PowerFlex® 700S and 700H Frame 11 Replacement Power Structures

Introduction

Use this document to install a replacement power structure on a PowerFlex 700S or 700H frame 11 drive. This document covers the following replacement power structures:

Spare Module Catalog String	PowerFlex 700H AC Input	PowerFlex 700H DC Input	PowerFlex 700S AC Input	PowerFlex 700S DC Input
SK-H1-PWRMOD-E460	20CE460	20CK460	20DE460	20DK460
	20CF460	20CM460	20DF460	20DM460
SK-H1-PWRMOD-E502	20CE502	20CK502	20DE502	20DK502
	20CF502	20CM502	20DF502	20DM502
SK-H1-PWRMOD-E590	20CE590	20CK590	20DE590	20DK590
	20CF590	20CM590	20DF590	20DM590
SK-H1-PWRMOD-D590	20CC590	20CH590	20DC590	20DH590
	20CD590	20CJ590	20DD590	20DJ590
SK-H1-PWRMOD-D650	20CC650	20CH650	20DC650	20DH650
	20CD650	20CJ650	20DD650	20DJ650
SK-H1-PWRMOD-D730	20CC730	20CH730	20DC730	20DH730
	20CD730	20CJ730	20DD730	20DJ730

What You Need to Do

- ❒ Step 1: Configure new power structure
- ❒ Step 2: Remove power from existing drive
- ❒ Step 3: Remove old power structure
- ❒ Step 4: Install new power structure
- ❒ Step 5: Connect new power structure to components in drive
- ❒ Step 6: Install product identification label on new power structure
- ❒ Step 7: Start drive

Step 1: Configuring the New Power Structure

Before configuring the power structure you must remove the protective covers from the drive. Refer to publication PFLEX-IN006…, *Installation Instructions - PowerFlex 700S and 700H High Power Drives,* for assistance in removing these covers.

Configuring a DC Input Drive

Power structures are shipped from the factory pre-configured for DC input operation.

Connecting an AC Input Drive

Power structures are shipped from the factory pre-configured for DC input operation. When installing a replacement power structure on a drive with AC input, you must remove the X2 plug from it's protective sleeve and plug the cable into the ASIC and Rectifier board(s).

Task	Description
Ⓐ	Remove the cover from the ASIC board assembly.
Ⓑ	Disconnect the ASIC fan from the assembly by unplugging the cable from X1 on the ASIC board (see Figure 1 on page 3 for location).
Ⓒ	Remove the cover from the connector on the loose cable (bundled with the flat gate driver board cables) and connect the cable to the X2 connector on the ASIC board (see Figure 1 on page 3 for location).
Ⓓ	Connect the other end of the cable connected to X2 on the ASIC board to the X13 connector for the Rectifier board(s) on the V Phase and W Phase (if present) power stack (see Figure 2 on page 3 for location).
Ⓔ	Connect the fan cable to the X1 connector on the ASIC board.
Ⓕ	Install the cover on the ASIC board assembly.

Figure 1 ASIC Board Connections

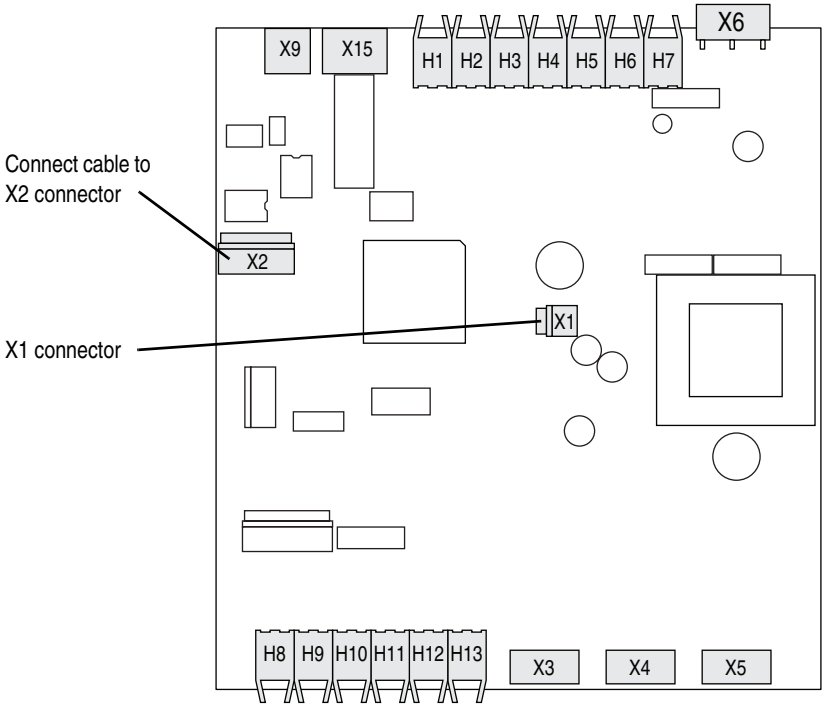
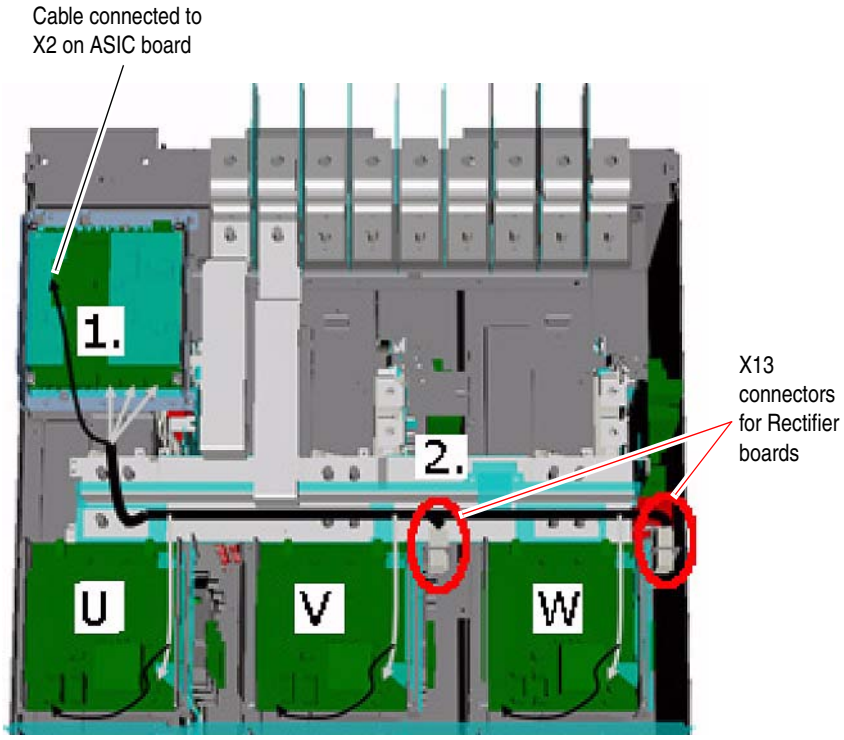


