KIT HEATSINK COOLING MANIFOLD SCR ASSEMBLY

100309, 100309-6

Installation and servicing of Danfoss Turbocor® compressors by qualified and product trained personnel only. Follow these instructions and sound refrigeration/electrical/servicing practices relating to installation, commissioning, maintenance and service.

Consult the appropriate Danfoss Turbocor Compressors Inc. (DTC) Service Manual on turbocor.danfoss.com for detailed service instructions.	**Never power compressor without covers in place and secured.** **Removing the mains input cover will expose you to a voltage hazard of up to 575V. Ensure the mains input power is off and locked out before removing cover.** **Before removing top cover, wait at least 20 minutes after isolating AC power to allow the high voltage capacitors to discharge.**	Always wear appropriately rated safety equipment when working around equipment and/or components energized with high voltage. **This equipment contains hazardous voltages that can cause serious injury or death.**	**Recover all refrigerant from compressor in accordance with local codes and ensure pressure is fully vented before the removal of refrigerant containing components.**

1 - Introduction

HEATSINK COOLING MANIFOLD Removal and installation.

2 - Removing Refrigerant from Compressor:

- Recover refrigerant from compressor in accordance with local codes and practices.

3 - Removal Instruction:

1. Isolate compressor power and lock out in accordance with local codes and practices.
2. Release the fasteners that secure the Mains Input Cover and remove the cover.
3. Using an appropriately rated volt meter, confirm that the AC voltage is isolated.
4. Wait at least 20 minutes for the DC bus capacitors to discharge.

DANGER: Do NOT touch any components when removing the top cover. This is particularly true for compressors with CE covers because they are coated on the outside for the express purpose of being conductive

5. Release the fasteners that secure the Top Cover and remove the cover, taking particular care not to touch ANY components underneath.
6. Using an appropriately rated volt meter, check the DC bus bars for voltage level. If the voltage is above 5VDC, wait five (5) minutes and recheck until 5VDC or below is achieved.
7. Disconnect 3 phase mains input wiring.

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8. For F Series and later compressors, remove the Soft Start Temperature Harness. Refer to Figure 1 (Soft Start J9 Connector).

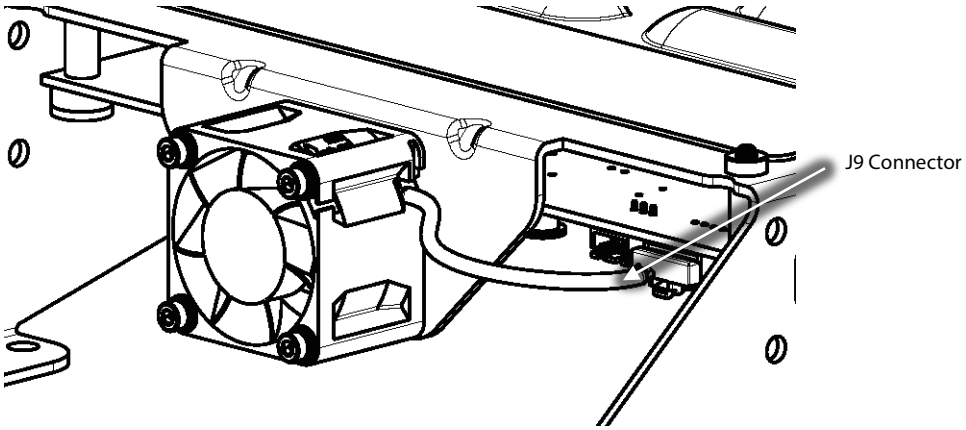

Figure 1 – Soft Start J9 Connector

9. Remove the cable tie securing the Soft Start ground cable to the AC/DC cable.
10. Disconnect the Soft Start ground wire and mains input ground wire by removing the two (2) top nuts and from the ground post on the compressor housing at 3-phase connection point. Refer to Figure 2 (Ground Location).

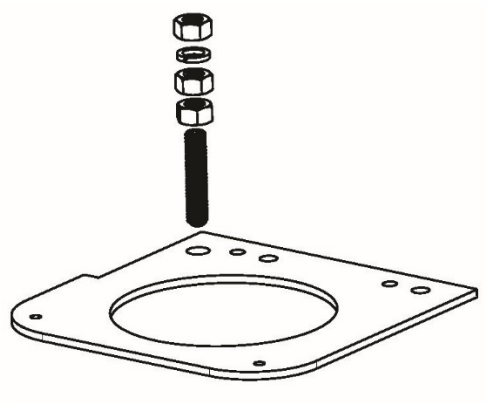

Figure 2 – Ground Location

11. Remove the M5x15 fasteners that secure the Soft Start mounting bracket to the compressor. Refer to Figure 3 (Soft Start Mounting Fasteners).

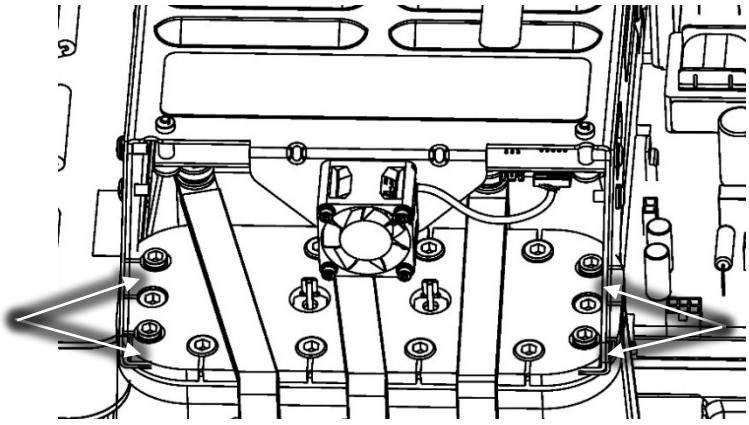

Figure 3 – Soft Start Mounting Fasteners

12. Lift the Soft Start and turn it over, placing it board-side up on the AC Bus Bars. Refer to Figure 4 (Soft Start Lift).

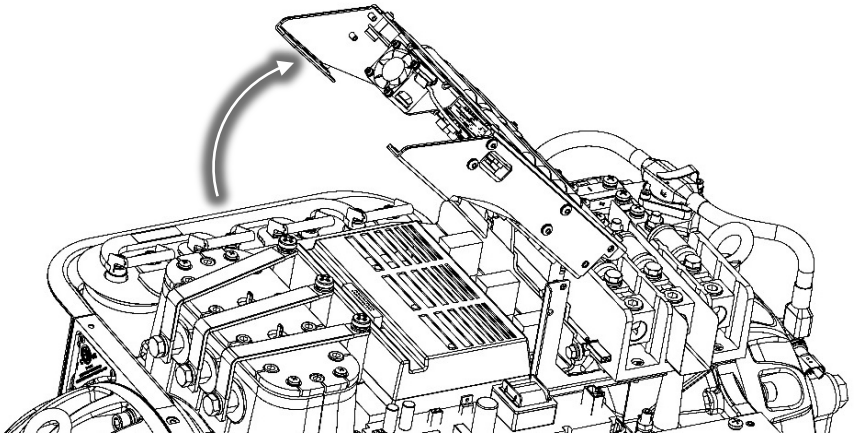

Figure 4 – Soft Start Lift

13. Unplug the cable connectors from the Soft Start board. Refer to Figure 5 (Soft Start Harness Removal).

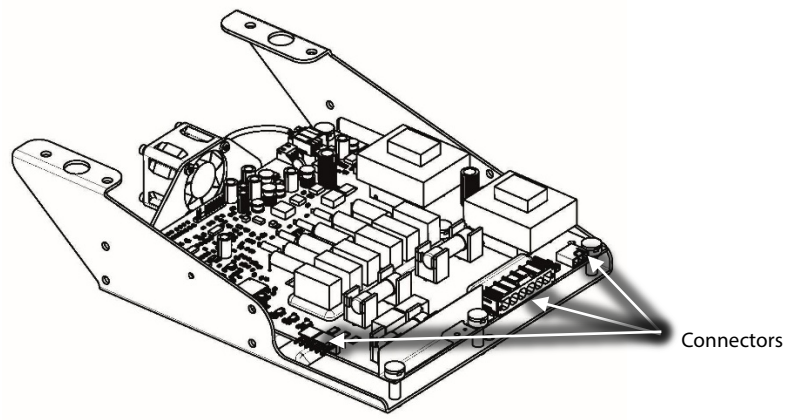

Figure 5 – Soft Start Harness Removal

14. Lift away the Soft Start assembly and place it in a safe location.

15. Disconnect the two (2) SCR Gate connectors from each rectifier. Refer to Figure 6 (Soft Start SCR Gate Cable Harness Removal) for the location of the connectors on the SCRs.

