



***CONTROL
TECHNIQUES***

Modular Drive System

Drive Module Install Guide

P/N 400525-04

Revision: A1

Date: February 27, 2002

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EMERSON™
Industrial Automation

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When you call, please be at your computer, with your documentation easily available, and be prepared to provide the following information:

- Product version number, found by choosing About from the **Help** menu
- The type of controller or product you are using
- Exact wording of any messages that appear on your screen
- What you were doing when the problem occurred
- How you tried to solve the problem

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Document Conventions

Manual conventions have been established to help you learn to use this manual quickly and easily. As much as possible, these conventions correspond to those found in other Microsoft® Windows® compatible software documentation.

Menu names and options are printed in bold type: the **File** menu.

Dialog box names begin with uppercase letters: the Axis Limits dialog box.

Dialog box field names are in quotes: “Field Name.”

Button names are in italic: *OK* button.

Source code is printed in Courier font: `Case ERMS`.

In addition, you will find the following typographic conventions throughout this manual.

This	Represents
bold	Characters that you must type exactly as they appear. For example, if you are directed to type a:setup , you should type all the bold characters exactly as they are printed.
italic	Placeholders for information you must provide. For example, if you are directed to type <i>filename</i> , you should type the actual name for a file instead of the word shown in italic type.
ALL CAPITALS	Directory names, file names, key names, and acronyms.
SMALL CAPS	Non-printable ASCII control characters.
KEY1+KEY2 example: (Alt+F)	A plus sign (+) between key names means to press and hold down the first key while you press the second key.
KEY1,KEY2 example: (Alt,F)	A comma (,) between key names means to press and release the keys one after the other.

WARNING

“Warning” indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION

“Caution” indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury.

CAUTION

“Caution” used without the safety alert symbol indicates a potentially hazardous situation that, if not avoided, may result in property damage.

Note

For the purpose of this manual and product, “Note” indicates essential information about the product or the respective part of the manual.

Throughout this manual, the word “drive” refers to an MDS.

Safety Instructions

General Warning

Failure to follow safe installation guidelines can cause death or serious injury. The voltages used in the product can cause severe electric shock and/or burns and could be lethal. Extreme care is necessary at all times when working with or adjacent to the product. The installation must comply with all relevant safety legislation in the country of use.

Qualified Person

For the purpose of this manual and product, a “qualified person” is one who is familiar with the installation, construction and operation of the equipment and the hazards involved. In addition, this individual has the following qualifications:

- Is trained and authorized to energize, de-energize, clear and ground and tag circuits and equipment in accordance with established safety practices.
- Is trained in the proper care and use of protective equipment in accordance with established safety practices.
- Is trained in rendering first aid.

Reference Materials

The following related reference and installation manuals may be useful with your particular system.

- *MDS Module Installation Manual* (P/N 400525-02)
- *MDS Reference Manual* (P/N 400525-01)
- *CT-MME-POWER-CD* (P/N 962524-00)

Safety Considerations

Safety Precautions

This product is intended for professional incorporation into a complete system. If you install the product incorrectly, it may present a safety hazard. The product and system may use high voltages and currents, carries a high level of stored electrical energy, or is used to control mechanical equipment which can cause injury.

You should give close attention to the electrical installation and system design to avoid hazards either in normal operation or in the event of equipment malfunction. System design, installation, commissioning and maintenance must be carried out by personnel who have the necessary training and experience. Read and follow this safety information and the instruction manual carefully.

Enclosure

This product is intended to be mounted in an enclosure which prevents access except by trained and authorized personnel, and which prevents the ingress of contamination. This product is designed for use in an environment classified as pollution degree 2 in accordance with IEC664-1. This means that only dry, non-conducting contamination is acceptable.

Setup, Commissioning and Maintenance

It is essential that you give careful consideration to changes to drive settings. Depending on the application, a change could have an impact on safety. You must take appropriate precautions against inadvertent changes or tampering. Restoring default parameters in certain applications may cause unpredictable or hazardous operation.

