. You may need to remove a tie wrap holding the two pieces of the core together. Gently lift the two white retaining tabs and remove the ferrite core piece from in front of input terminals L1, L2, and L3. See Figure 25.
3. Using a 3 mm Allen wrench, remove the screws (**A**) from the three bus bars at input terminals L1, L2, and L3. See Figure 25.
4. Remove the top terminal block as follows. See Figure 25 for 200/240 V controllers. See Figure 26 for 400/460 V controllers.
  - Unplug the 6-pin connector from the top of the terminal block. Label and retain the wire for installation onto the new terminal block.
  - Using a T-20 Torx driver, remove the four screws (**B**) securing the top terminal block to the drive frame.
  - Pull the terminal block from under the three bus bars and out of the drive.
  - Slide the ferrite core piece out of the terminal block and retain it for installation into the new terminal block.

**Table 6: Power Terminal Block Wiring**

Wire No. <sup>1</sup>	Description	To:	Terminal No.
E110	6-pin	Power board	S500

<sup>1</sup> See the wiring table and schematic on pages 50 and 51 for complete drive wiring. Wire numbers are given for cross referencing the wires with the wiring table and the schematic. The numbers do not appear on the wires.

**Figure 25: Top Terminal Block Removal: 200/240 V Controllers**

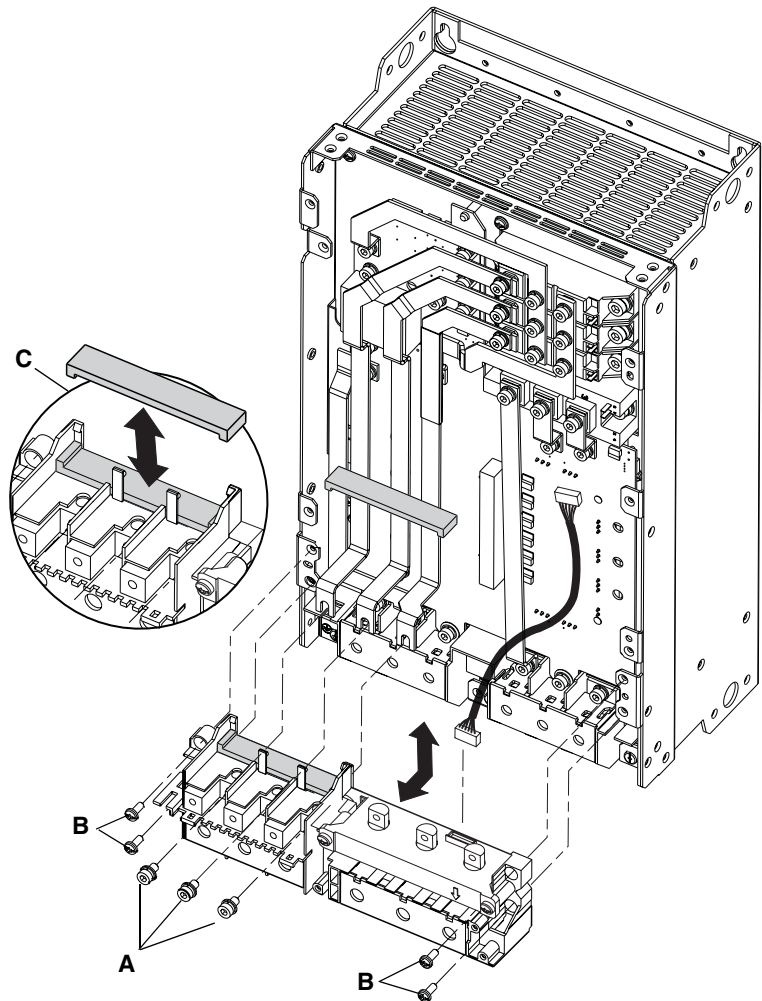
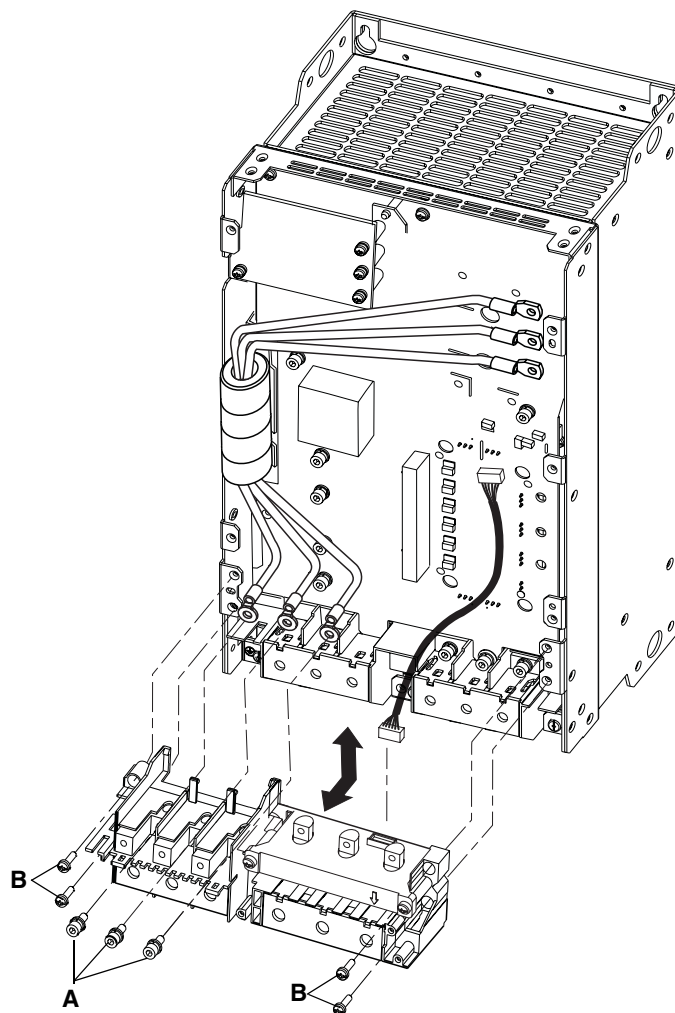


Figure 26: Top Terminal Block Removal: 400/460 V Controllers



## Remove the Bottom Power Terminal Block

5. Remove the bottom power terminal block as follows.
  - Using a 3 mm Allen wrench, remove the six screws (**A** and **B**) securing the terminal block to the bus board. See Figure 27.

**NOTE:** The two end screws (**A**) are longer than the four middle screws (**B**). Note that removing the screw at output terminal **T1** also releases the bottom end of a bus bar.