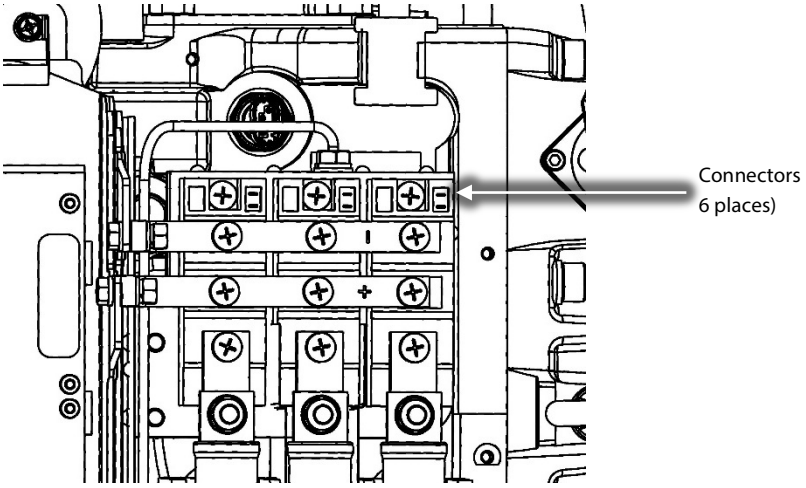

Figure 6 – Soft Start SCR Gate Cable Harness Removal

16. Remove the M6x20 fasteners that secure the DC Bus Bars to the Capacitor Bus Bar Assembly.
17. Remove the M6x16 fasteners that secure the DC Bus Bars to the SCRs. Then remove the DC Bus Bars. Refer to Figure 7 (DC Bus Bar Removal).

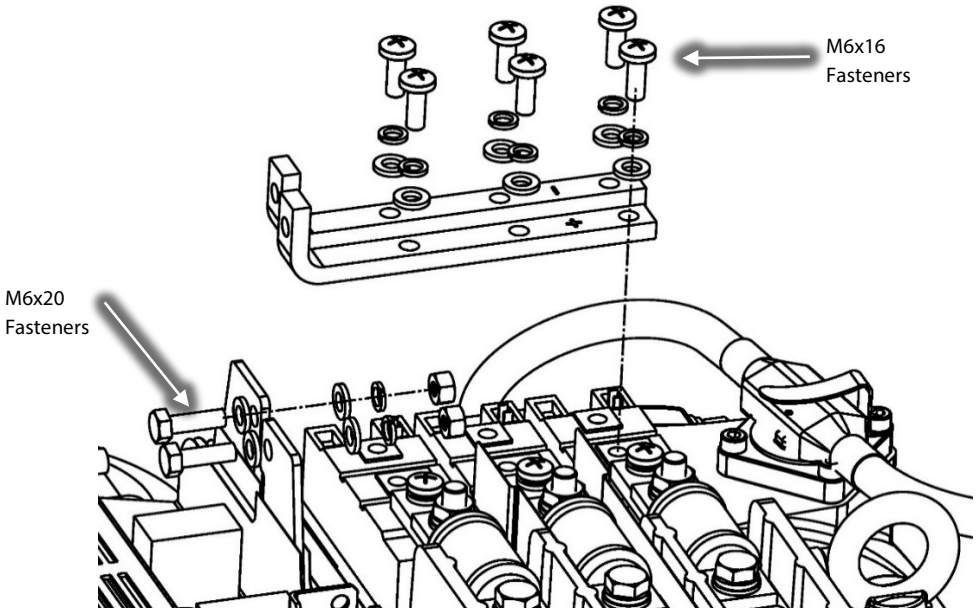

Figure 7 – DC Bus Bar Removal

18. Remove the M6x16 fasteners that connect the Fast-Acting Fuses to the SCRs. Refer to Figure 8 (Fuse Block Assemblies).
19. Remove the Terminal Block Adapter to Fuse fasteners (two per fuse) that secure the fuses to the Terminal Block and set aside the fuse assemblies.
20. Refer to Figure 8 (Fuse Block Assemblies) and Figure 9 (Mylar Removal).

