Installation Instructions

PowerFlex® DC Drive - Frame A SCR Modules for Drives with a Power Traces Circuit Board

ATTENTION: Only qualified personnel familiar with DC drives and associated machinery should plan or implement the installation, start-up and subsequent maintenance of the system. Failure to comply may result in personal injury and/or equipment damage.

ATTENTION: To avoid an electric shock hazard, ensure that all power to the drive has been removed before performing the following.

ATTENTION: This drive contains ESD (Electrostatic Discharge) sensitive parts and assemblies. Static control precautions are required when installing, testing, servicing or repairing this assembly. Component damage may result if ESD control procedures are not followed. If you are not familiar with static control procedures, reference A-B publication 8000-4.5.2, “Guarding Against Electrostatic Damage” or any other applicable ESD protection handbook.

What This Kit Includes

- SCR modules (3 for non-regenerative drives, 6 for regenerative drives)
- Mounting screws and washers (6 for non-regenerative drives, 12 for regenerative drives)
- Gate leads (6 for non-regenerative drives, 12 for regenerative drives)
- Thermal Grease
- Static strap

Important: The SCR Modules supplied with this kit should only be used in the following Frame A drives:

<table>
<thead>
<tr>
<th>230V AC Input</th>
<th>460V AC Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive Current Rating Code</td>
<td>DC Amps</td>
</tr>
<tr>
<td>7P0</td>
<td>7</td>
</tr>
<tr>
<td>9P0</td>
<td>9</td>
</tr>
<tr>
<td>012</td>
<td>12</td>
</tr>
<tr>
<td>020</td>
<td>20</td>
</tr>
<tr>
<td>029</td>
<td>29</td>
</tr>
<tr>
<td>038</td>
<td>38</td>
</tr>
<tr>
<td>055</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Tools That You Need

- Phillips® screwdriver
- Flathead screwdriver
- Nut driver or wrench for hex stand-offs
- Torque wrench

Phillips® is a registered trademark of Phillips Screw Company.

What You Need to Do

The SCR modules are located on the heat sink of the drive chassis, below all circuit boards and components. To install the SCR modules:

- Step 1: Remove power from the drive
- Step 2: Remove the protective covers
- Step 3: Remove the Control EMI shield and Control board
- Step 4: Remove the Pulse Transformer and Switching Power Supply boards
- Step 5: Remove the Power Traces board and AC Current Transducers
- Step 6: Remove the existing SCR modules
- Step 7: Install the new SCR modules
- Step 8: Install the Power Traces board and AC Current Transducers
- Step 9: Install the Pulse Transformer and Switching Power Supply boards
- Step 10: Install the Control EMI Shield and Control board
- Step 11: Replace the protective covers and document the change
Step 1: Remove Power from the Drive

ATTENTION: 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. Remove and lock-out all incoming power to the drive.

Step 2: Remove the Protective Covers

1. Remove the two screws that secure the power terminal cover to the drive and slide the cover down and off the drive chassis.
2. Disconnect the DPI cable from the HIM assembly (if present).

3. Remove the screws that secure the bottom cover to the drive, then slide the cover down and off the drive chassis.

4. Press in on the sides at the bottom edge of the top cover and at the same time pull the cover toward you to pull it partially off the drive chassis.

5. At the top of the drive, pull the cover forward, away from the drive, until the pins fit in the keyhole in the top of the cover, then carefully lift the cover off of the drive chassis.

**Important:** The HIM assembly is connected via a cable to the Control board and therefore will not pull free from the drive until disconnected. See page 5 for instructions.
6. Disconnect the HIM Communication cable from the connector on the upper right corner of the Control board and set the cover aside.
Step 3: Remove the Control EMI Shield and Control Board

Note: The SCR Modules are located on the heat sink of the drive, behind the Control, Pulse Transformer, Switching Power Supply and Power Traces boards. All of these boards must be removed in order to replace the SCR Modules.

1. Carefully disconnect the cables from connectors XA, XR and XFCD on the Control board.

2. Remove all appropriate I/O and control wiring including:
   - digital and analog I/O plug-in terminal blocks on the Control board
   - analog tachometer terminal block on the Control board
   - encoder terminal block on the Control board
   - cable shields that are grounded to the Control EMI shield
   - I/O terminal blocks on the I/O Expansion board
   - I/O terminal blocks on the 115V AC to 24V DC I/O Converter board

Disconnect cables from XA, XR and XFCD
Disconnect I/O and control wiring

Note: Control board shown with Communication Adapter and optional boards removed.
3. Remove the four screws (and ground wire on the lower left corner of board) that secure the Control EMI shield and Control board to the chassis and slide the Control EMI shield and Control board up and out of the drive.

**Important:** Be careful when removing the EMI shield not to pull free any of the gate leads or other cables on the Pulse Transformer circuit board below the EMI shield.
Step 4: Remove the Pulse Transformer and Switching Power Supply Boards

Note: The Switching Power Supply circuit board is secured to the back of the Pulse Transformer circuit board.

1. Remove the slotted air flow plate from the top of the drive.
   - For 38A/10 HP and 55A/15 HP drives with 230V AC input and 35A/20 HP, 45A/25 HP, and 52A/30 HP drives with 460V AC input, remove the four screws that secure the slotted air flow plate to the top of the drive, remove the fan cable from connector XV on the Switching Power Supply board and remove the plate.
– For all other drives, remove the two screws that secure the slotted air flow plate to the top of the drive and remove the plate.

**Important:** Mark all connections and wires before removal to avoid incorrect wiring during reassembly.
Figure 1  Pulse Transformer Circuit Board Layout

Components shown within dashed lines are only on the Pulse Transformer board for regenerative drives.
2. Remove the plug-in control power terminal block from the Pulse Transformer circuit board (refer to Figure 1 on page 10 for location).