Safety of Machinery

Within the European Union all machinery in which this product is used must comply with Directive 89/392/EEC, Safety of Machinery.

The product has been designed and tested to a high standard, and failures are very unlikely. However the level of integrity offered by the product's control function – for example stop/start, forward/reverse and maximum speed – is not sufficient for use in safety-critical applications without additional independent channels of protection. All applications where malfunction could cause injury or loss of life must be subject to a risk assessment, and further protection provided where needed.

WARNING

General warning

Failure to follow safe installation guidelines can cause death or serious injury. The voltages used in this unit can cause severe electric shock and/or burns, and could be lethal. Extreme care is necessary at all times when working with or adjacent to this equipment. The installation must comply with all relevant safety legislation in the country of use.

AC supply isolation device

The AC supply must be removed from the drive using an approved isolation device or disconnect before any servicing work is performed, other than adjustments to the settings or parameters specified in the manual. The drive contains capacitors which remain charged to a potentially lethal voltage after the supply has been removed. Allow at least 6 minutes for the Epsilon 205, 3 minutes for Epsilon 202/203 and 30 seconds for E Series drives after removing the supply before carrying out any work which may involve contact with electrical connections to the drive.

Products connected by plug and socket

A special hazard may exist where the drive is incorporated into a product which is connected to the AC supply by a plug and socket. When unplugged, the pins of the plug may be connected to the drive input, which is only separated from the charge stored in the bus capacitor by semiconductor devices. To avoid any possibility of electric shock from the pins, if they are accessible, a means must be provided for automatically disconnecting the plug from the drive (e.g., a latching contactor).

Grounding (Earthing, equipotential bonding)

The drive must be grounded by a conductor sufficient to carry all possible fault current in the event of a fault. The ground connections shown in the manual must be followed.

Fuses

Fuses protection must be provided at the input in accordance with the instructions in the manual.

Isolation of control circuits

The installer must ensure that the external control circuits are isolated from human contact by at least one layer of insulation rated for use at the applied AC supply voltage.

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Drive Module Removal

Step 1: Removing a Drive Module from it's backplane

⚠ WARNING

DO NOT remove the Drive Modules until at least 2 minutes after AC Power has been remove from the system.

1. Unplug all I/O and/or cable connections to the Drive Module.
2. Loosen the Retaining Screws of the module being removed
3. Grasp the top and bottom Integrated Removal Tab of the module.
4. Pull the module from the backplane.