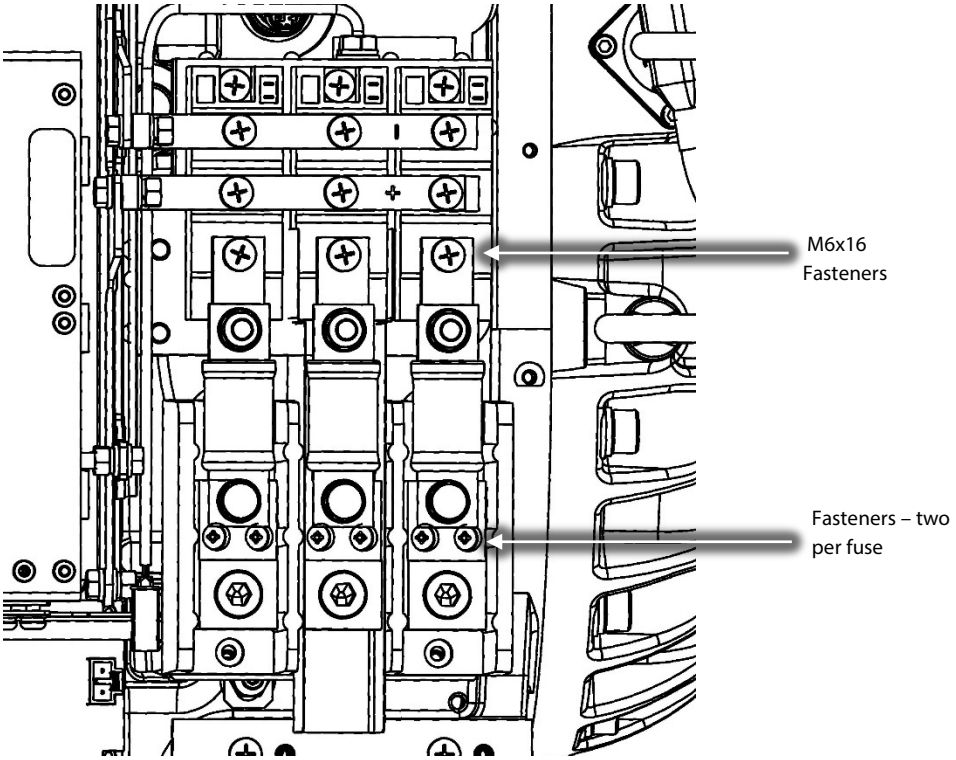

Figure 8 – Fuse Block Assemblies

21. Remove the insulating Mylar from the middle Terminal Block and set aside. Refer to Figure 9 (Mylar Removal).

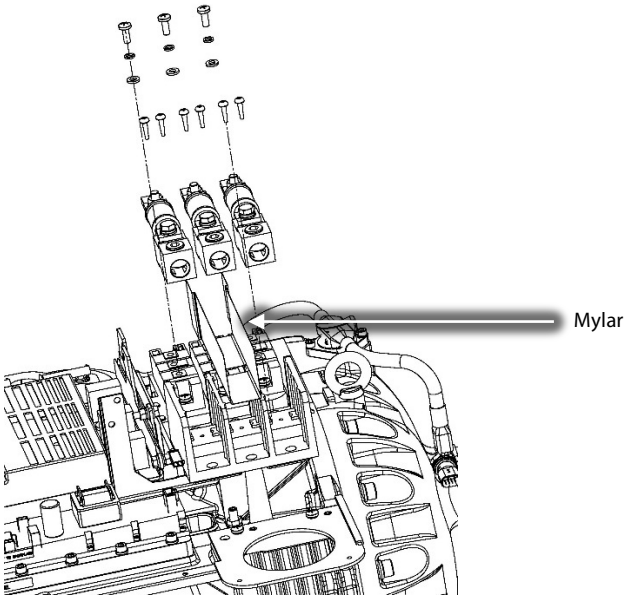

Figure 9 – Mylar Removal

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22. Disconnect the DC+ and DC- of the Soft Start harness from the DC bus assembly noting the orientation. Refer to Figure 10 (Soft Start Harness Removal).

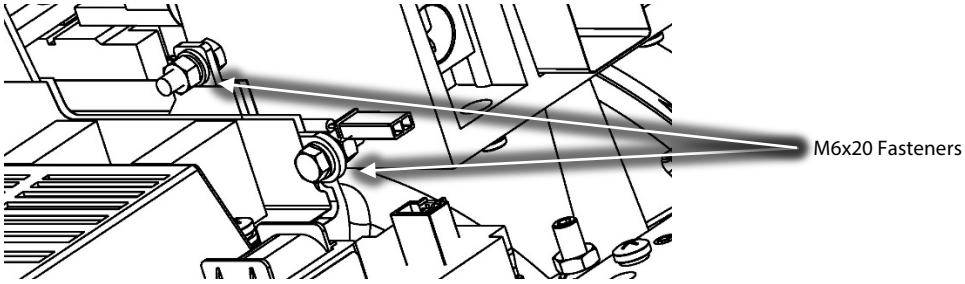

Figure 10 – Soft Start Harness Removal

23. Disconnect the snubber capacitors from the Inverter noting the leg orientation of one leg is longer than the other. Refer to Figure 11 (Snubber Capacitor Removal).

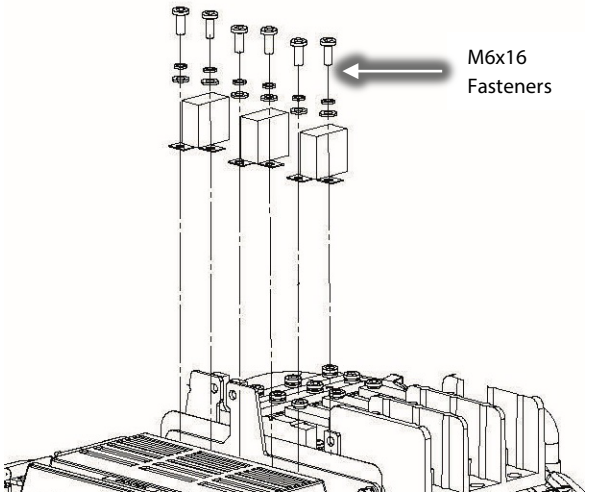

Figure 11 – Snubber Capacitor Removal

24. Remove the nylon nuts at the base of the DC capacitor assembly, under the main compressor housing. Refer to Figure 12 (Capacitor Nut Removal).

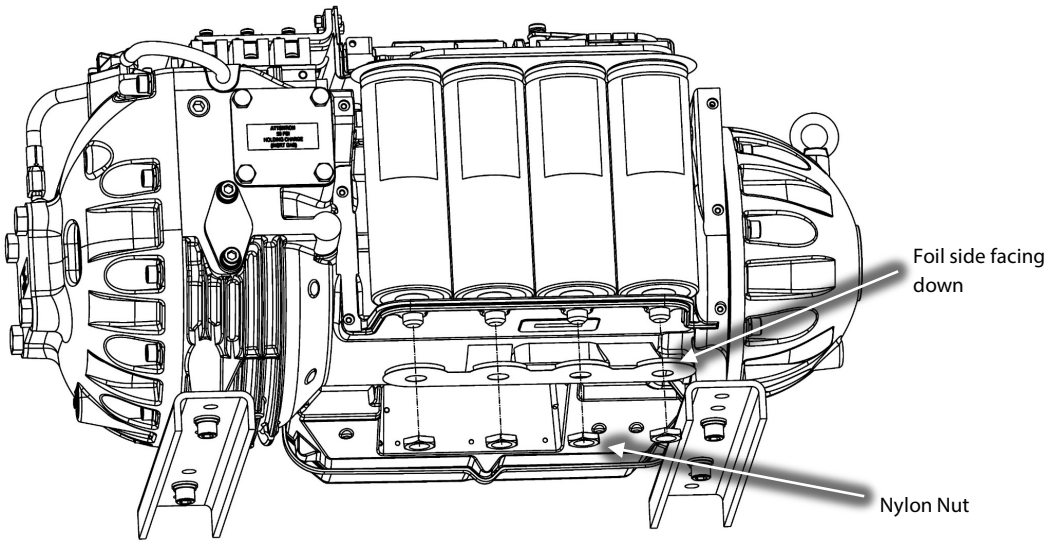

Figure 12 – Capacitor Nut Removal

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25. Carefully lift the DC Bus Bars and capacitors out as an assembly. Refer to Figure 13 (Capacitor Assembly Removal).

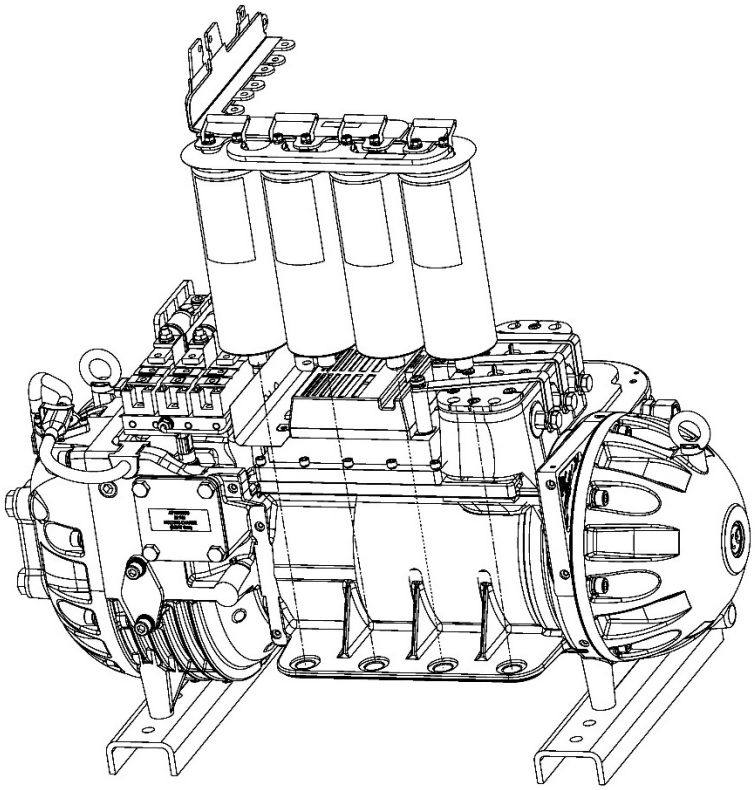

Figure 13 – Capacitor Assembly Removal

26. Remove the insulating Mylar from the Inverter. Refer to Figure 14 (Capacitor Mylar Removal).

NOTE: This step is not applicable to Major Revision G and later compressors.