- Using a 3 mm Allen wrench, loosen the screw (**C**) securing the top of the bus bar that goes to terminal **T1**. Swing the bus bar to the right to allow access to the bus board mounting screws. See Figure 27.
- Using a 3 mm Allen wrench, remove four screws (**D**) from the right side of the bus board and four screws (**E**) from the left side of the bus board to loosen the board. See Figure 27.

**NOTE:** The screws (**D**) on the right side of the board are longer than the screws (**E**) on the left.

- Using a T-20 Torx driver, remove the four screws securing the bottom terminal block to the drive frame. See Figure 28 on page 37.
- Pull the terminal block out from under the bus board and remove it from the drive. See Figure 28 on page 37.

**Figure 27: Bottom Terminal Block Replacement, Part 1 (200/240 V Unit Shown)**

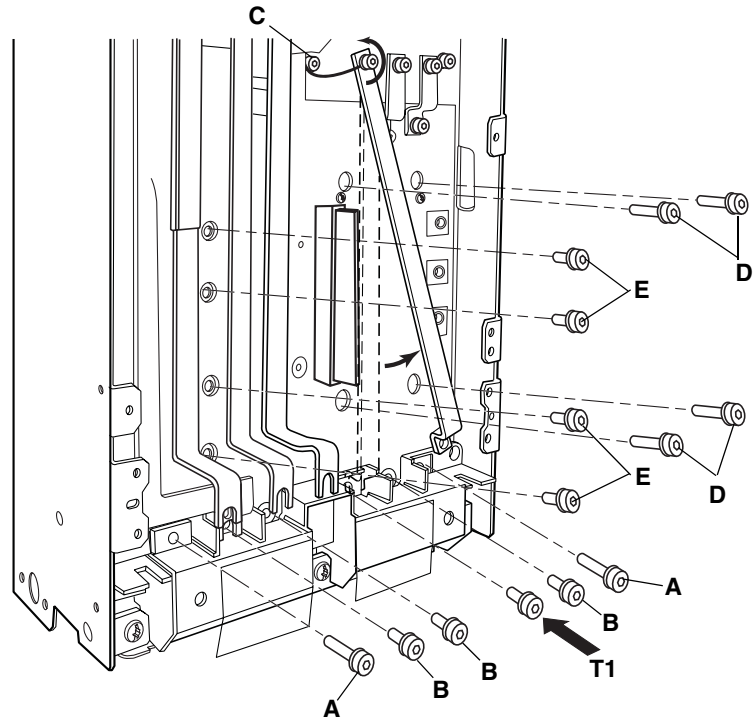
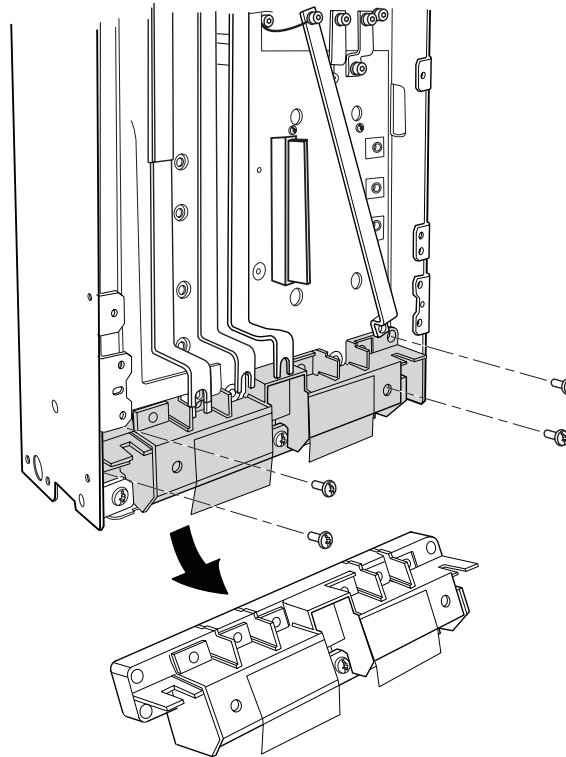


Figure 28: Bottom Terminal Block Replacement, Part 2



### Install the Bottom Power Terminal Block

6. Install the bottom portion of the new power terminal block as follows.
  - Insert the terminal block under the bus board. See Figure 28.
  - Using a T-20 Torx driver, secure the terminal block to the drive frame with four screws. See Figure 28. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).

**NOTE:** Note the differences in the bus board mounting screws. There are four longer screws (**D**) and four shorter screws (**E**). See Figure 27 on page 36.

- Using a 3 mm Allen wrench, install the four longer screws (**D**) on the right side of the bus board. See Figure 27. Tighten the screws to 1.1–1.4 N•m (9.7–15.1 lb-in).
- Using a 3 mm Allen wrench, install the four shorter screws (**E**) on the left side of the bus board. See Figure 27. Tighten the screws to 2.6–3.3 N•m (23–29.2 lb-in).

**NOTE:** Note the differences in the six screws securing the terminal block to the bus board. The two longer screws (**A**) go in the left and right positions, and the four shorter screws (**B**) go in the middle. See Figure 27.

- Using a 3 mm Allen wrench, secure the bus bar to terminal **T1** with one of the shorter screws. See Figure 27. Tighten the screw at terminal **T1** to 2.1–2.7 N•m, (18.6–23.9 lb-in) and tighten the screw (**C**) at the top of the bus bar to 2.1–2.7 N•m (18.6–23.9 lb-in).
- Using a 3 mm Allen wrench, install the remaining five screws (**A** and **B**) securing the terminal block to the bus board. See Figure 27. Tighten the screws to 2.1–2.7 N•m (18.6–23.9 lb-in).

### Install the Top Power Terminal Block

**Table 7: Power Terminal Block Wiring**

Wire No. <sup>1</sup>	Description	To:	Terminal No.
E110	6-pin	Power board	S500

<sup>1</sup> See the wiring table and schematic on pages 50 and 51 for complete drive wiring. Wire numbers are given for cross referencing the wires with the wiring table and the schematic. The numbers do not appear on the wires.

7. Install the top portion of the new power terminal block as follows. See Figure 29 for 200/240 V controllers. See Figure 30 on page 39 for 400/460 V controllers.
  - **200/240 V units only:** Slide the ferrite core piece (A) into the terminal block.
  - Position the terminal block under the three bus bars at input terminals L1, L2, and L3 and into the drive.
  - Using a T-20 Torx driver, install the four screws (B) securing the terminal block to the drive frame. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).
  - Plug the 6-pin connector into the top of the terminal block. Refer to Table 7.
8. **200/240 V units only:** Gently lift the two white retaining tabs and install the ferrite core piece in front of input terminals L1, L2, and L3 (A). See Figure 29. You may also need to replace a tie wrap around the two pieces of the ferrite core.
9. Using a 3 mm Allen wrench, install the screws (C) securing the three bus bars to input terminals L1, L2, and L3. See Figure 29. Tighten the screws to 2.1–2.7 N•m (18.5–24 lb-in).