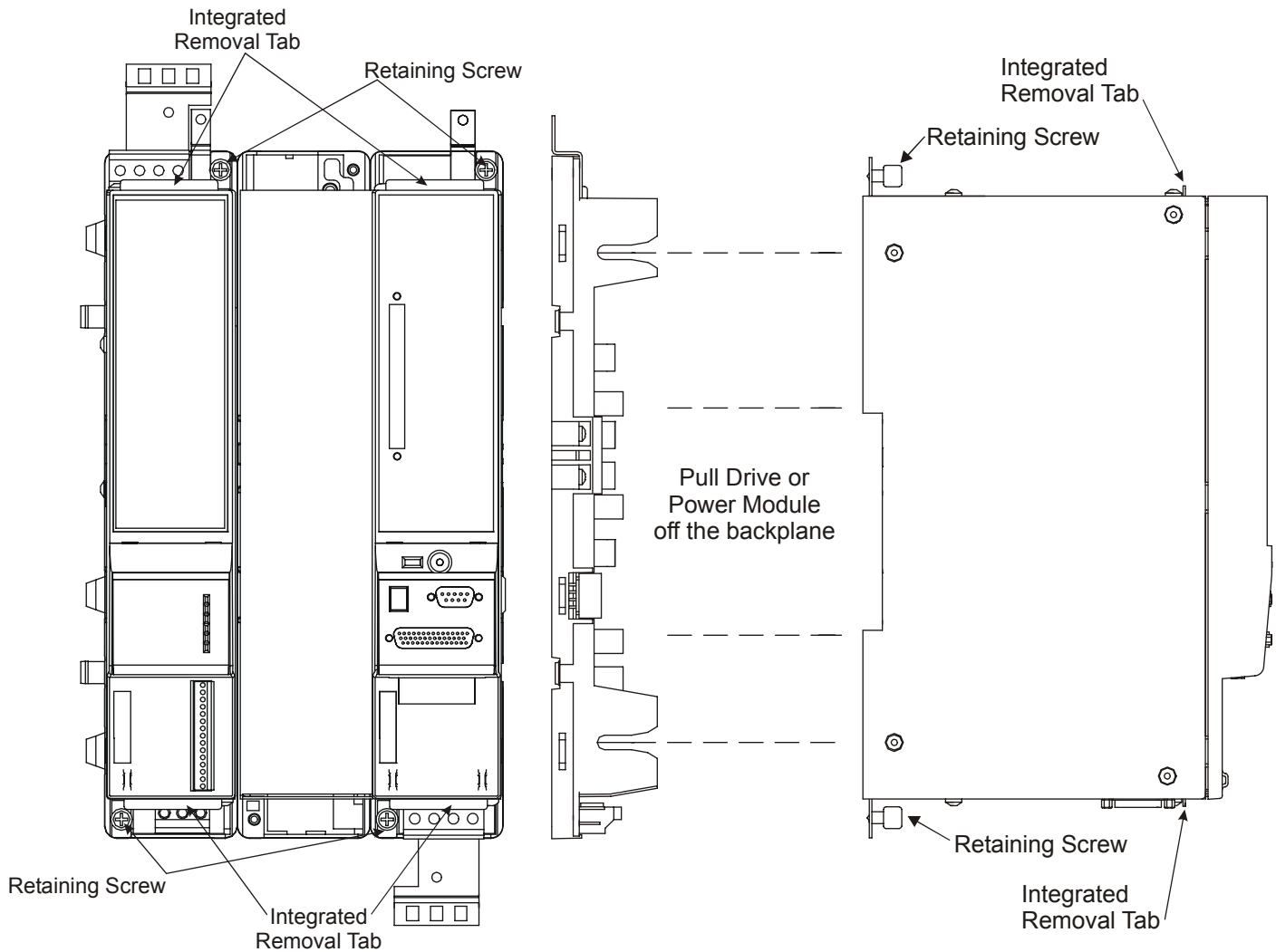


Figure 1: Drive Module Removal Diagram

Step 2: Drive Module Fuse Replacement (If Required)