Figure 2 Rectifier Board Connectors



Configuring the EMC Filter

Frame 11 size drives are equipped with common mode capacitors. To guard against drive damage, these capacitors should be disconnected depending upon the type of ground system on which the drive is installed.

Installation on an Ungrounded Distribution System or High Resistive Ground

If you are installing a **400/480V** AC input drive on an ungrounded distribution system or high resistive ground, you:

- Must move the common mode jumper to the disconnected position - refer to Move the Common Mode Jumper to the Disconnected Position on page 6.
- Should insulate terminal X4 on the Rectifier circuit board- refer to Insulate Terminal X4 on the Rectifier Circuit Board on page 7.

If you are installing a **600/690V** AC input drive on an ungrounded distribution system or high resistive ground, you:

- Must move the common mode jumper to the disconnected position - refer to Move the Common Mode Jumper to the Disconnected Position on page 6.
- Must insulate terminal X4 on the Rectifier circuit board- refer to Insulate Terminal X4 on the Rectifier Circuit Board on page 7.

Installation on a Grounded B Phase Delta System

If you are installing a drive on a grounded B phase Delta system, you:

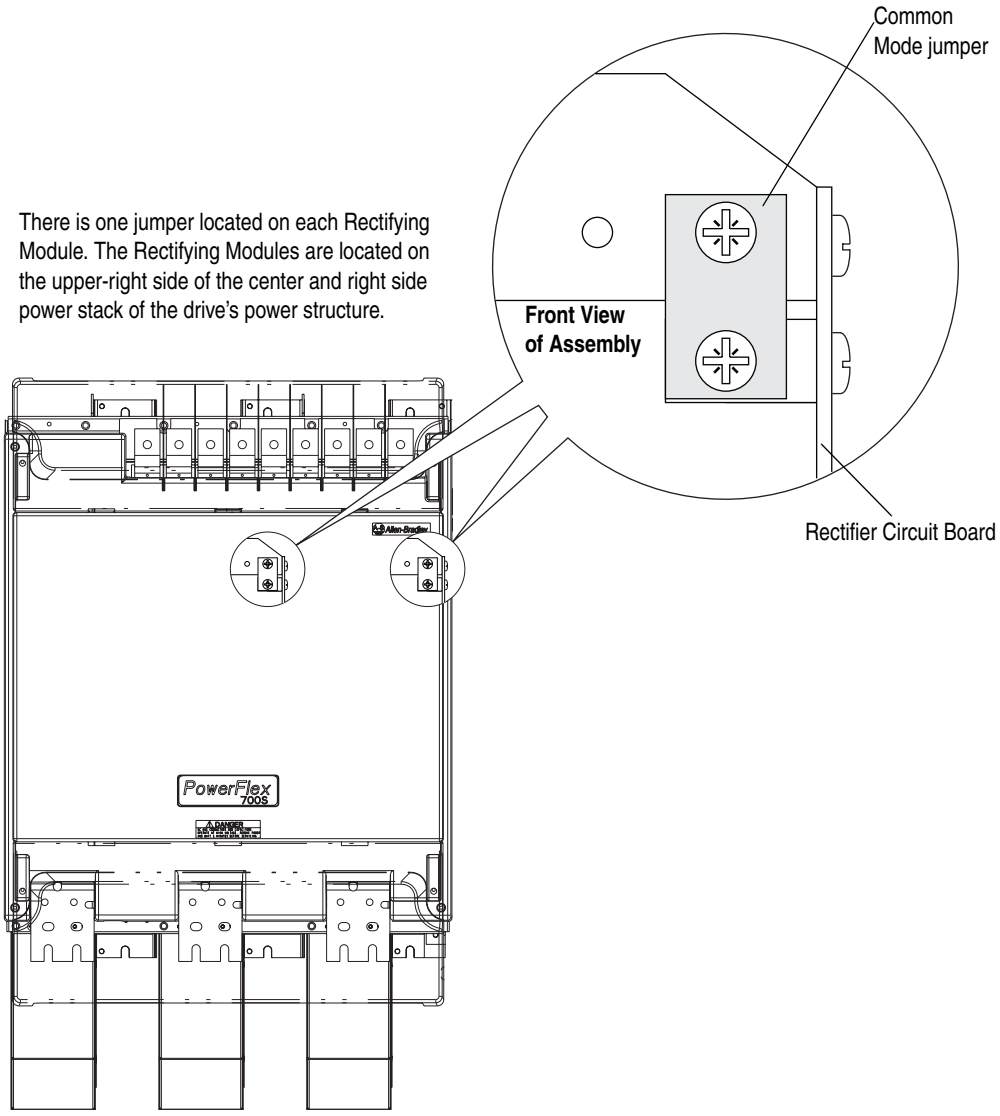
- Must move the common mode jumper to the disconnected position - refer to Move the Common Mode Jumper to the Disconnected Position on page 6.
- Must insulate terminal X4 on the Rectifier circuit board- refer to Insulate Terminal X4 on the Rectifier Circuit Board on page 7.