**Figure 29: Top Terminal Block Installation: 200/240 V Controllers**

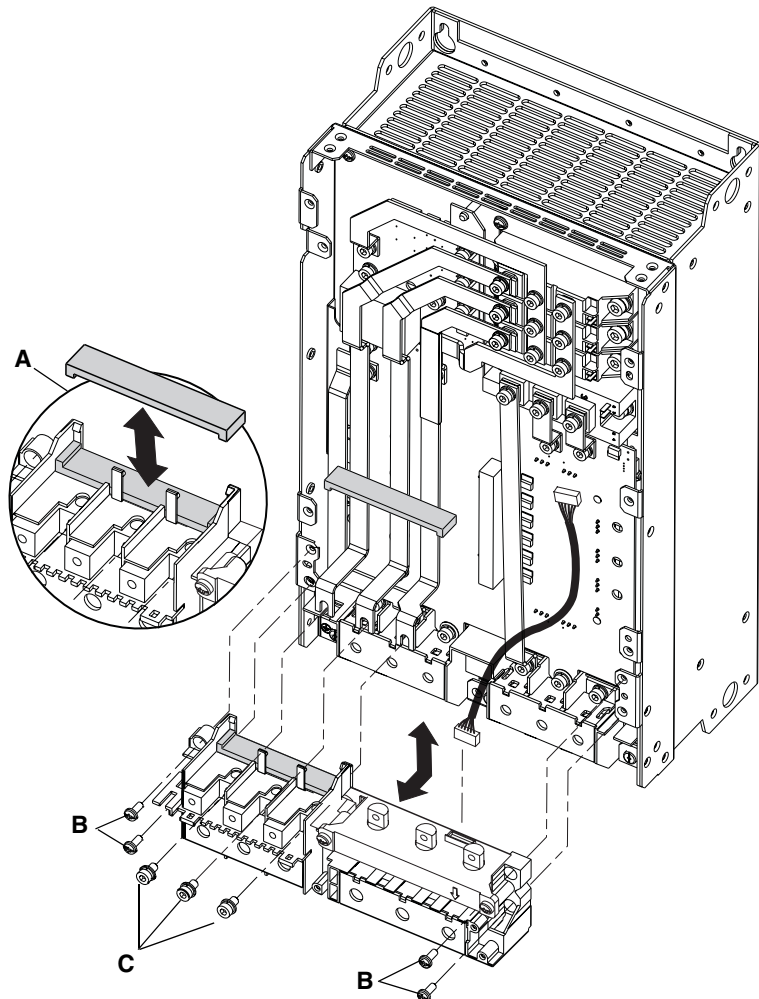
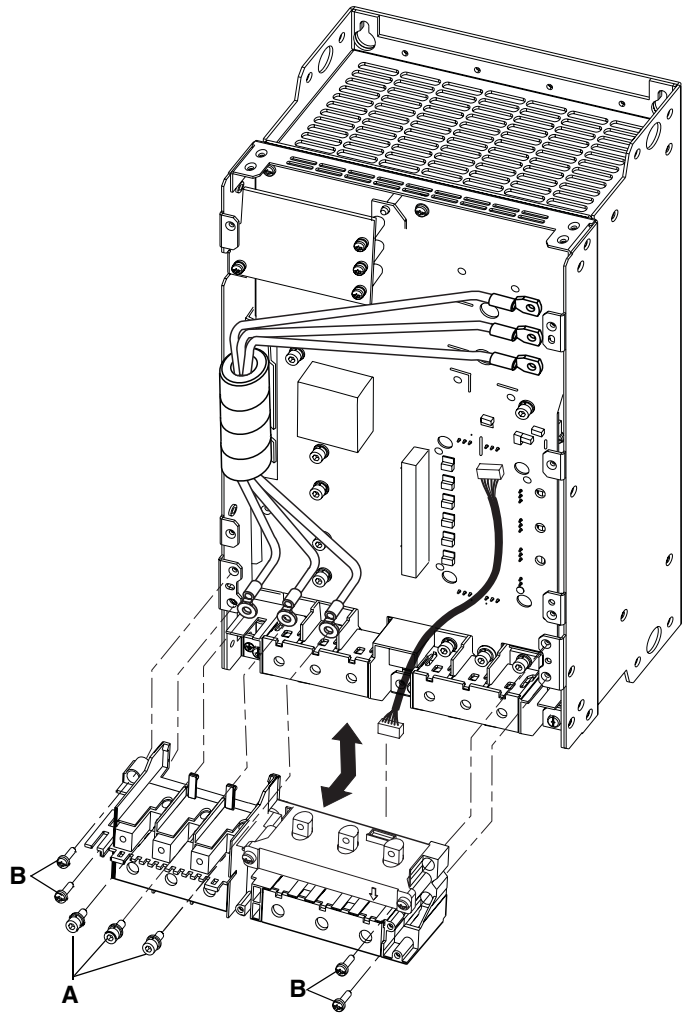