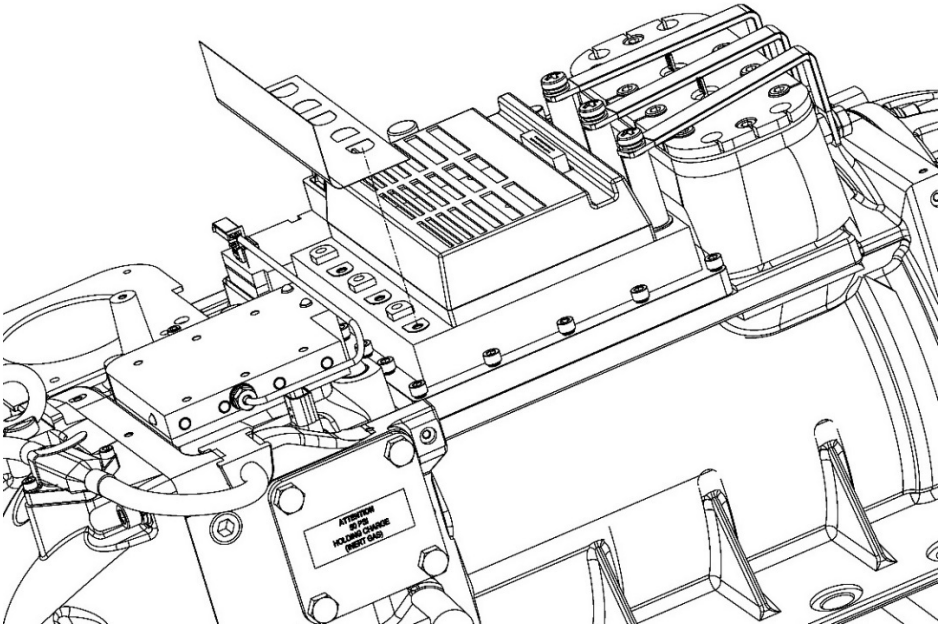

Figure 14 – Capacitor Mylar Removal

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27. Remove the M10x16 and M8x70 fasteners to release the three (3) bus assembly connections between the IGBT assembly and the high-power feed through. Refer to Figure 15 (Motor Bus Bar Removal).

    NOTE: Hold the high-power feedthrough using a 36mm wrench while removing the M10 screws to prevent movement of the feedthrough assembly.

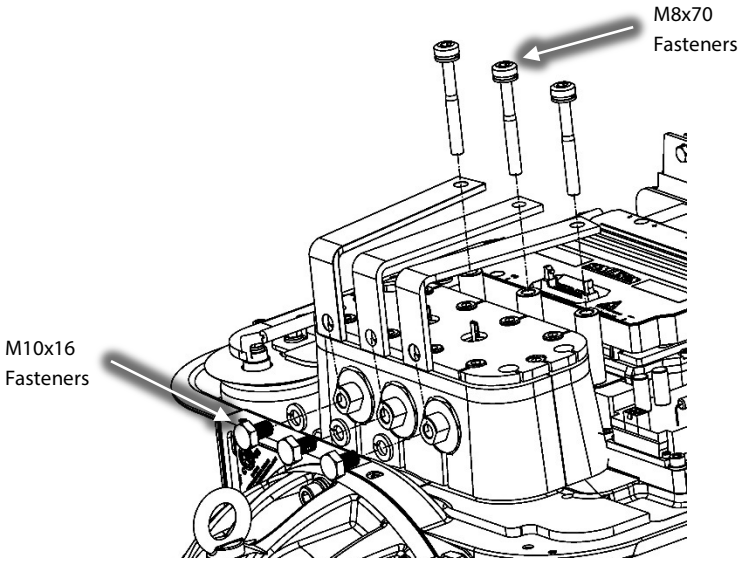

Figure 15 – Motor Bus Bar Removal

28. Remove the Inverter cable harness from the top of the Inverter. Refer to Figure 16 (Inverter Harness Removal).

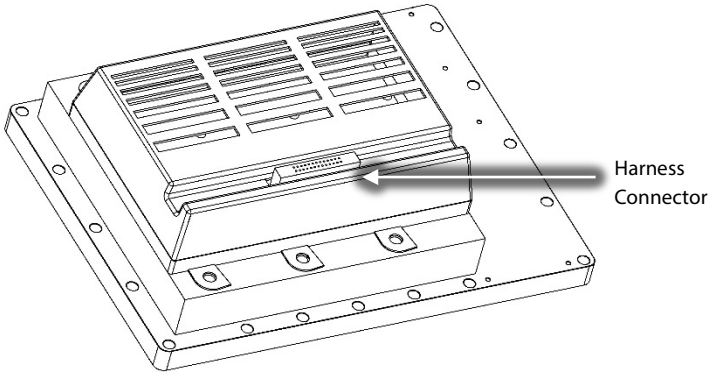

Figure 16 – Inverter Harness Removal

29. Disconnect all wiring connections from the HV DC-DC. Refer to Figure 17 (DC-DC Harness Removal).

    NOTE: There is no need to remove the DC-DC converter from the Inverter heat sink plate

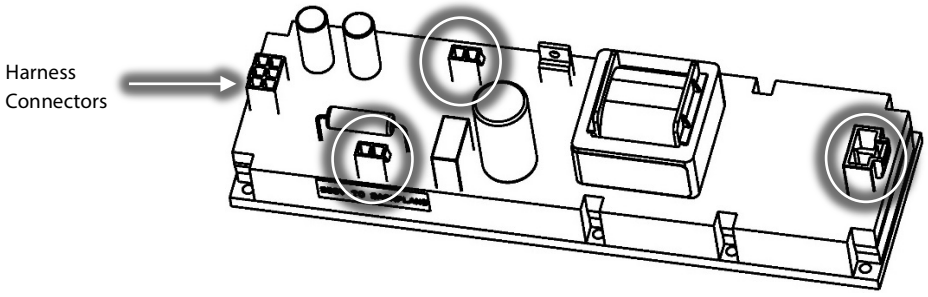

Figure 17 – DC-DC Harness Removal

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30. Remove the M6x16 fasteners that secure each rectifier diode to the cooling manifold and remove the rectifier diode. Refer to Figure 18 – (SCR Fasteners).

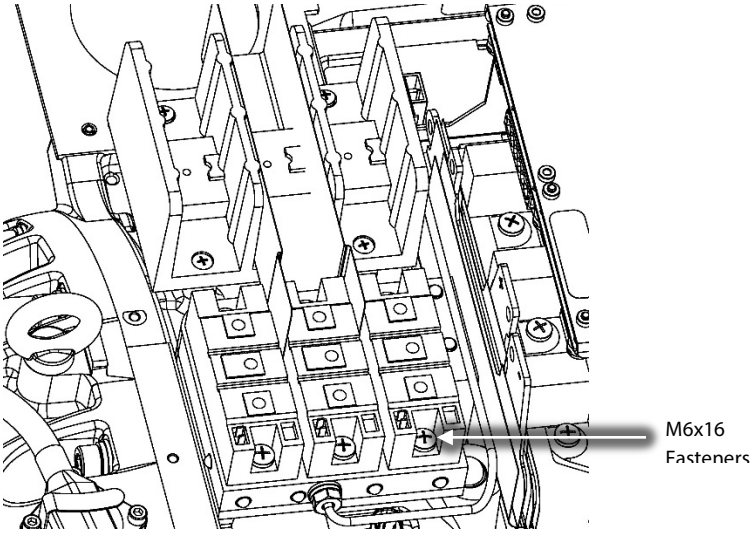

Figure 18 – SCR Fasteners

31. Remove the SCRs from the SCR cooling manifold assembly.
32. Disconnect the harness from the SCR temperature sensor, discharge P/T sensor, IGV motor connection, and the suction P/T sensor. Set the Compressor Controller Cable Harness aside. Refer to Figure 19 (Cable Harness Compressor Controller Removal).