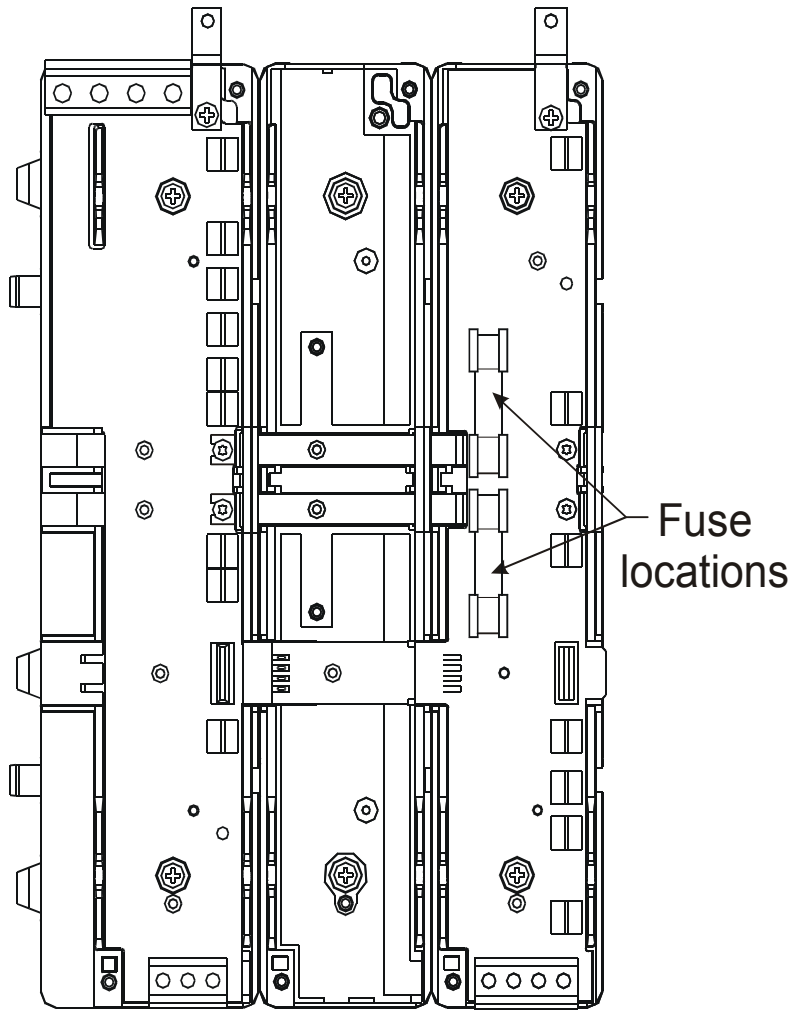


Figure 2: Fuse Location in a Drive Module Backplane - MP-2500/MD-434 Shown

The Drive Module backplane is equipped with two over current protection fuses with the ratings shown here. Control Techniques recommends fuse type: SHAWMUT® A70Q514F.

Drive Module	Fuse Rating
MD-404	10 A
MD-407	16 A
MD-410	20 A
MD-420	32 A
MD-434	50 A

Step 3: Drive Module Backplane Disassembly (If Required)

These instructions are to remove a Drive Module backplane from another Module backplane. Shown in the figure below is a Power and Drive Module Backplane assembly.

