



# KIT - TT300 VOLTAGE UPGRADE - 400V TO 380V

100521-1



**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.**

<p>Consult the appropriate Danfoss Turbocor Compressors Inc. (DTC) Service Manual on <a href="http://turbocor.danfoss.com">turbocor.danfoss.com</a> for detailed service instructions.</p>	<p><b>Never power compressor without covers in place and secured.</b></p> <p><b>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.</b></p> <p><b>Before removing top cover, wait at least 20 minutes after isolating AC power to allow the high voltage capacitors to discharge.</b></p>	<p>Always wear appropriately rated safety equipment when working around equipment and/or components energized with high voltage.</p> <p><b>This equipment contains hazardous voltages that can cause serious injury or death.</b></p>	<p><b>Recover all refrigerant from compressor in accordance with local codes and ensure pressure is fully vented before the removal of refrigerant containing components.</b></p>
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## 1 - Introduction

Inverter Assembly Removal and installation.

## 2 - Removing Refrigerant from Compressor:

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

## 3 - INVERTER ASSEMBLY Removal Instructions:

- **NOTE:** Refer to the current Service Manual for more details in removal and installation.

1. Isolate compressor power and lock out in accordance with local codes and practices.
2. Remove the mains cover only.
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. Remove the Top Cover by releasing the fasteners that secure 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. For F Series and later compressors, remove the Soft Start Temperature Harness. Refer to Figure 1 (Soft Start J9 Connector).

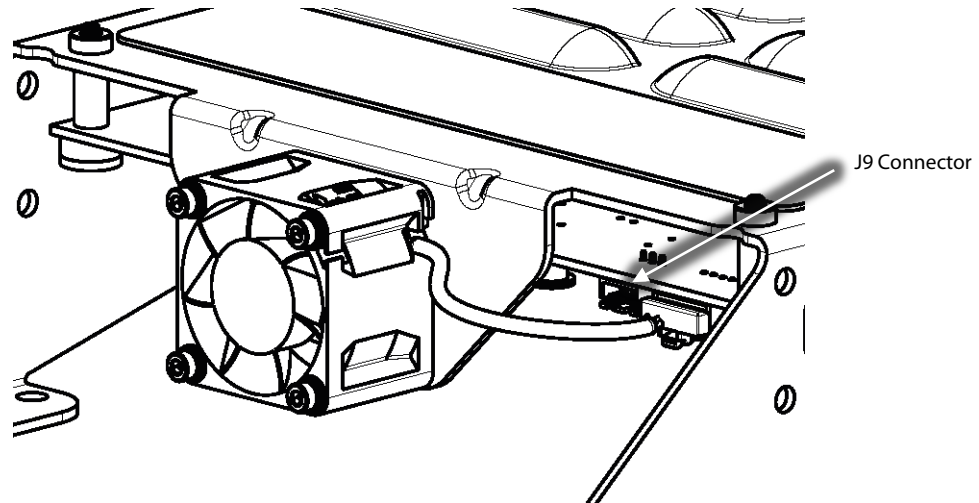


Figure 1 – Soft Start J9 Connector

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

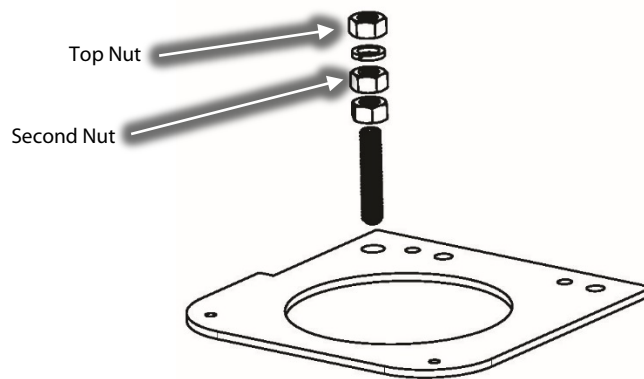


Figure 2 – Ground Location

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

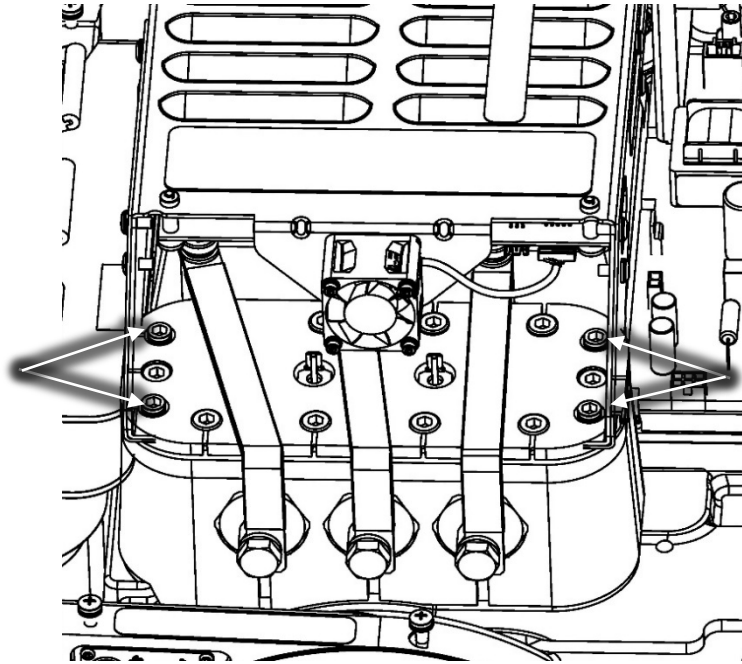


Figure 3 – Soft Start Mounting Fasteners

11. 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).