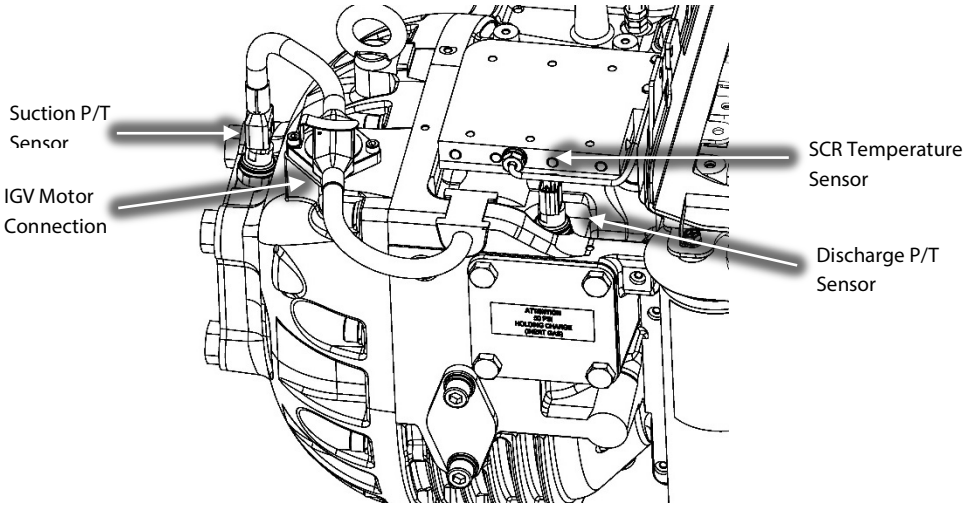

Figure 19 – Cable Harness Compressor Controller Removal

33. Recover refrigerant from compressor in accordance with local codes and practices.
34. Remove the M6x30 fasteners that secure the Inverter to the compressor main housing. Refer to Figure 20 (Inverter Removal).
35. Carefully, remove the Inverter and discard the two (2) O-rings underneath. (Note that the SCR cooling manifold will be attached to the Inverter cooling plate.)

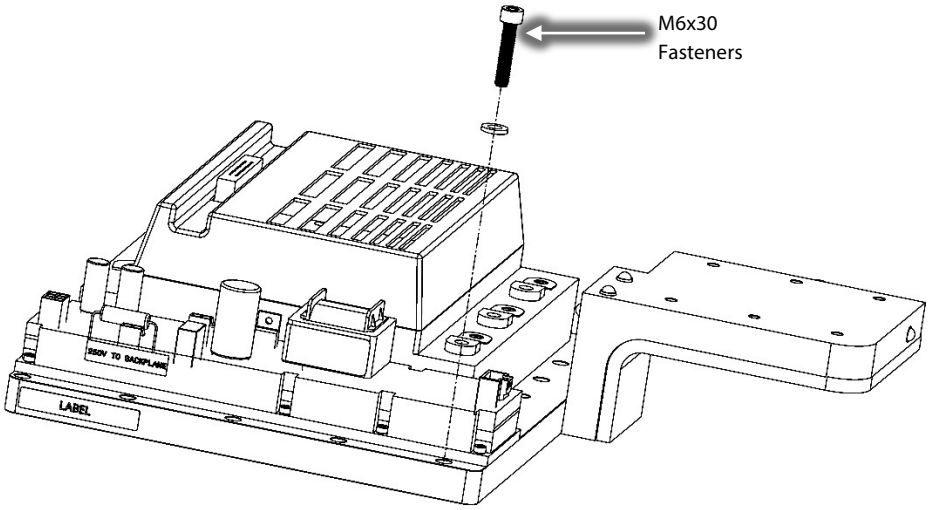

Figure 20 – Inverter Removal

36. Carefully remove the SCR cooling manifold foam insulation in order to gain access to the fasteners shown in Figure 20 (SCR Cooling Manifold Removal).

37. Remove and discard the M6x20 fasteners indicated in Figure 21 (SCR Cooling Manifold) and carefully remove the SCR Cooling Manifold. Carefully set aside the Inverter assembly.

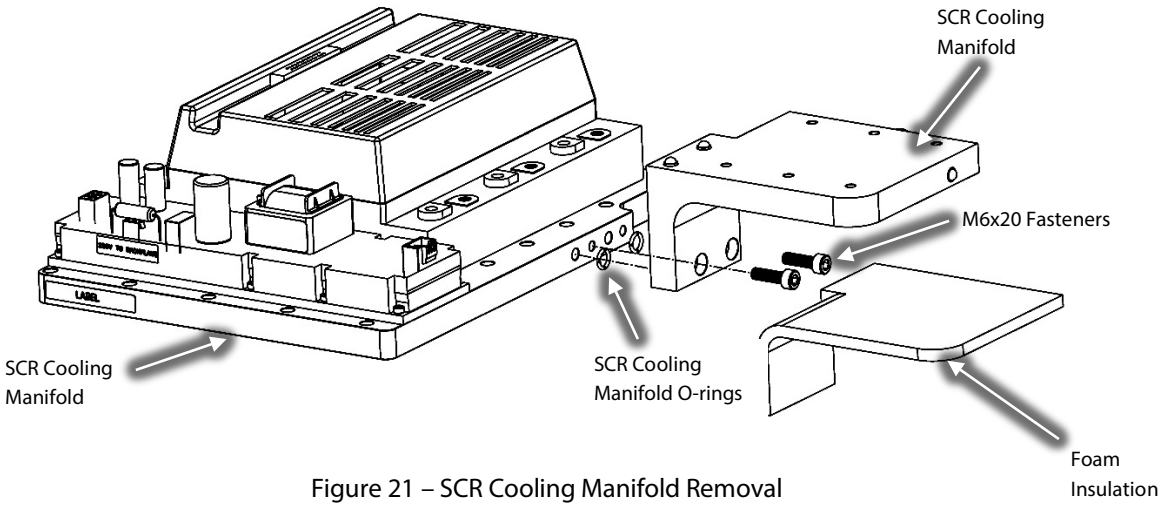

Figure 21 – SCR Cooling Manifold Removal

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4 - Installation Instruction:

1. Ensure that no residue remains on the contact surfaces of either the IGBT plate or the SCR Cooling Manifold.
2. Apply O-Lube to the O-rings provided and install them into the SCR Cooling Manifold. Refer to Figure 22 (SCR Cooling Manifold O-ring Installation).

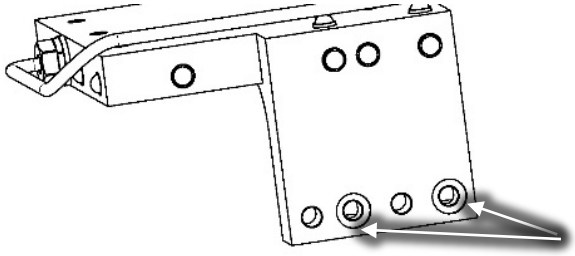

Figure 22 –SCR Cooling Manifold O-ring Installation

3. Reinstall the SCR Cooling Manifold to the Inverter Cooling Manifold torque the fasteners to 7 Nm (62 in.lb.). Refer to Figure 23 (SCR Cooling Manifold Installation).
4. Install the new insulation onto the backside of the SCR Cooling Manifold.