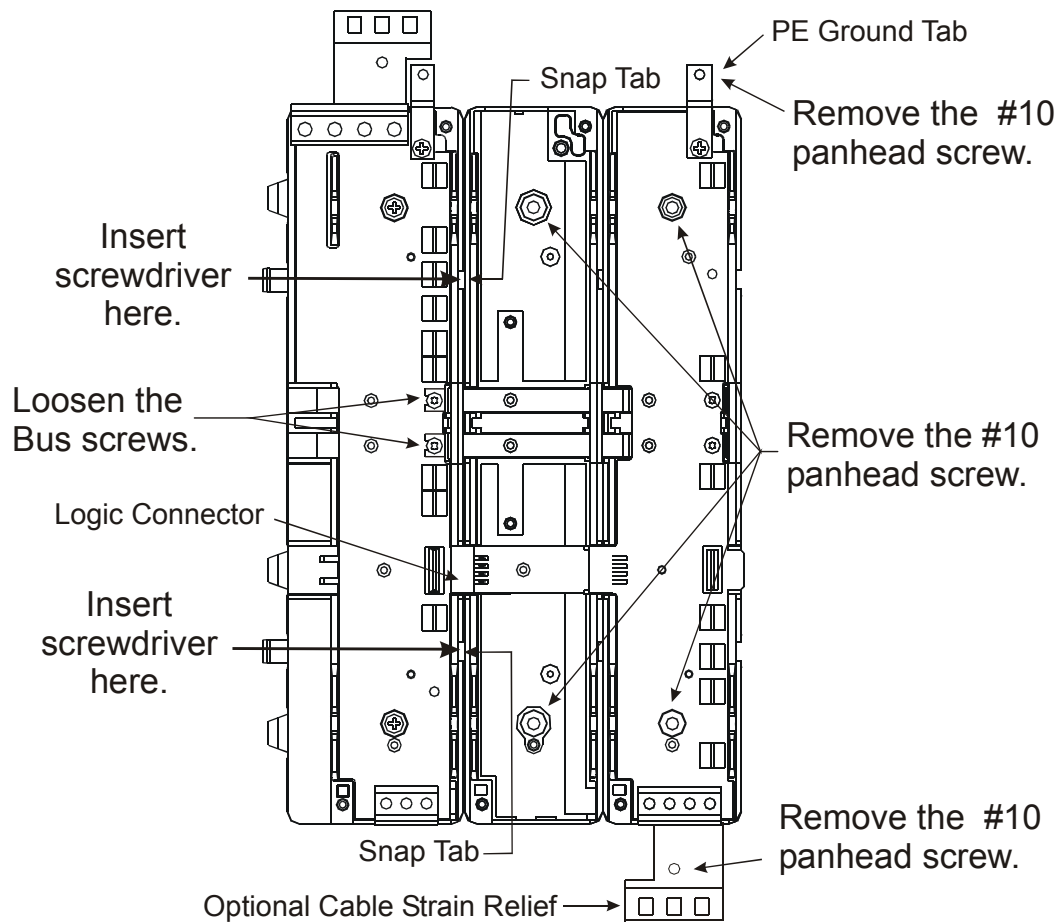


Figure 3: Drive Module Backplane Disassembly Diagram

⚠ WARNING

DO NOT remove the Drive Modules until at least 2 minutes after AC Power has been removed from the system.

1. Remove the Drive Module from its backplane. For details see "Drive Module Removal" on page 1.
2. Remove the PE ground tab screw and if applicable the Optional Cable Strain Relief screw of the backplane being removed.
3. Remove the screws that secure the backplane to the metal mounting panel. If applicable the Optional Cable Strain Relief can be removed now.
4. Loosen the Bus screws.
5. Insert a flat tipped screwdriver into the slot between backplanes as shown in Fig 3. Push on the screwdriver with enough force to depress the snap tab, at the same time carefully pull the backplane away from the other backplane. The backplanes only need to be separated far enough so the snap tab is unlocked from the other backplane.
6. Insert the screwdriver in the slot on the other end of the backplane and depress the snap tab, carefully pull the backplane away, unplugging the Logic connector from the other backplane.

Drive Module Installation

Drive Module Dimensions

Dimensional drawings can be found at www.emersonct.com or on the CT-MME-POWER-CD and Installation Manual that is shipped with the Power Module.

Step 1: Drive Module Backplane Installation

Note

Starting from the Power Module, the Drive Modules must be installed from largest (highest current rating) to smallest (lowest current rating), with the largest size attached to the Power Module.