Note: Refer to *Wiring and Grounding Guidelines for Pulse Width Modulated (PWM) AC Drives - Installation Instructions*, publication DRIVES-IN001…, for additional information on an ungrounded distribution system or high resistive ground installation.

The jumper is located on the Rectifying Module(s). For drives with one Rectifying Module, it is located on the upper-right side of the middle power stack (V Phase). For drives with two Rectifying Modules, they are located on the upper-right side of the middle (V Phase) and right-side (W Phase) power stacks.

Voltage Class	Amps	Number of Rectifying Modules
400/480V AC	590	2
	650	2
	730	2
600/690V AC	460	1
	502	1
	590	2

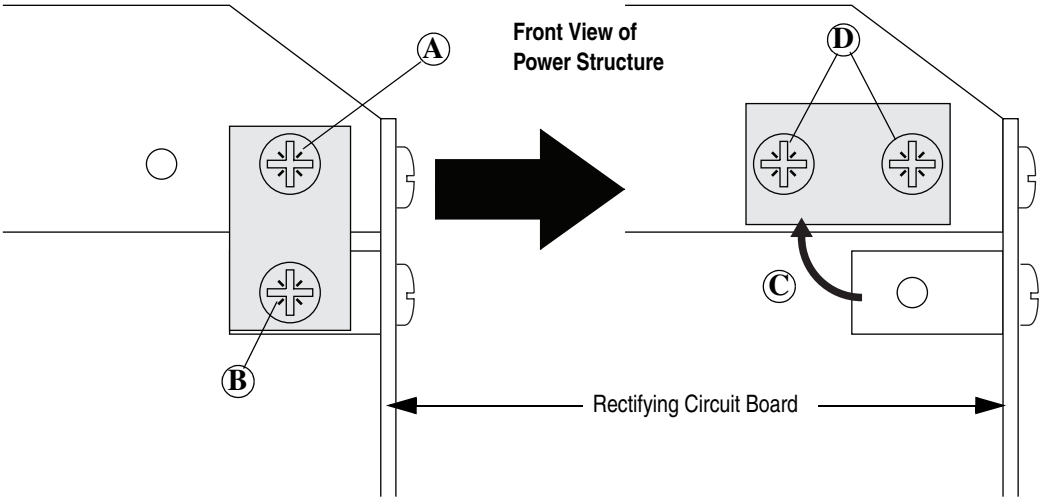
Figure 3 Common Mode Jumper and Rectifier Circuit Board Location



Move the Common Mode Jumper to the Disconnected Position

1. Follow the lettered steps below to move the common mode jumper to the disconnected position (refer to Figure 3 on page 5 for jumper location).

Task	Description
Ⓐ	Loosen the upper screw.
Ⓑ	Remove the lower screw.
Ⓒ	Move the jumper to the horizontal position.
Ⓓ	Install and tighten the screws.

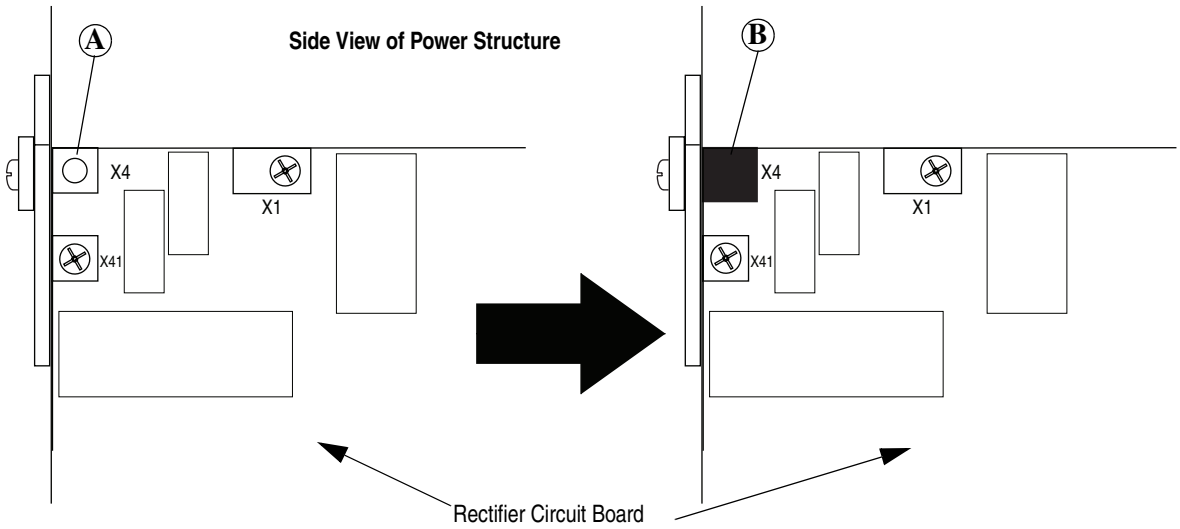


Insulate Terminal X4 on the Rectifier Circuit Board

1. Follow the lettered steps below to insulate terminal X4 on the Rectifier circuit board (refer to Figure 3 on page 5 for jumper location).