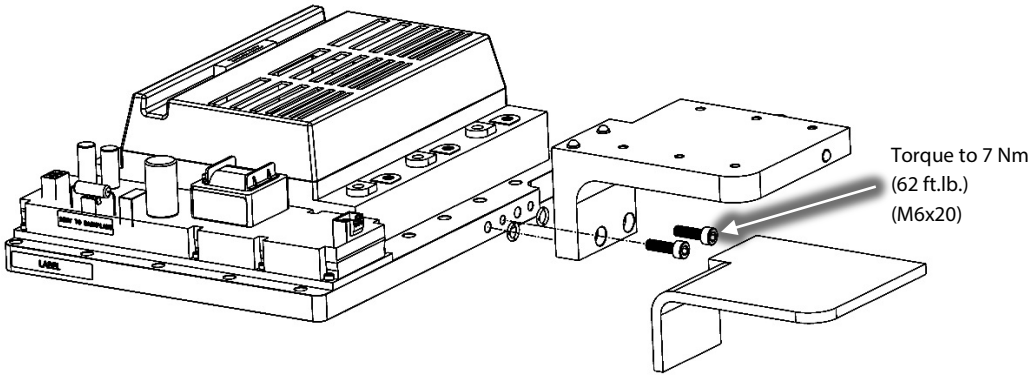

Figure 23 – SCR Cooling Manifold Installation

5. Clean the O-ring grooves in the compressor housing.
6. Apply O-Lube to the Inverter O-ring provided and place the O-ring in the compressor housing groove.
7. Install the small O-ring into the motor cooling port.

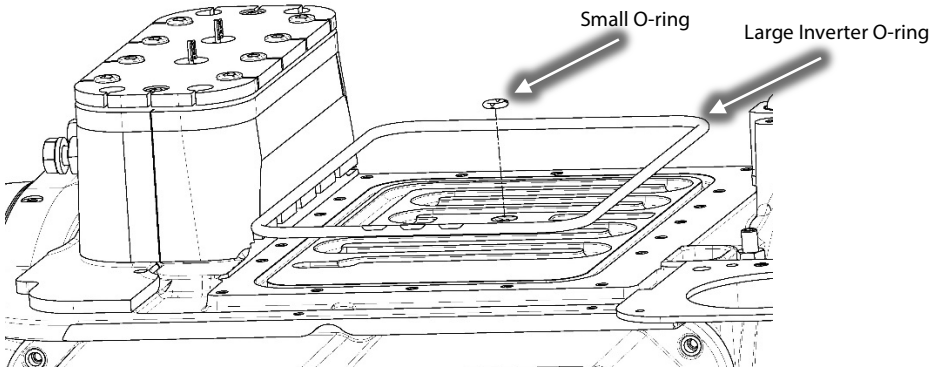

Figure 24 – Inverter O-ring Installation

8. Carefully, install the Inverter on the compressor housing with the SCR temperature sensor cable run underneath the SCR cooling manifold.

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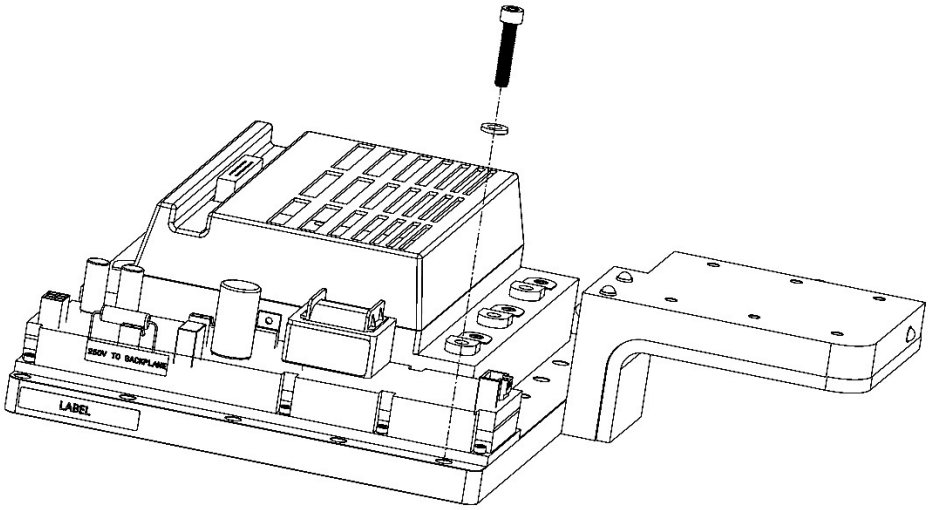

Figure 25 – Inverter Installation

9. Install the M6x30 Inverter fasteners in a diagonal pattern and torque to 3 Nm (27 in.lb.) on the first pass then to 8 Nm (71 in.lb.) on the second pass. Refer to Figure 26 (Inverter Fastener Locations).

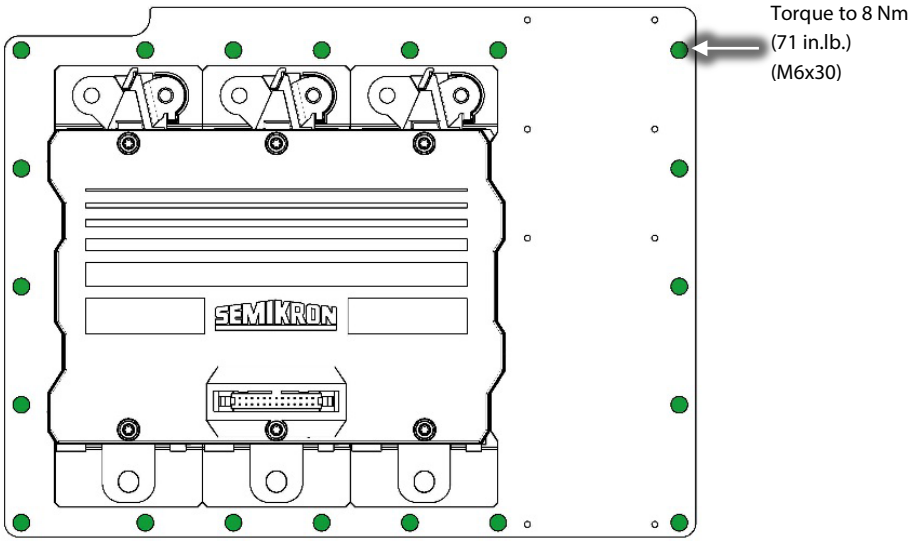

Figure 26 – Inverter Fastener Locations

10. Leak test and evacuate the compressor in accordance with industry standards.
11. Reconnect the SCR temperature sensor, discharge P/T sensor, IGV motor connection, and the suction P/T sensor.
12. Ensure that no residue remains on the contact surfaces of the SCR Cooling Manifold.
13. Take each SCR diode and spread a thin and uniform coat of Dow Corning Silicone Heat Sink paste (or equivalent) entirely over the bottom the diode surface. Refer to Figure 27 (Heat Sink Paste Application).

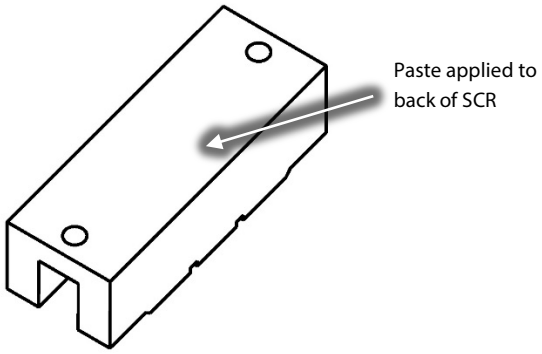

Figure 27 – Heat Sink Paste Application

14. Install the diodes on the SCR Cooling Manifold and torque to 5 Nm (44 in.lb.). The diode pins should be on the same side of the Manifold sensor wire. Refer to Figure 28 (SCR Orientation).