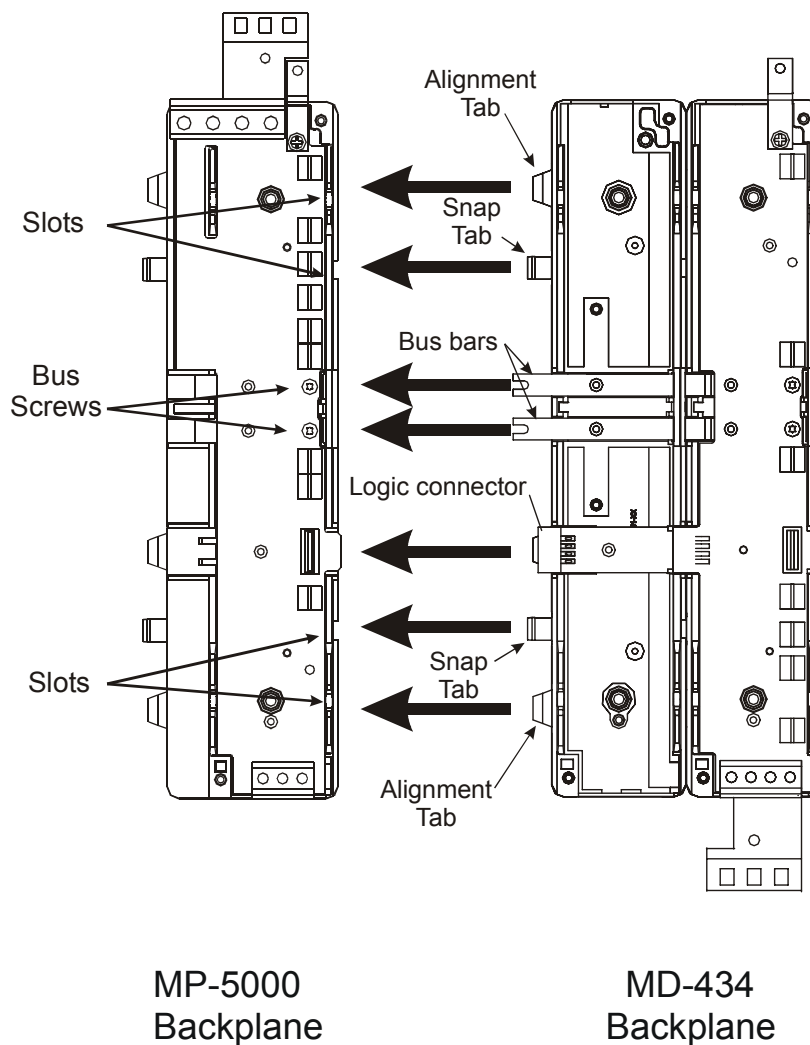


Figure 4: Assembling the Drive Module Backplane to the Power Module Backplane.

1. Loosen the DC Bus screws on the Power Module backplane.
2. Align the DC Bus bars with the DC Bus screws, the Logic connector with the Power Module board and all the tabs on the Drive Module backplane with the slots in the Power Module backplane.
3. Push the Drive Module backplane firmly into the Power Module backplane until the Bus bars are under the DC Bus screws and the backplanes snap together. The Power Module backplane board is plugged into the Drive Module backplane Logic connector and the tabs are secure in the slots. Backplane side walls of both modules are in contact with each other.
4. Torque the bus screws to 8-10 in.lbs.