Task	Description
Ⓐ	Remove the screw from the X4 connection on the Rectifier circuit board.
Ⓑ	Insulate the top and bottom of the X4 connection on the Rectifier circuit board.

Important: Do not install the screw and washer that was removed from this connection.



Step 2: Removing Power From the Existing Drive

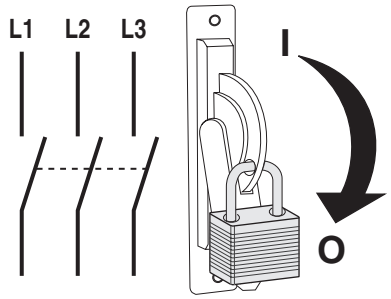
ATTENTION: To avoid an electric shock hazard, verify that the voltage on the bus capacitors has discharged before servicing the drive. Check the DC bus voltage at the Power Terminal Block by measuring between the +DC and -DC terminals, between the +DC terminal and the chassis, and between the -DC terminal and the chassis. The voltage must be zero for all three measurements.

Remove power before making or breaking cable connections. When you remove or insert a cable connector with power applied, an electrical arc may occur. An electrical arc can cause personal injury or property damage by:

- sending an erroneous signal to your system's field devices, causing unintended machine motion
- causing an explosion in a hazardous environment

Electrical arcing causes excessive wear to contacts on both the module and its mating connector. Worn contacts may create electrical resistance.

1. Turn off and lock out input power. Wait five minutes.
2. Verify that there is no voltage at the drive's input power terminals.
3. Measure between the +DC and -DC terminals, between the +DC terminal and the chassis, and between the -DC terminal and the chassis. The voltage must be zero for all three measurements.



Step 3: Removing the Old Power Structure

Refer to the *PowerFlex 700H/S Frame 11 Hardware Service Manual*, publication PFLEX-TG003…, for information about removing the power structure.

Step 4: Installing the New Power Structure

Refer to the *PowerFlex 700H/S Frame 11 Hardware Service Manual*, publication PFLEX-TG003…, for information about installing the power structure.

Step 5: Connecting the Power Structure to Components in the Drive

You must connect the power structure to control components on the control frame. If the drive has DC input, you must also connect the precharge circuit.

Connections to the 700S Control Frame

When installing a power structure in a PowerFlex 700S drive, you must make the following connections between the ASIC and Fiber Optic Interface, Power Supply Voltage Feedback, Common Mode Filter and Rectifier boards.

Connect this component: termination point in the Power Structure to …	…this component : termination point on the Control Frame
ASIC Board: H1 (fiber optic connector)	Fiber Optic Interface Board: J8 (fiber optic connector)
ASIC Board: H2 (fiber optic connector)	Fiber Optic Interface Board: J9 (fiber optic connector)
ASIC Board: H3 (fiber optic connector)	Fiber Optic Interface Board: J10 (fiber optic connector)
ASIC Board: H4 (fiber optic connector)	Fiber Optic Interface Board: J11 (fiber optic connector)
ASIC Board: H5 (fiber optic connector)	Fiber Optic Interface Board: J12 (fiber optic connector)
ASIC Board: H6 (fiber optic connector)	Fiber Optic Interface Board: J14 (fiber optic connector)
ASIC Board: H7 (fiber optic connector)	Fiber Optic Interface Board: J13 (fiber optic connector)
ASIC Board: X10	Insulate and do not connect
ASIC Board: X2	Rectifier Board: X13 (AC input drives only)
Power Supply Voltage Feedback Board: J8	Common Mode Filter Board: J5
Power Supply Voltage Feedback Board: J5 (fiber optic connector)	Fiber Optic Interface Board: J6
Power Supply Voltage Feedback Board: J4 (fiber optic connector)	Fiber Optic Interface Board: J7