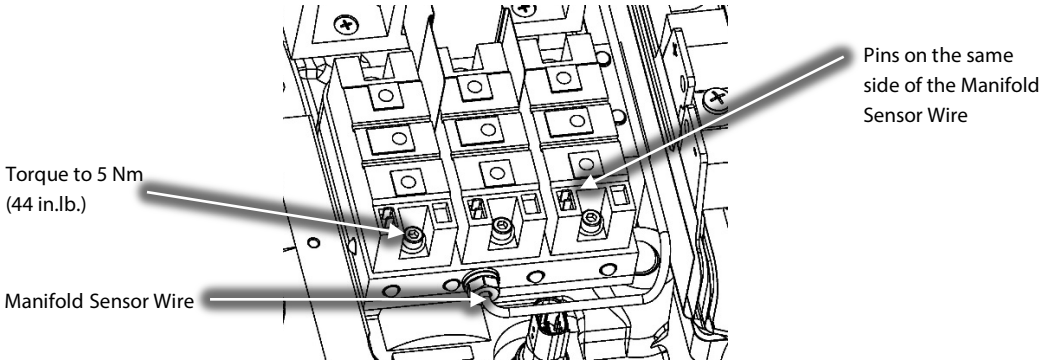

Figure 28 – SCR Orientation

15. Place the motor bus bars in their correct locations; they are designed to align to individual bolt patterns and should not be forced.
16. Loosely install the M8x70 fasteners that secure the Motor Bus Bars to the Inverter output through the copper tubes. Be careful not to over tighten the fasteners to the High-Power Feedthroughs.
17. Install the M10x16 fasteners that connect the Motor Bus Bars to the High-Power Feedthroughs and torque to 14 Nm (10 ft.lb.).
18. Go back and torque the M8x70 fasteners that secure the Motor Bus Bars to the Inverter output through the copper tubes to 14 Nm (10 ft.lb.).
19. Refer to Figure 29 (Motor Bus Bar Installation).

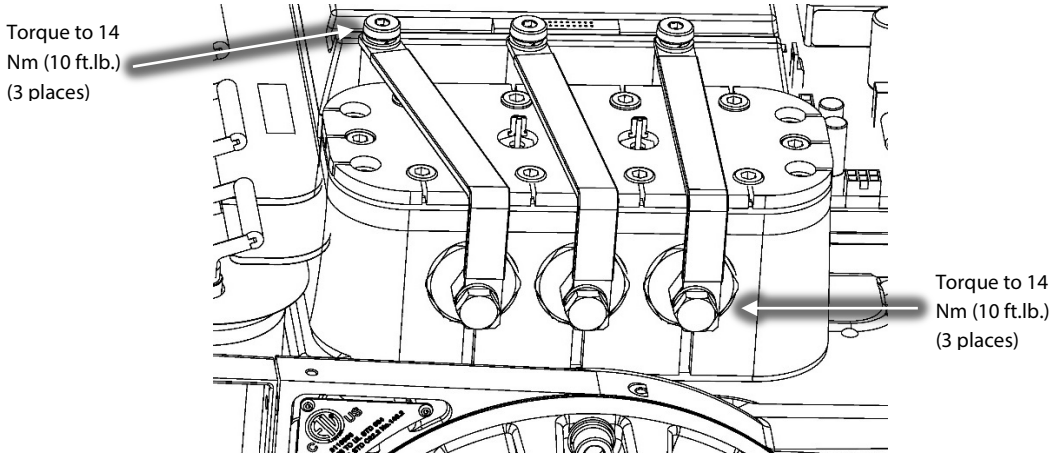

Figure 29 – Motor Bus Bar Installation

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20. Reinstall the DC Bus Bar and capacitor assembly over the Inverter. Refer to Figure 13 (Capacitor Assembly Removal).
21. Reconnect the snubber capacitors to the Inverter noting the leg orientation and torque to specification. Starting from the DC Bus Capacitor side, torque to 7 Nm (62 in.lb.). Refer to Figure 11 (Snubber Capacitor Removal).
22. Place the capacitor membrane foil side down, underneath the main compressor housing and then reinstall the nylon nuts to the base of the DC capacitor assembly, under the main compressor housing and torque to 7 Nm (62 in.lb.). Refer to Figure 12 (Capacitor Nut Removal).
23. Reconnect the DC+ and DC- of the Soft Start harness from the DC bus assembly noting the orientation and torque to 10 Nm (7 ft.lb.). Refer to Figure 10 (Soft Start Harness Removal).
24. Reconnect the DC Bus Bars to the SCRs and torque to 5 Nm (44 in.lb.). Refer to Figure 7 (DC Bus Bar Removal).
25. Reconnect the DC Bus Bars the DC Bus and torque to specification. Refer to Figure 7 (DC Bus Bar Removal).
26. Reconnect all electrical connections to the HV DC-DC converter. Refer to Figure 17 (DC-DC Harness Removal).
27. Reinstall the Mylar in the middle of the Terminal Block. Refer to Figure 30 (Main Power Mylar Insertion).

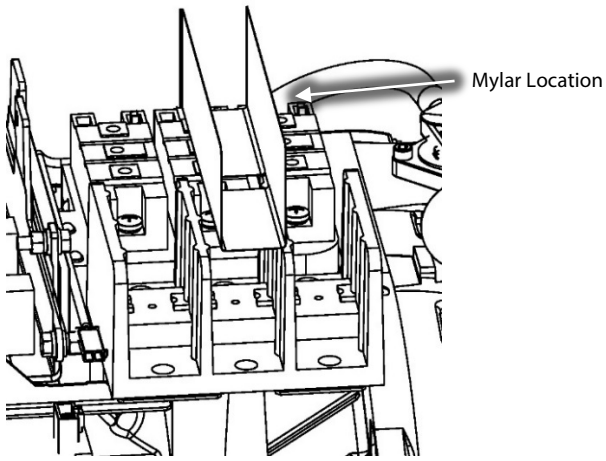

Figure 30 – Main Power Mylar Insertion

28. Place the three (3) Fuse Assemblies on the Terminal Block.
29. Secure the three (3) Fuse Assemblies (Bus Bar side) to the SCRs using the M6x16 fasteners with the 3-phase input wires of the Soft Start AC/DC Harness, noting their orientation. Only finger tighten at this point. Refer to Figure 31 (Fuse Assembly Installation) for this and the following two (2) steps.
30. Install the three (3) Fuse Assemblies to the Terminal Block with the six (6) fasteners and torque to 4 Nm (35 in.lb.).
31. Torque the M6x16 fasteners for the Bus Bar side of the three (3) Fuse Assemblies to the SCRs to 5 Nm (44 in.lb.).

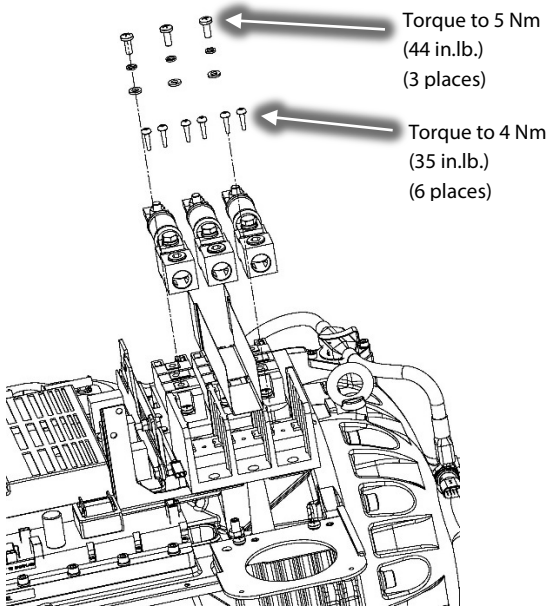

Figure 31 – Fuse Assembly Installation

32. Place the 3-Phase input wires in correct sequence on the fasteners to the fuse input to the SCRs and tighten the set screws. Refer to Figure 32 (3-Phase Connection).