3. Remove the cables from connectors X3 and XP on the Pulse Transformer board (refer to Figure 1 on page 10 for location).

4. For drives with a fan, remove the cable from connector X4 on the Pulse Transformer board.

5. For Pulse Transformer boards with an armature voltage feedback terminal block, FIR1-XX, rev “Q” and higher, remove the connector from XCD_IO on the upper left corner of the board.
6. Remove the appropriate gate leads (refer to Figure 1 on page 10 for location):

   - For regenerative drives, remove each pair of (orange and yellow) gate lead cables from connectors KG01…KG06 and KG1…KG6 and push each lead through the appropriate opening in the board.
   
   - For non-regenerative drives, remove each pair of (orange and yellow) gate lead cables from connectors KG01…KG06 and push each lead through the appropriate opening in the board.

   **Important:** Remove the gate leads by grasping the connector and pulling up. DO NOT pull the gate leads off by pulling on the wires.

7. Remove the cable from connectors XTA on the Pulse Transformer board (refer to Figure 1 on page 10 for location).
8. Remove the six screws that secure the Pulse Transformer board (and Switching Power Supply board) to the drive and, while lifting up slightly on the board, slide the Pulse Transformer and Switching Power Supply boards toward the top of the drive and out of the chassis.

**Important:** The cables from connectors X4 (if present) and XTA must slide through the openings in the board as it is lifted out of the drive chassis. Take care not to damage these cables and connectors.

![Image showing the removal of the Pulse Transformer and Switching Power Supply boards]

---

![Image showing the careful routing of cables through openings]

---

![Image showing the regenerative drive]

---
Step 5: Remove the Power Traces Board

1. Remove the screws that secure the terminal lugs (if present) and power and ground wiring to terminals U, V, W, C, D and PE at the bottom of the drive.

Note: Non-regenerative drive without terminal lugs shown.

2. Remove the six stand-offs (and the ground wire) from the Power Traces circuit board.
3. Remove all screws and washers that secure the board to the SCR Modules and power terminal isolation strip and remove the Power Traces board from the drive.

Non-Regenerative drive

Remove all screws and washers

Remove six stand-offs and PE ground wire

Remove six screws

Regenerative drive

Remove all screws and washers

Remove six stand-offs and PE ground wire

Remove six screws
Step 6: Remove the Existing SCR Modules

1. Remove the two screws and washers that secure each SCR Module to the heatsink and remove the SCR Modules.

Step 7: Install the New SCR Modules

Install the new SCR modules in reverse order of removal as detailed in Step 6: Remove the Existing SCR Modules above.

Important: Verify that each SCR Module is orientated in the same position as it was prior to removal.

Important: Thermal grease must be applied to the bottom of the SCR modules before securing them to the heatsink.

Use the following table to determine the proper tightening torque for the SCR Modules installed.

<table>
<thead>
<tr>
<th>230V AC Input</th>
<th>Final Torque</th>
<th>460V AC Input</th>
<th>Final Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part Number</td>
<td></td>
<td>Part Number</td>
<td></td>
</tr>
<tr>
<td>SK-20P-S7F44</td>
<td>2.5...4 Nm (22...35.4 lbf·in)</td>
<td>SK-20P-S7F73</td>
<td>2.5...4 Nm (22...35.4 lbf·in)</td>
</tr>
<tr>
<td>SK-20P-S7F45</td>
<td>2.5...4 Nm (22...35.4 lbf·in)</td>
<td>SK-20P-S7F74</td>
<td>2.5...4 Nm (22...35.4 lbf·in)</td>
</tr>
</tbody>
</table>
Step 8: Install the Power Traces Board

Install the Power Traces board in reverse order of removal as detailed in Step 5: Remove the Power Traces Board on page 14.

Verify that the connecting wire on the board is placed in the exact location as previously installed.

<table>
<thead>
<tr>
<th>230V AC Input</th>
<th>460V AC Input</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Part Number</strong></td>
<td><strong>Final Torque</strong></td>
</tr>
<tr>
<td>SK-20P-S7F44</td>
<td>2.5...4 Nm (22...35.4 lb-in)</td>
</tr>
<tr>
<td>SK-20P-S7F45</td>
<td>2.5...4 Nm (22...35.4 lb-in)</td>
</tr>
</tbody>
</table>

Step 9: Install the Pulse Transformer and Switching Power Supply Boards

Install the Pulse Transformer and Switching Power Supply boards in reverse order of removal as detailed in Step 4: Remove the Pulse Transformer and Switching Power Supply Boards on page 8.

**ATTENTION:** Each gate lead cable must be connected to the exact connector from which it was removed on the Pulse Transformer circuit board or damage to the drive may occur.

Step 10: Install the Control EMI Shield and Control Board

Install the Control EMI Shield and Control board in the reverse order of removal as detailed in Step 3: Remove the Control EMI Shield and Control Board on page 6.
Step 11: Replace the Protective Covers and Documenting the Change

1. Replace the protective covers in the reverse order of removal as described in Step 2: Remove the Protective Covers on page 3.

2. Install the DPI cable (if present).

3. Record the installation of the new SCRs and date of installation on the Field Installed Option label on the side of the drive (as shown below).

Related Documentation


<table>
<thead>
<tr>
<th>For . . .</th>
<th>Read this document</th>
<th>Publication Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>In depth information regarding the operation of PowerFlex Digital DC drives</td>
<td>User Manual - PowerFlex Digital DC Drives</td>
<td>20P-UM001...</td>
</tr>
</tbody>
</table>