Figure 4 Connections for 700S Drives with Phase II Control

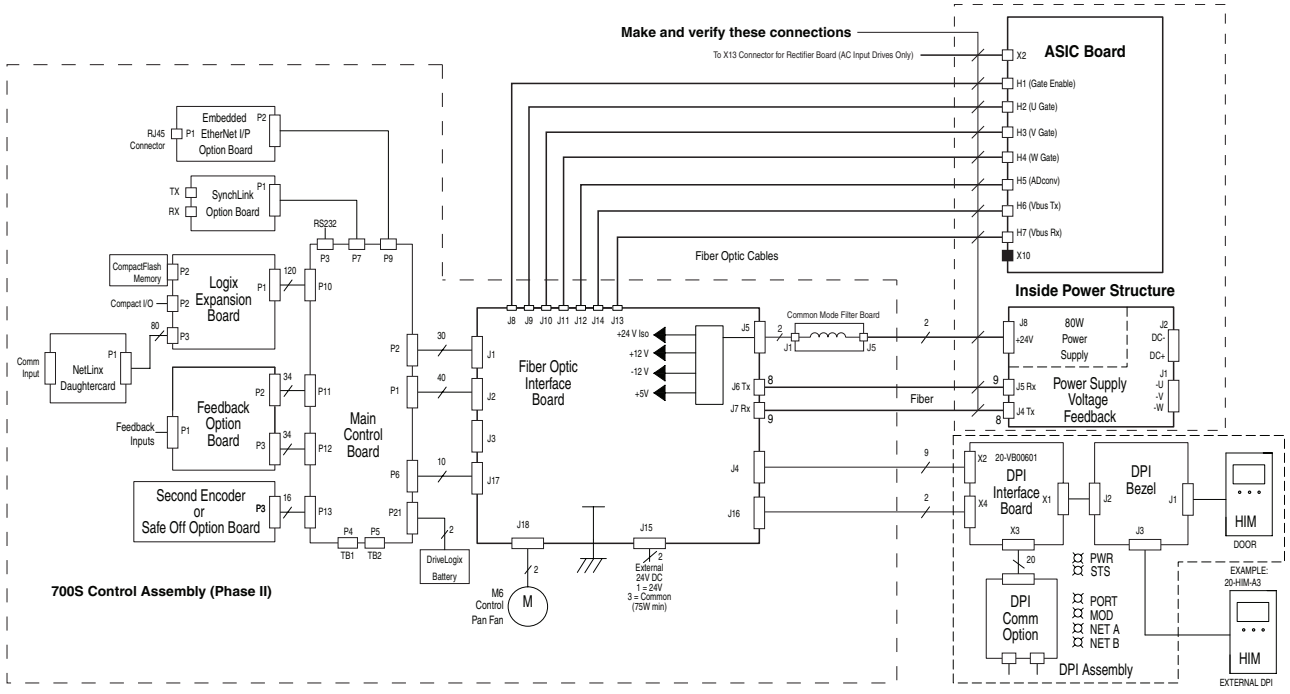


Figure 5 Termination Points on the ASIC Board

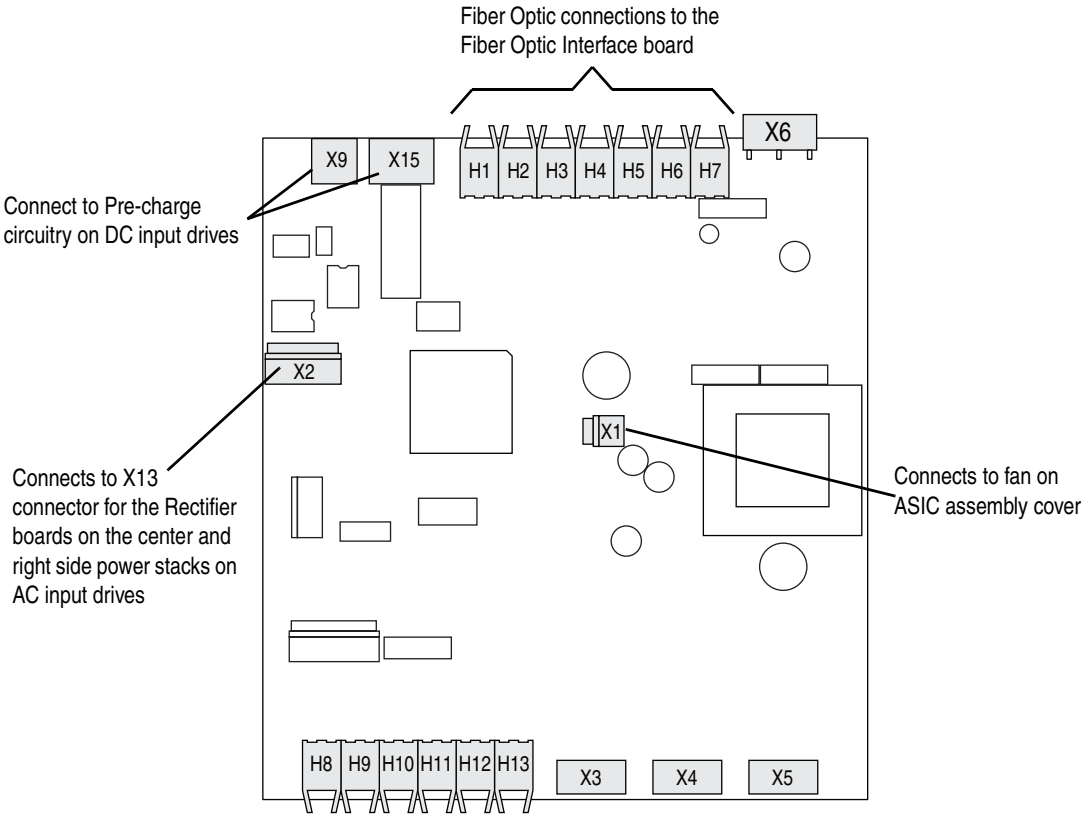
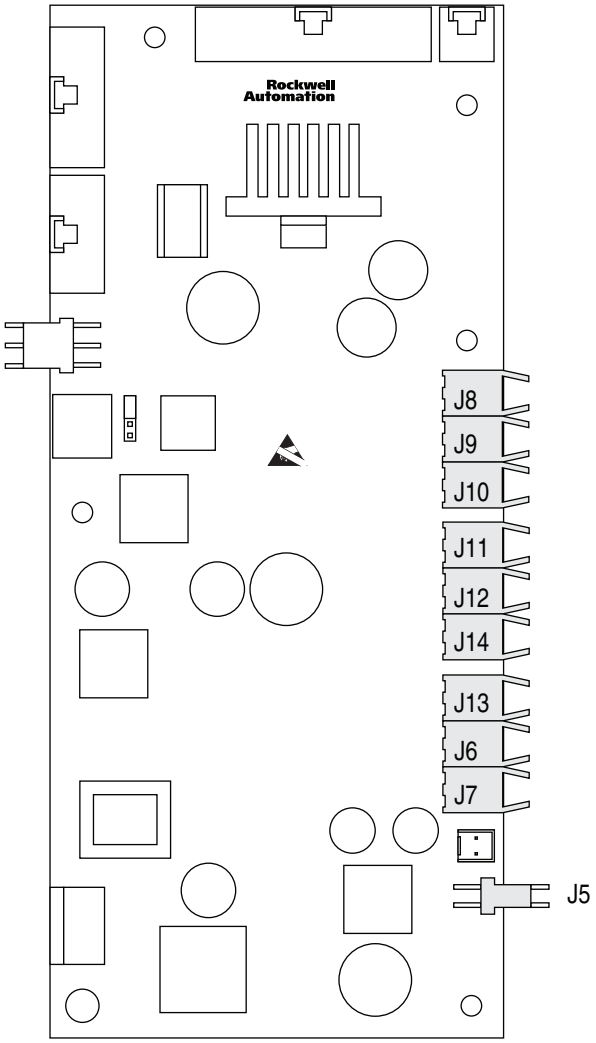
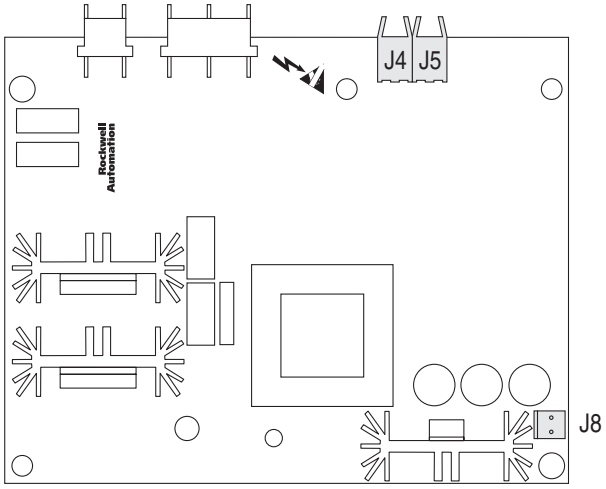