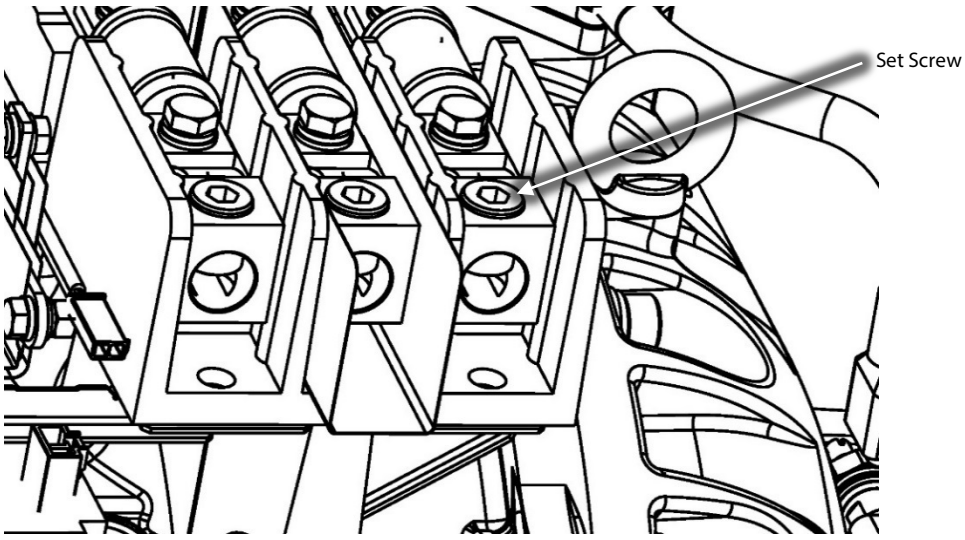

Figure 32 – 3-Phase Connection

33. Connect the SCR Gate cable harness to the SCRs noting its orientation.
34. Reconnect all wiring harnesses to the Soft Start (excluding the J9 Connector).
35. Flip the Soft Start over and align the Soft Start mounting bracket with the holes in the Motor Power Feed Through Cover Plate.
36. Insert the M5x15 fasteners to secure the Soft Start mounting bracket and torque to 5 Nm (44 in.lb.).
37. Attach the J9 connector to the Soft Start Board.
38. Reroute and connect the Soft Start ground wire and other ground cables to the ground post on the compressor housing at 3 phase connection. Refer to Figure 33 (Ground Nuts) for the torque specifications.

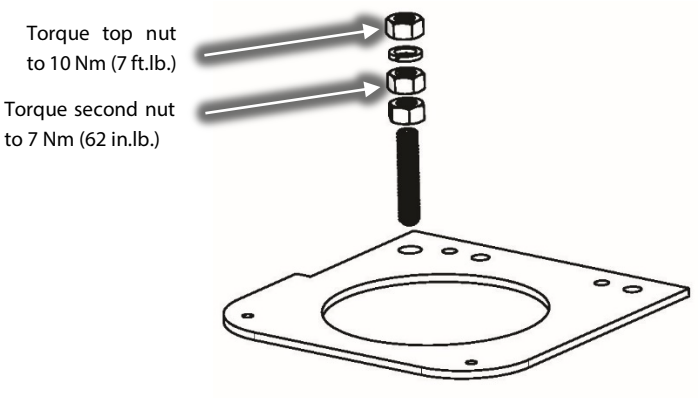

Figure 33 – Ground Nuts

39. Install covers.

Capacitor Cover

40. Place the Capacitor Cover and secure it with the long fastener (M5 x 20) and flat washer in position number three (3) as shown in the following figure. Use five (5) remaining fasteners to secure the cover. Fasten according to the sequence in Figure 34 (Capacitor Cover Torque Sequence). Follow the sequence twice.

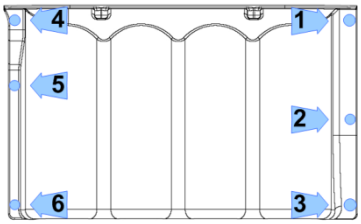

Figure 34 – Capacitor Cover Torque Sequence

Top and Mains Input Cover

41. Ensure that no residue remains on the contact surfaces of Top Cover and casting sides.
42. Place the Top Cover and secure it with the M5x15 fasteners according to the following sequence. Follow the sequence twice. The first time, only tighten the fasteners half way down to allow for adjustments. Torque to 13 in.lb. on the second pass. Refer to Figure 35 (Top Cover Torque Sequence).

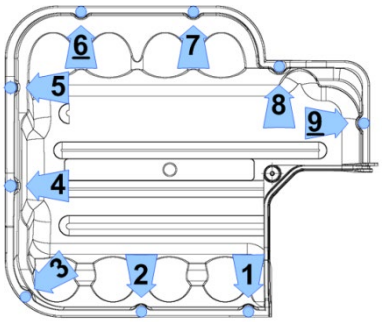

Figure 35 – Top Cover Torque Sequence

43. Ensure that no residue remains on the contact surfaces of the Mains Input Cover and casting sides.
44. Place the Mains Input Cover and secure it with the M5x15 fasteners. Tighten according to Figure 36 (Mains Input Cover Torque Sequence).

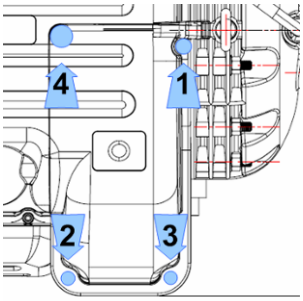

Figure 36 – Mains Input Cover Torque Sequence

45. Follow the sequence twice. The first time, only tighten the fasteners half way down to allow for adjustment. Torque to 13 in.lb. on the second pass. Tighten the # 4 fastener only once and use caution as to not overtighten.
46. Recharge compressor with refrigerant.
47. Apply mains power to the compressor.

Torque Values

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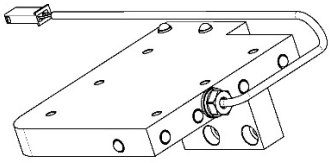
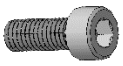
Component	Torque Value
SCR cooling manifold to Inverter cooling manifold Fastener	7 Nm (62 in.lb.)
SCR to SCR Cooling Manifold Fastener	5 Nm (44 in.lb.)
Soft Start Mounting Fastener	5 Nm (44 in.lb.)
DC-DC Mounting Fastener	0.5 Nm (4 in.lb.)
Inverter to Compressor Housing Fastener	8 Nm (71 in.lb.)
Motor Bus Bar to Motor Fastener	14 Nm (10 ft.lb.)
Motor Bus Bar to Inverter Fastener	14 Nm (10 ft.lb.)
Soft Start DC+ & DC- to DC Bus Fastener	10 Nm (7 ft.lb.)
Snubber Capacitors to Inverter Fastener	7 Nm (62 in.lb)
Nylon Nuts	7 Nm (62 in.lb)
DC Bus Bar to DC Bus Fastener	10 Nm (7 ft.lb.)
DC Bus Bars to SCR Fastener	5 Nm (44 in.lb.)
Fuse to SCR Fastener	5 Nm (44 in.lb.)
Fuse to Terminal Block Fastener	4 Nm (35 in.lb.)
Ground Post Nut	10 Nm (14 ft.lb.)
Cover Fastener	1.5 Nm (13 in.lb.)

Kit Contents

QTY	Part(s) Description	Picture(s)
1	HEATSINK - COOLING MANIFOLD SCR ASSEMBLY	
2	SCREW M6x16 S/HD CAP	
1	INSULATION KIT MANIFOLD	
2	O-RING #2-011	
1	O-RING - #2-377	
1	O-RING- #2-109 (MAIN CASING & IGBT HEATSINK)	
1	LUBRICATION-SUPER-O-LUBE-2G