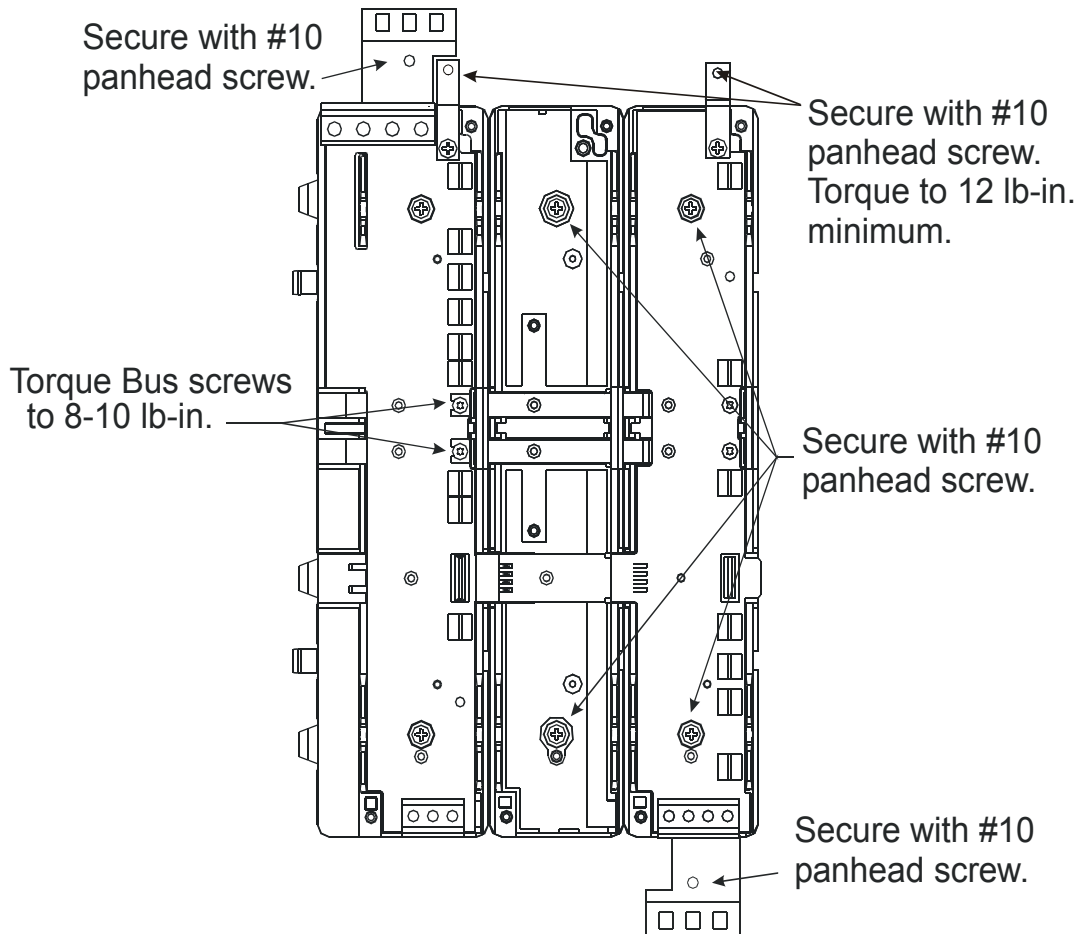


Figure 5: Securing the Drive Module backplane to the Power Module backplane.

5. To install the Optional Cable Strain Relief bracket, slide the bracket behind the backplane, aligning the slot with the backplane screw, push until it stops then secure with a #10 panhead screw.
6. Secure the Drive Module backplane to enclosure mounting panel with #10 panhead screws.

Note

The paint must be removed from behind the PE Ground Tab to ensure proper ground connection.

7. Secure the PE ground tab with a #10 panhead screw, torque to 12 in.lb.
8. Continue adding Drive Modules, largest to smallest, by repeating step 1 through step 7.

The Power Module and Drive Module backplanes can be assembled as described above, where one backplane is assembled and secured to the enclosure at a time. Another method is to assemble all the backplane together (Steps 1-4) and then secured to the enclosure mounting panel.

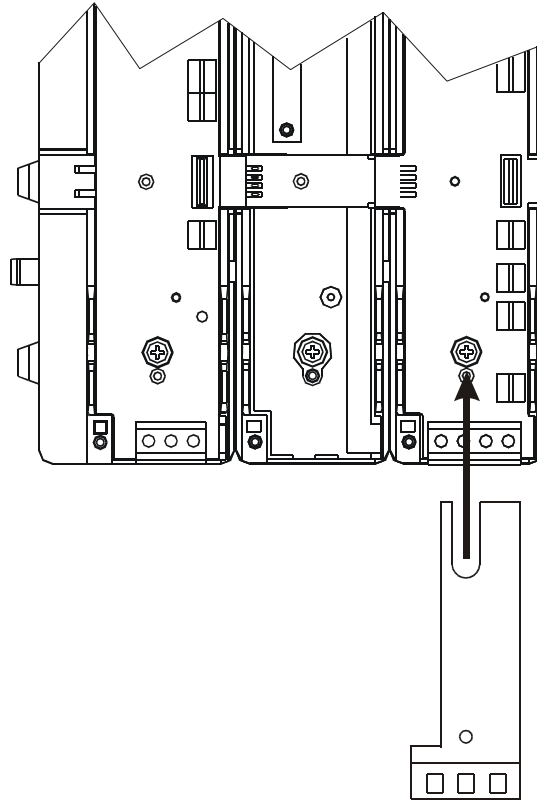


Figure 6: Installing the Optional Cable Strain Relief Bracket

Step 2: Drive Module High Power Connections

Motor Power Cable Wiring to the Drive Module

The Motors are equipped with up to three male MS (Military Standard) connectors, one for motor power connections, one for encoder connections and one for the brake (if so equipped).

Motor power connections from the Drive Module to the motor can be made with the CMDS, CMMS, CMDF or CMMF cable which have a female MS style connector on the motor end and four individual wires and shield that connect to the motor power connector on the bottom of the Drive Module.