Figure 6 Termination Points on 700S Boards

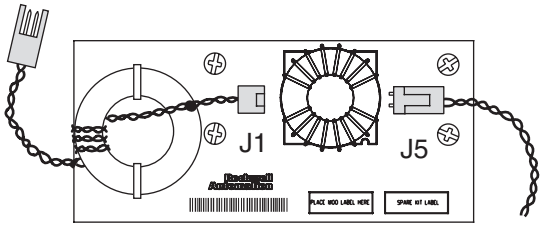
Fiber Optic Interface Board



Power Supply Voltage Feedback Board



Common Mode Filter Board



Connections to the 700H Control Frame

When installing a power structure in a PowerFlex 700H drive, you must make eight connections between the ASIC and Fiber Optic Adapter and Rectifier boards.

Connect this component: termination point in the Power Structure to …	…this component : termination point on the Control Frame
ASIC Board: H1 (fiber optic connector)	Fiber Optic Adapter Board: H1 (fiber optic connector)
ASIC Board: H2 (fiber optic connector)	Fiber Optic Adapter Board: H2 (fiber optic connector)
ASIC Board: H3 (fiber optic connector)	Fiber Optic Adapter Board: H3 (fiber optic connector)
ASIC Board: H4 (fiber optic connector)	Fiber Optic Adapter Board: H4 (fiber optic connector)
ASIC Board: H5 (fiber optic connector)	Fiber Optic Adapter Board: H5 (fiber optic connector)
ASIC Board: H6 (fiber optic connector)	Fiber Optic Adapter Board: H6 (fiber optic connector)
ASIC Board: H7 (fiber optic connector)	Fiber Optic Adapter Board: H7 (fiber optic connector)
ASIC Board: X10	Fiber Optic Adapter Board: X2
ASIC Board: X2	Rectifier Board: X13

Figure 7 Connections Between the Power Structure and Control Frame (700H Drives)