Figure 30: Top Terminal Block Installation: 400/460 V Controllers

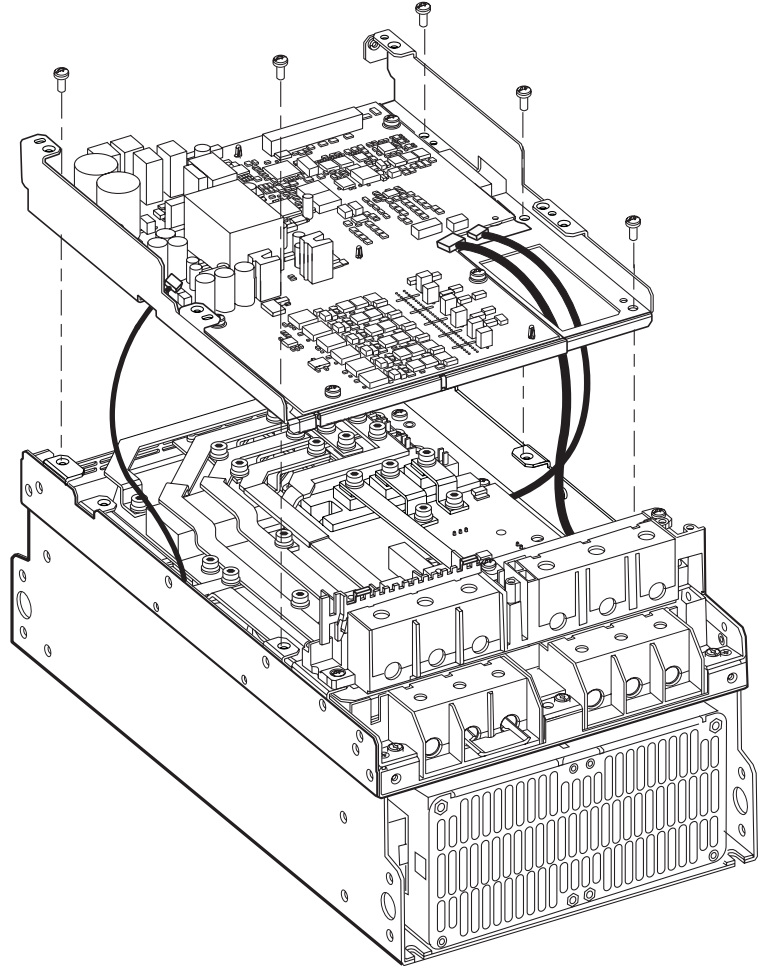




**Replace the Power Board Mounting Plate**

10. Replace the power board mounting plate as follows. See Figure 31.
- Routing one red lead through the left side and two black leads through the right side, place the power board mounting plate over the bus board.
  - Using a T-20 Torx driver, install the 5 screws that secure the cover plate to the bus board. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).

**Figure 31: Power Board Mounting Plate Replacement**





**Replace the Power Board Connections**

11. Install the following connections on the power board. Refer to Table 8 and Figure 32 for connector locations.

- At the top of the board, from left to right install: the 2-pin connector at terminal S202, the 9-pin connector at terminal S201, the 6-pin connector at terminal S104, and the 3-pin connector at terminal S101.
- At the left side of the board, from top to bottom install: the 2-pin connector at terminal S120, the 4-pin connector at terminal S103, and the 2-pin connector at terminal S200.
- At the right side of the board, from left to right install: the 6-pin connector at terminal S500 and the 4-pin connector at terminal S400.

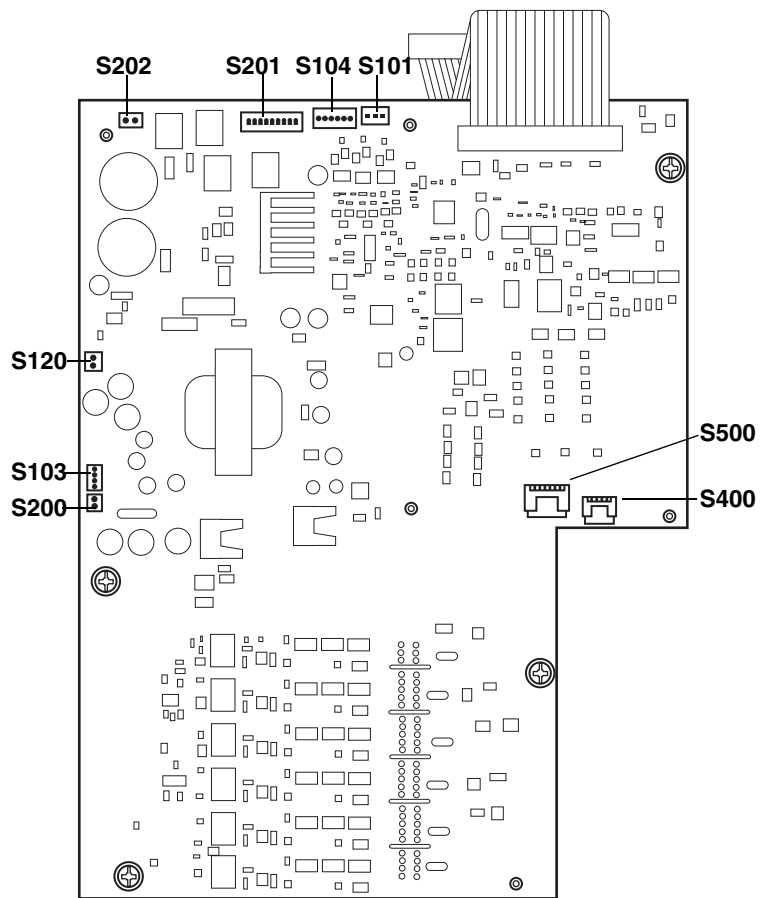
**Table 8: Power Board Wiring**

Wire No. <sup>1</sup>	Terminal No.	Description	To:
E109	S202	2-pin	Bus board
E106	S201	9-pin	Bus board
E112	S104	6-pin	SCR <sup>2</sup> L1, L2, L3
E111	S101	3-pin	Bus board
E104	S120	2-pin	Main fan connector
E101	S103	4-pin	Control module
E102	S200	2-pin	LED
E110	S500	6-pin	Power terminal block
E105	S400	4-pin	Bus board

<sup>1</sup> See the wiring table and schematic on pages 50 and 51 for complete drive wiring. Wire numbers are given for cross referencing the wires with the wiring table and the schematic. The numbers do not appear on the wires.

<sup>2</sup> SCR: Silicon controlled rectifiers

**Figure 32: Power Board Connections**



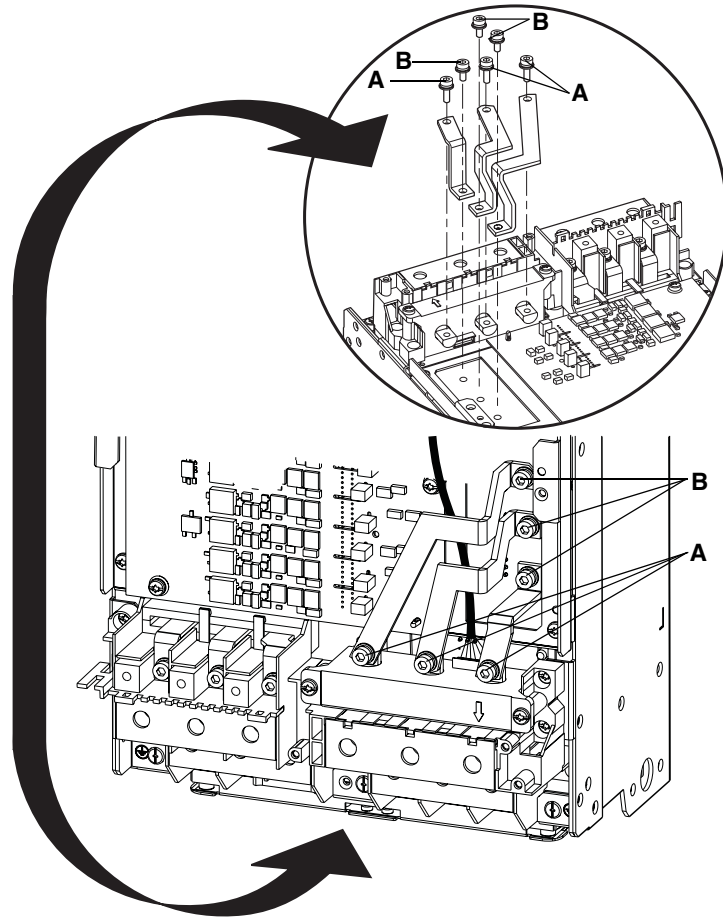
## Replace the Output Bus Bars

12. Replace the output bus bars at the bottom right of the drive as follows. See Figure 33.

**NOTE:** Note the differences in the six screws securing the output bus bars. The bottom screws (**A**) at output terminals T1, T2, and T3 are longer than the top screws (**B**) at the bus board.