Note

The motor ground wire and shields must be run all the way back to the amplifier terminal and must not be connected to any other conductor, shield or ground.

Drive Module Motor Connections	Motor Power Cable Model Color Code	
	For HT and MH motors	
	CMDS, CMMS, and CMLS	CMDF, CMMF and CMLF
PE	Green/Yellow	Green/Yellow
T	Blue	Red 3
S	Black	Red 2
R	Brown	Red 1

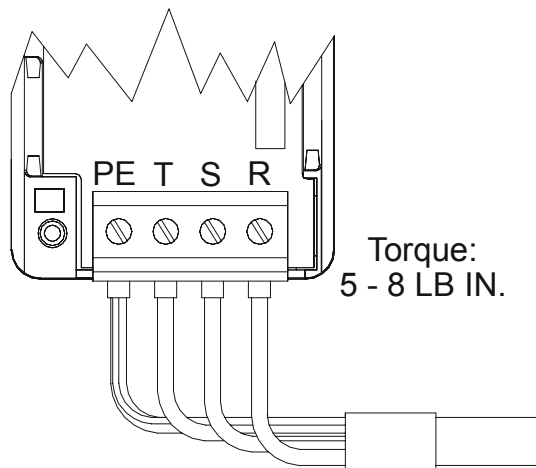


Figure 7: Drive Module Motor Power Wiring Diagram

Step 3: Drive Module Installation

After the Power Module is installed to its backplane the Drive Modules can be installed to their respective backplanes.

Note

Make sure all power is off before installing any of the modules.

Orient the Drive Module so the top of the module is up and the alignment bars in the Module aligns with the alignment tabs in the backplane. The sheet metal of the Drive Module will be on the outside of the alignment tabs.

CAUTION

Improper alignment of the module can cause damage to the module or the backplane.

Firmly press the Drive Module into the backplane to insure good backplane connection. When the Module is completely seated to the backplane, tighten the top and bottom retaining screws.

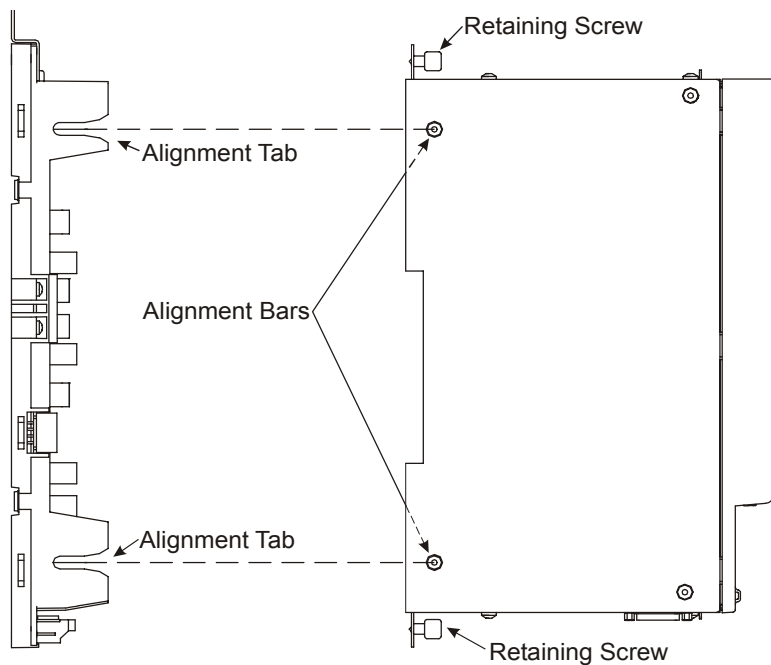


Figure 8: Drive Module Assembly Diagram

Since 1979, the “Motion Made Easy” products, designed and manufactured in Minnesota U.S.A., are renowned in the motion control industry for their ease of use, reliability and high performance.

For more information about Control Techniques “Motion Made Easy” products and services, call (800) 397-3786 or contact our website at www.emersonct.com.

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