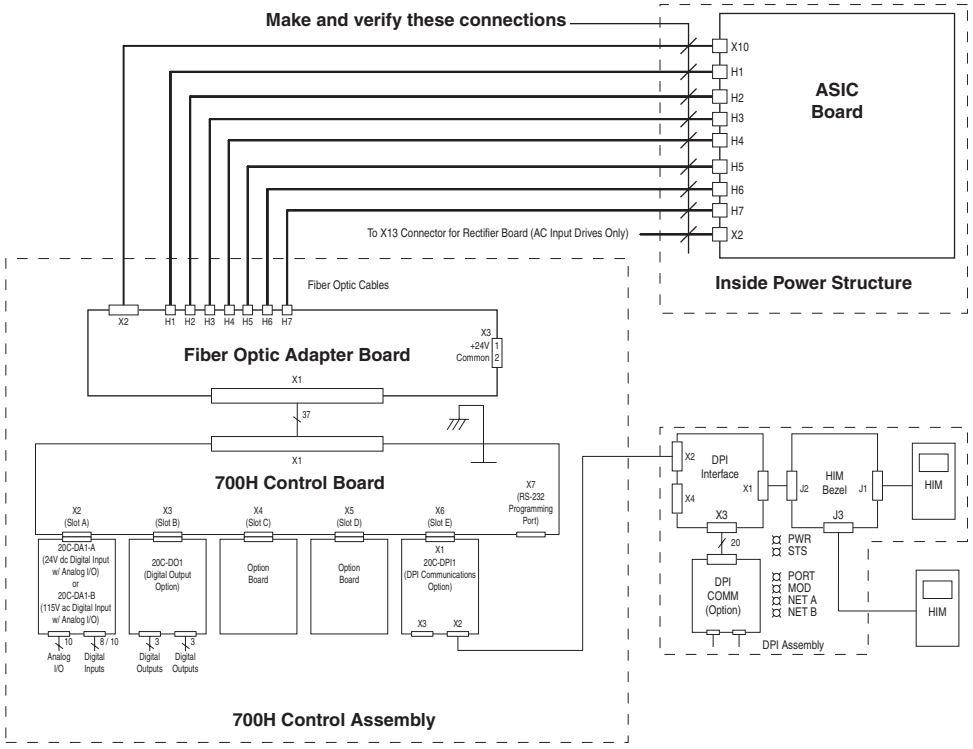
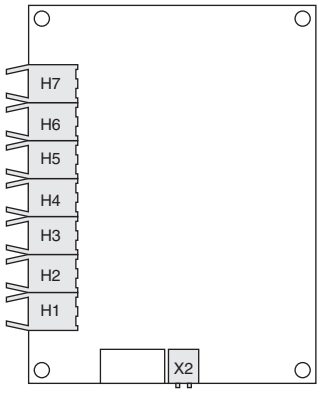


Figure 8 Termination Points on Fiber Optic Adapter Board (700H Drives)
Back View



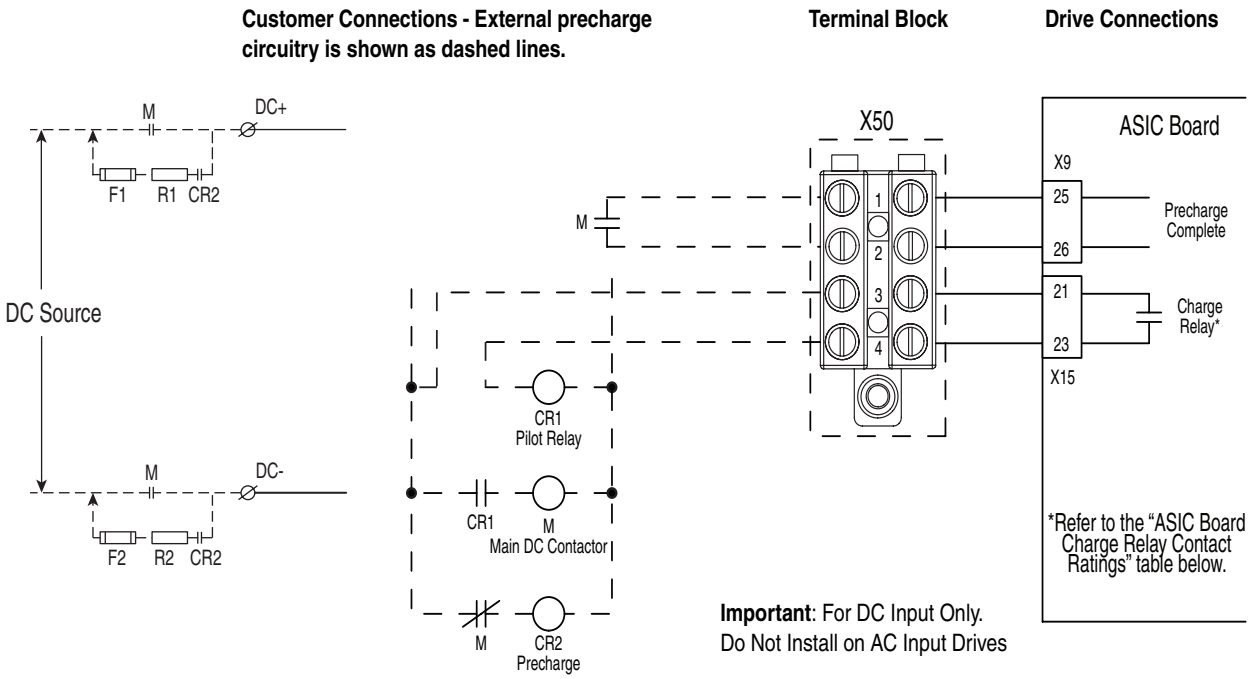
Pre-Charge Connections on Drives with DC Input

You must connect the ASIC board connectors X9 and X15 to the X50 terminal block for the pre-charge circuit. The X50 terminal block is located on the Control Frame. Refer to the *Installation Instructions - PowerFlex 700S and 700H High Power Drives*, publication PFLEX-IN006…, for information regarding the pre-charge circuit.