- Using a 3 mm Allen wrench, install the three bus bars on the bus board and secure them with three screws (**B**). Tighten the screws to 2.6–3.3 N•m (23–29.2 lb-in).
- Using a 3 mm Allen wrench, secure the bus bars to output terminals T1, T2, and T3 and secure them with three screws (**A**). Tighten the screws to 2.1–2.7 N•m (18.6–23.9 lb-in).

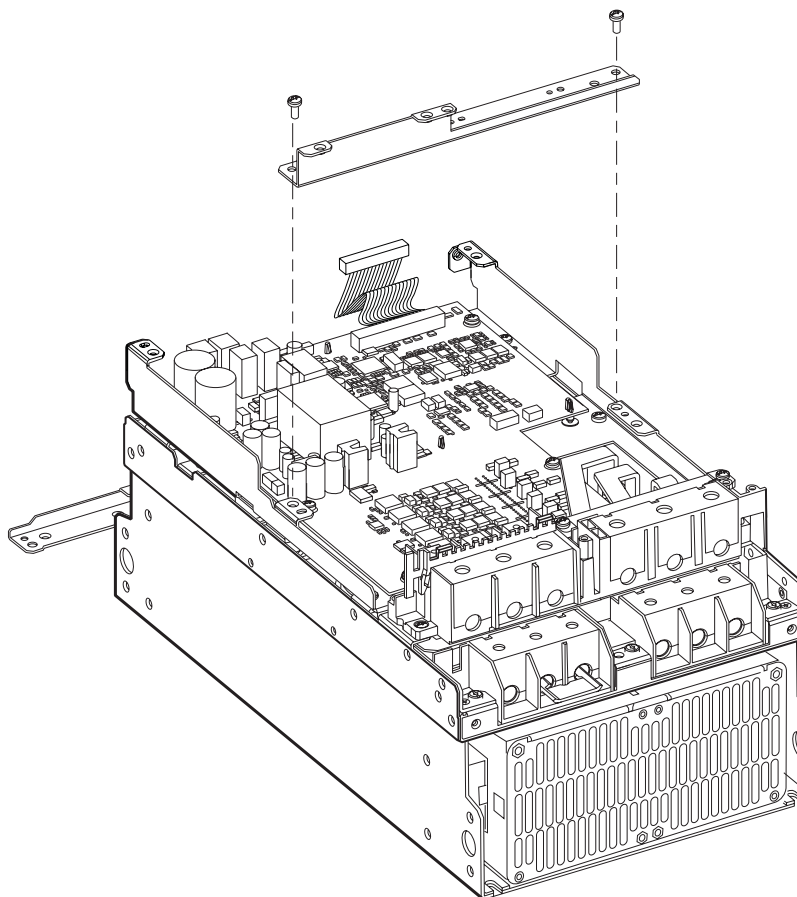
Figure 33: Output Bus Bar Replacement



### Replace the Middle Crossbrace

13. Position the middle crossbrace on the drive frame. See Figure 34. Using a T-20 Torx driver, install the two mounting screws at the right and left sides of the crossbrace. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).

**Figure 34: Crossbrace Replacement**



## Replace the Bus Bar Cover Plate

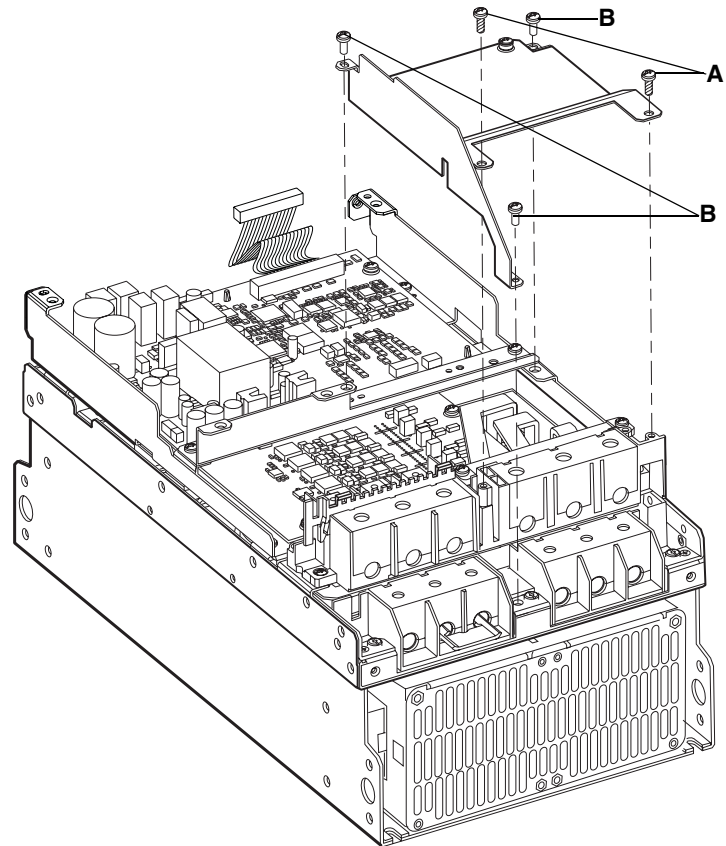
14. Reinstall the bus bar cover plate at the bottom right of the drive as follows. See Figure 35.

- Position the plate over the middle crossbrace and the power terminal block.

**NOTE:** Note the differences in the five screws that secure the bus bar cover plate. The two screws (**A**) over the terminal block screw into plastic and have coarser threads than the three screws (**B**) that attach the cover plate to the drive frame. Take care not to overtighten these screws or you may strip the threads.

- Using a T-20 Torx driver, install the three screws (**B**) securing the plate to the crossbrace and the drive frame. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).
- Using a T-20 Torx driver, install the two screws (**A**) securing the plate to the power terminal block. Tighten the screws to 1.8–2.2 N•m (15.9–19.5 lb-in).

**Figure 35: Bus Bar Cover Plate Replacement**



## Replace the Filter Board

15. Replace the filter board as follows. See Figure 36 on page 46.
  - Position the filter board between the middle crossbrace and input terminals L1, L2, and L3.
  - Using a T-20 Torx driver, install the top 2 screws (**A**) securing the filter board to the middle crossbrace. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).
  - Using a 3 mm Allen wrench, install the three screws (**B**) at input terminals L1, L2, and L3. Tighten the screws to 2.1–2.7 N•m (18.6–23.9 lb-in).

## Replace the Insulator

16. Reinstall the insulator as follows. See Figure 36 on page 46.

### DANGER

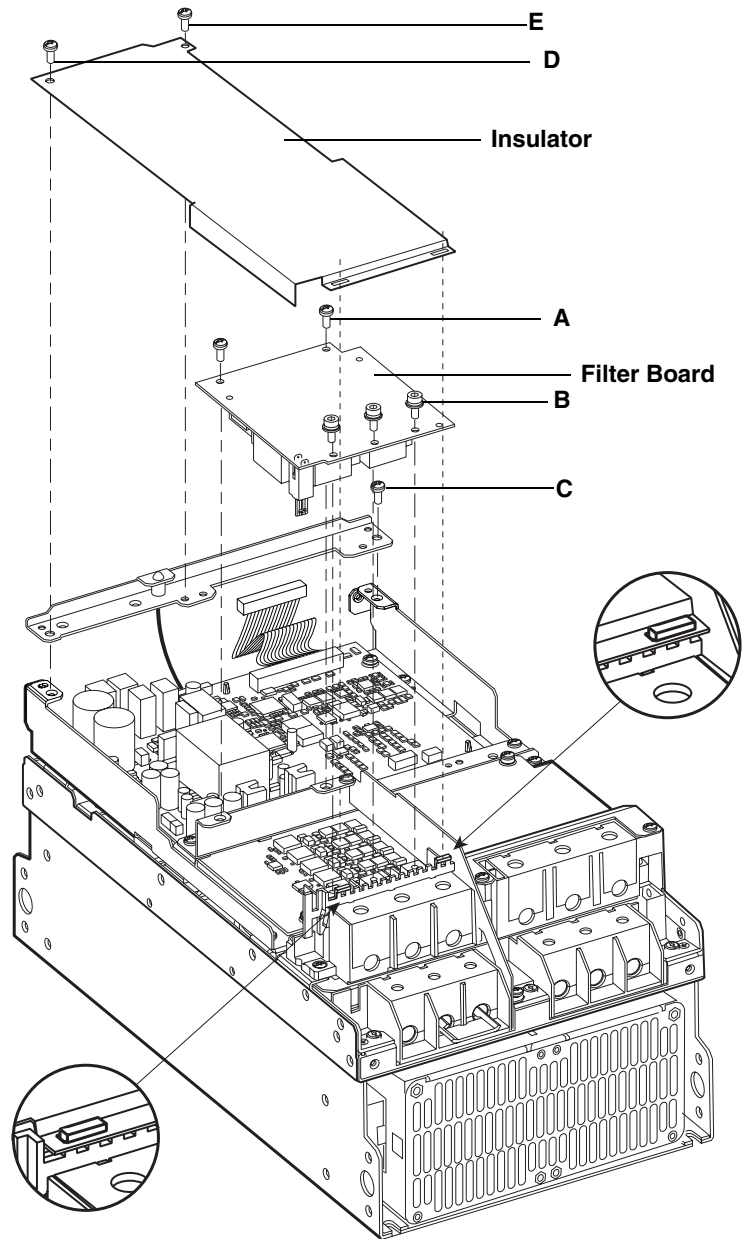
#### HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Install the insulator as shown in Figure 36 on page 46.
- Before installing the insulator, ensure that it has no tears or cracks. If the insulator is damaged, contact your Schneider Electric representative.
- Do not install a damaged insulator.

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

- Tucking the LED wire into the drive, position the right side of the top crossbrace on the drive frame. Using a T-20 Torx driver, install the right mounting screw (**C**), but do not tighten it.
- Position the left side of the top crossbrace and then the left side of the insulator over the drive frame. Using a T-20 Torx driver, secure both the crossbrace and the insulator with one screw (**D**). Tighten the screws at the right and left sides of the crossbrace to 1.1–1.7 N•m (9.7–15.1 lb-in).
- Using a T-20 Torx driver, secure the right side of the insulator to the top crossbrace with one screw (**E**). Tighten the screw to 1.1–1.7 N•m (9.7–15.1 lb-in).
- Ensure that the insulator is tucked under the left side of the drive cabinet, and that it completely covers the filter board.
- Secure the two insulator slots over the retaining tabs on the terminal block.

Figure 36: Filter Board Replacement



## Replace the Control Module

**Table 9: Control Module Wiring**

Wire No. <sup>1</sup>	Description	To:	Terminal No.
E100	40-pin	Power board	S100
E101	4-pin	Power board	S103

<sup>1</sup> See the wiring table and schematic on pages 50 and 51 for complete drive wiring. Wire numbers are given for cross referencing the wires with the wiring table and the schematic. The numbers do not appear on the wires.

17. Reinstall the control module as follows. See Figure 37.

- Carefully plug the 40-pin ribbon cable (A) into the back of the control module, and plug the 4-pin wire connector (B) into the left side of the control module.
- Position the control module over the top and middle crossbraces.
- Using a size 1 Phillips driver, install the four mounting screws (C) securing the control module to the crossbraces. Tighten the screws to 0.49–0.69 N•m (4.3–6.1 lb-in).
- Using a size 2 Phillips driver, install the mounting screw (D) at the bottom right corner of the control module. Tighten the screw to 1.1–1.7 N•m (9.7–15.1 lb-in).
- Slide the control terminal board (F) into the control module. Using a T-20 Torx driver, secure the spring-loaded screw (E) on the right side of the control module. Tighten the screw to 1.1–1.7 N•m (9.7–15.1 lb-in).
- Guide the control module cover into place and gently press it down until the snaps engage. See Figure 38 on page 48.