X50 Terminal Block Connections

ASIC Board Connector	Terminal	to	X50 Terminal	Pre-Charge Circuit Connection Description
X9	25	. . .	1	Pre-charge Complete Signal (+24V DC)
	26	. . .	2	Pre-charge Complete Signal (Common)
X15	21	. . .	3	Charge Relay Contact
	23	. . .	4	Charge Relay Contact

Figure 9 Sample Pre-charge Wiring Diagram

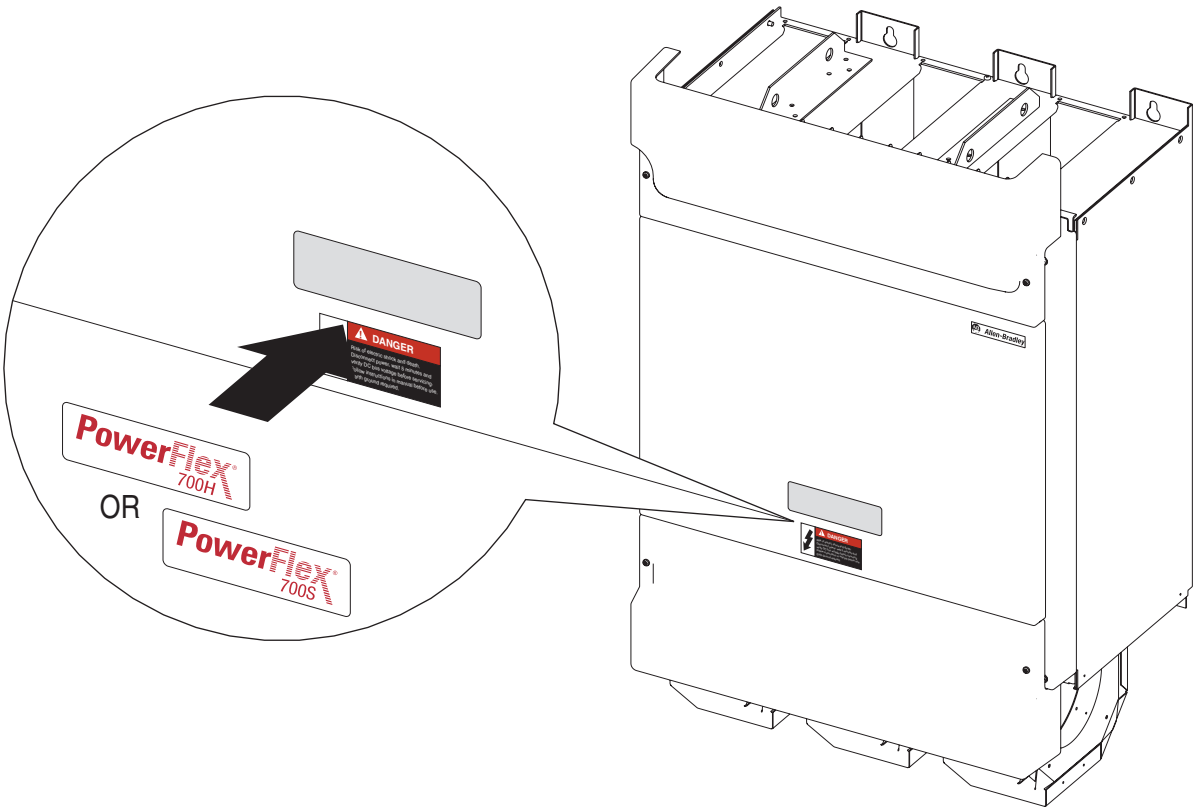


ASIC Board Charge Relay Contact Ratings

Load	Resistance load (cos ϕ = 1)
Rated load	8 A at 250 VAC: 5 A at 30 VDC
Rated carry current	8 A
Max. switching voltage	250 VAC; 30 VDC, (400 VAC)
Max. switching current	AC 8 A; DC 5 A
Max. switching power	2,000 VA; 150 W
Failure rate (reference value)	5 VDC 10 mA (for gold plating 0.35 µ min.)

Step 6: Installing the Product Identification Label on New Power Structure

All frame 11 replacement power structures are shipped from the factory without a product identification label on the drive. If you are installing the power structure in a 700S drive, you should label it with the accompanying PowerFlex 700S label. If you are installing the power structure in a 700H drive, you should label it with the accompanying PowerFlex 700H label.



Step 7: Starting the Drive

1. Install the protective covers on the drive. Refer to publication PFLEX-IN006…, *Installation Instructions - PowerFlex 700S and 700H High Power Drives,* for assistance in installing these covers.
2. Start up the drive. Refer to the Start Up procedures in the appropriate publication:
   - *User Manual - PowerFlex 700S Drives with Phase II Control*, 20D-UM006…
   - *Programming Manual - PowerFlex 700H Drives,* 20C-PM001…

Reference Materials

Allen-Bradley publications are available on the internet at *www.rockwellautomation.com/literature*.

The following manuals are recommended for general drive information:

Title	Publication
Wiring and Grounding Guidelines for Pulse Width Modulated Drives	DRIVES-IN001…
Industrial Automation Wiring and Grounding Guidelines	1770-4.1
Preventive Maintenance of Industrial Control and Drive System Equipment	DRIVES-TD001…
Safety Guidelines for the Application, Installation and Maintenance of Solid State Control	SGI-1.1
A Global Reference Guide for Reading Schematic Diagrams	0100-2.10
Guarding Against Electrostatic Damage	8000-4.5.2

The following manuals are recommended for detailed PowerFlex 700H and 700S information:

Title	Publication
Reference Manual - PowerFlex 700S Drives with Phase II Control	PFLEX-RM003…
User Manual - PowerFlex 700S Drives with Phase II Control	20D-UM006…
Programming Manual - PowerFlex 700H Drives	20C-PM001…
Installation Instructions - PowerFlex 700S and 700H High Power Drives	PFLEX-IN006…
Hardware Service Manual - PowerFlex 700S and 700H Frame 11 Drives	PFLEX-TG003…

For Allen-Bradley Drives Technical Support:

Title	Online at...
Allen-Bradley Drives Technical Support	**www.ab.com/support/abdrives**

www.rockwellautomation.com

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