**Figure 37: Control Module Replacement**

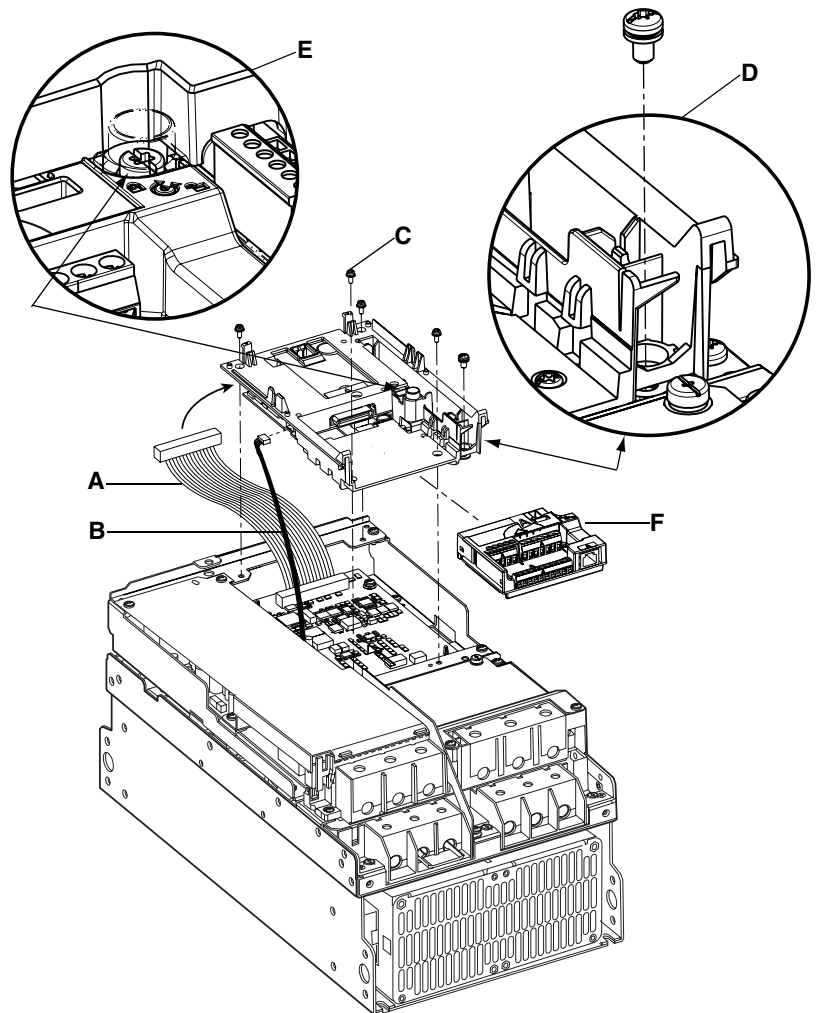
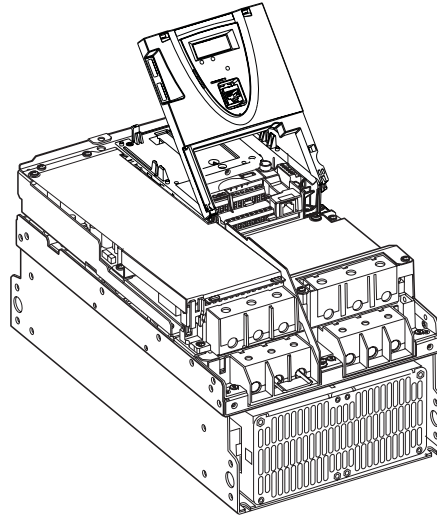


Figure 38: Control Module Cover Replacement

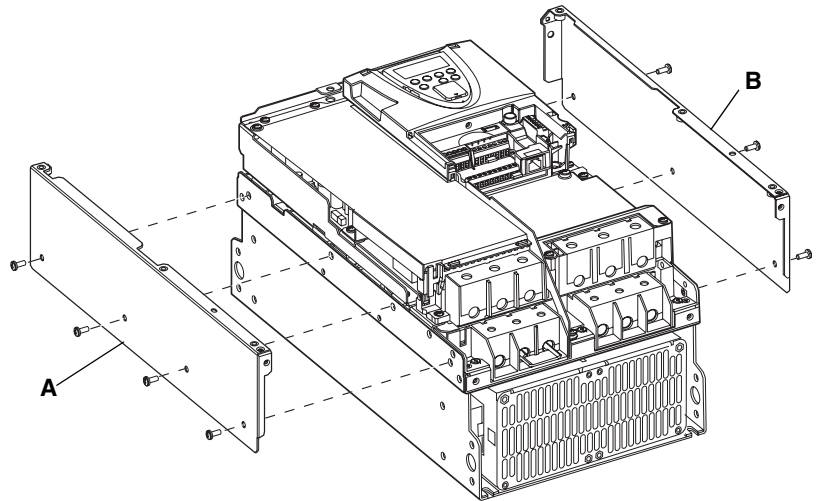


### Replace the Drive Panels and Cover

18. Using a T-20 Torx driver, replace the side panels as follows. See Figure 39.

- Reinstall the left side panel (**A**) and secure it with four screws. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).
- Reinstall the right side panel (**B**) and secure it with three screws. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).

Figure 39: Side Panel Replacement



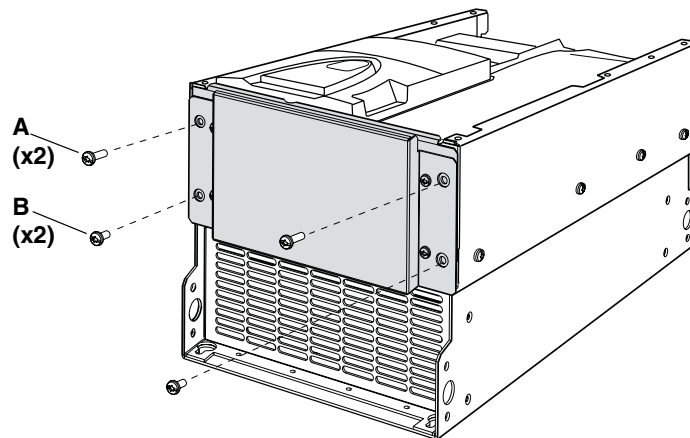


19. Replace the top panel as follows. See Figure 40.

**NOTE:** Note the differences between the top panel hardware. The two front screws (**A**) are longer than the two back screws (**B**).

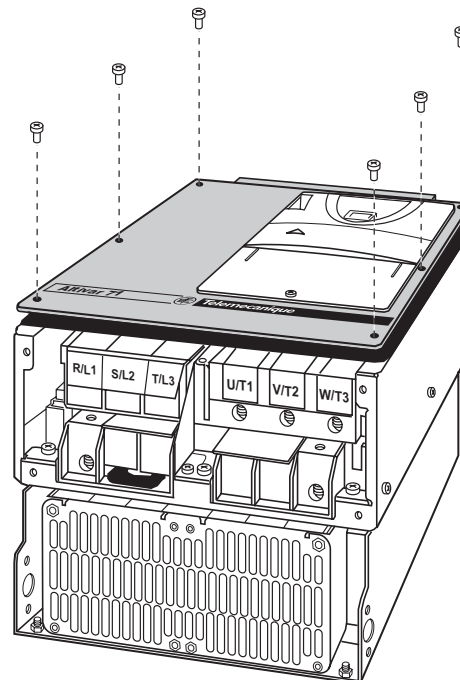
- Position the top panel with the notch for the LED at the front of the drive.
- Using a Torx T-20 driver, secure the top panel with four screws. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).

**Figure 40: Top Panel Replacement**



20. Using a size 2 Phillips driver, install the front cover and secure it with six screws. See Figure 41. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).

**Figure 41: Front Cover Replacement**



## Wiring

**Table 10: Wiring Table**

Wire No. <sup>1</sup>	Description	From:		To:	
		Component	Terminal No.	Component	Terminal No.
E100	40-pin	Power board	<b>S100</b>	Control module	<b>S100</b>
E101	4-pin	Power board	<b>S103</b>	Control module	<b>S103</b>
E102	2-pin	Power board	<b>S200</b>	LED	—
E103	2-pin	Main fan connector	—	Main fan	—
E104	2-pin	Power board	<b>S120</b>	Main fan connector	—
E105	4-pin	Power board	<b>S400</b>	Bus board	<b>S400</b>
E106	9-pin	Power board	<b>S201</b>	Bus board	<b>S201</b>
E109	2-pin	Power board	<b>S202</b>	Bus board	<b>S202</b>
E110	6-pin	Power board	<b>S500</b>	Power terminal block	—
E111	3-pin	Power board	<b>S101</b>	Bus board	<b>S101</b>
E112	6-pin	Power board	<b>S104</b>	SCR <sup>2</sup> L1, L2, L3	—
E113 (240 V only)	1-pin	Bus board	<b>T116</b>	Braking IGBT <sup>3</sup> module	—
E114 (240 V only)	2-pin	Bus board	<b>T117/T118</b>	Braking IGBT <sup>3</sup> module	—

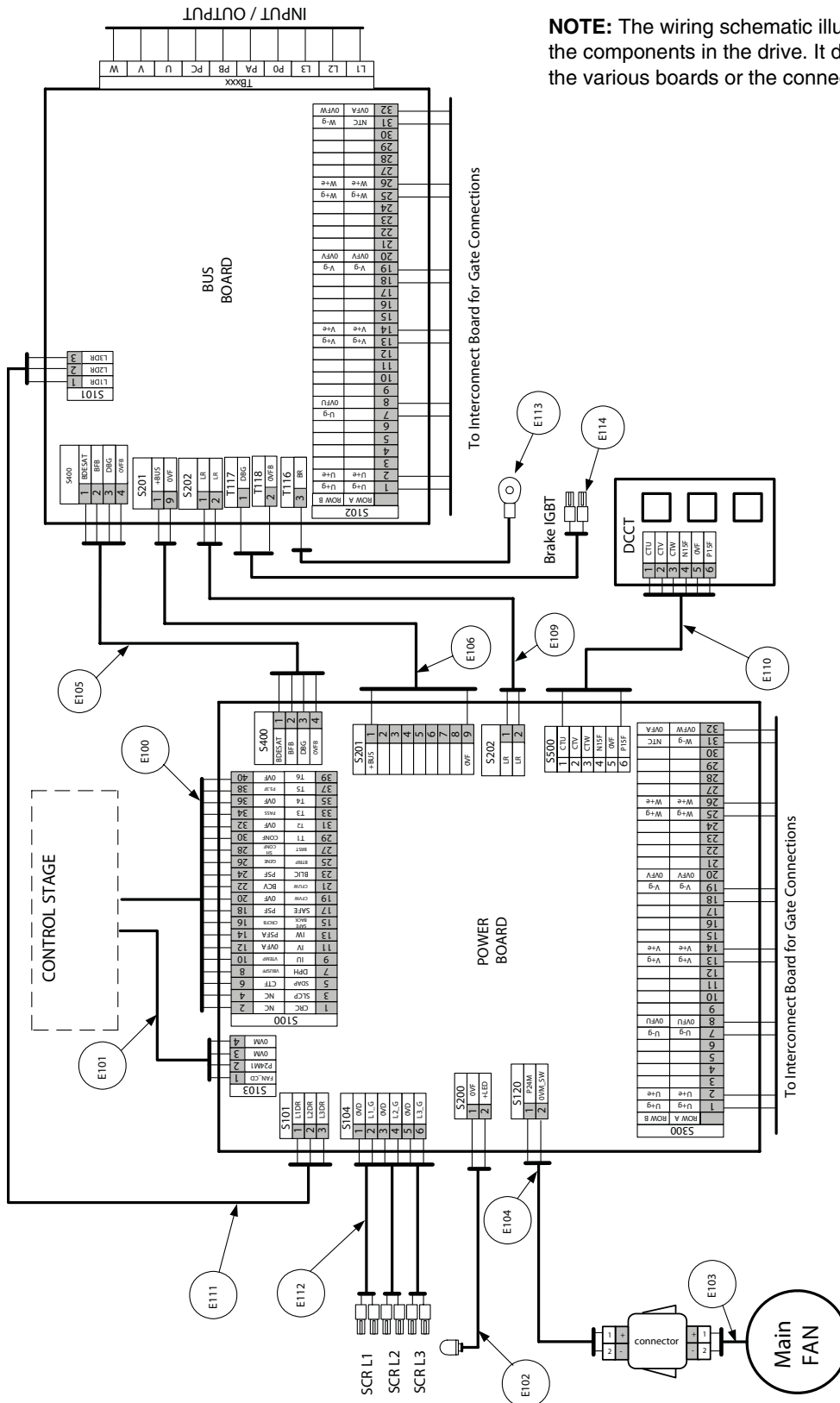
<sup>1</sup> Wire numbers are given for cross referencing the wires against the schematic on page 51. The numbers do not appear on the wires.

<sup>2</sup> SCR: Silicon controlled rectifiers

<sup>3</sup> IGBT: Insulated-gate bipolar transistor

Figure 42: Wiring Schematic

**NOTE:** The wiring schematic illustrates connections between the components in the drive. It does not illustrate the layout of the various boards or the connector locations on them.











**Spare Parts Kits for Altivar® 61/71 Drives, Frame Size 6  
Instruction Bulletin**

**Schneider Electric**

8001 Knightdale Blvd  
Knightdale, NC 27545 USA  
1-888-SquareD  
(1-888-778-2733)  
[www.schneider-electric.us](http://www.schneider-electric.us)

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