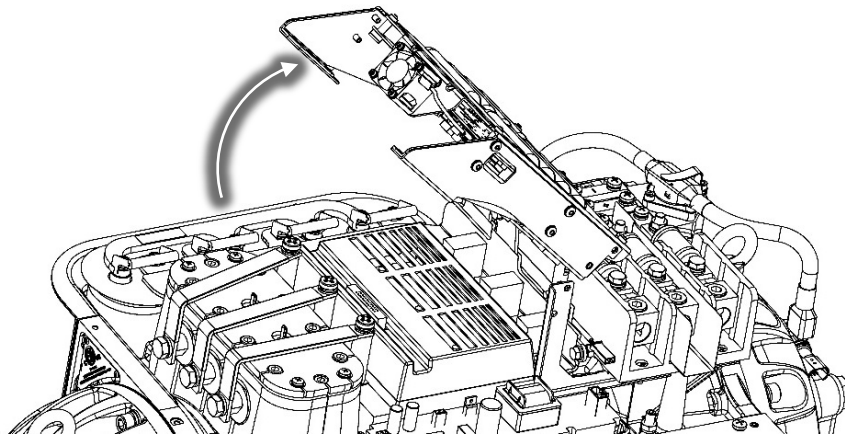


Figure 4 – Soft Start Lift

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

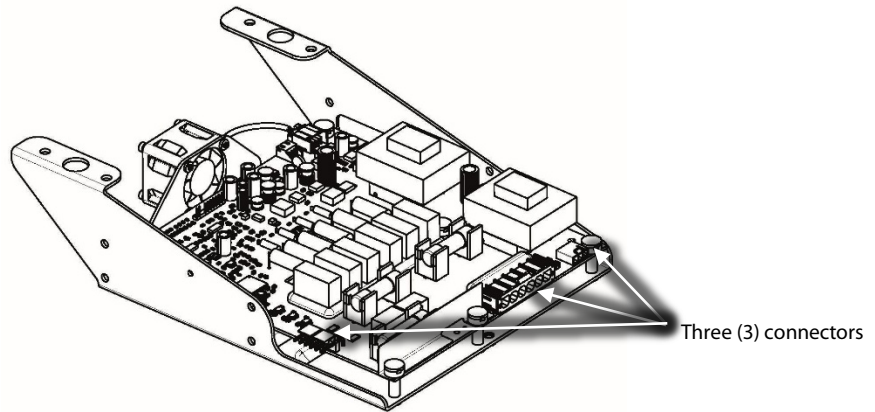


Figure 5 – Soft Start Harness Removal

13. Unplug the Soft Start SCR Gate cable harness from the SCRs noting its orientation. Refer to Figure 6 (Soft Start SCR Gate Cable Harness Removal) for the location of the connectors on the SCRs.

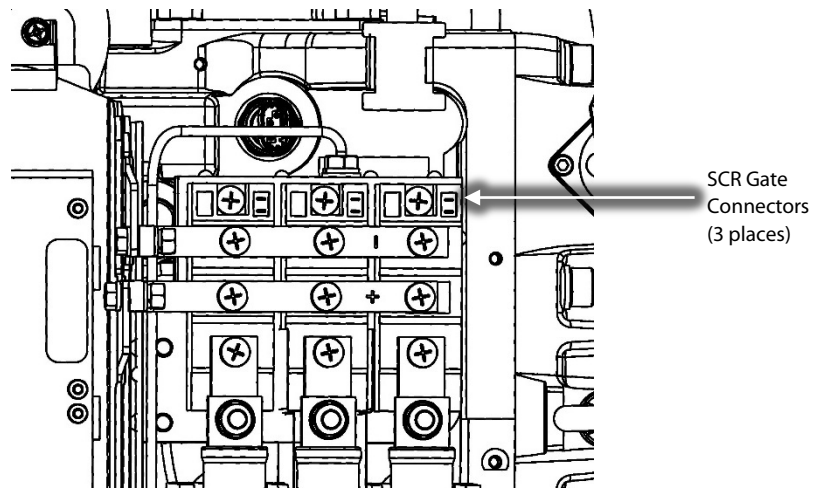


Figure 6 – Soft Start SCR Gate Cable Harness Removal

14. Set the Soft Start aside. This however will not be reused.

15. Remove the M6x20 fasteners that secure the DC Bus Bars to the Capacitor Bus Bar Assembly. Refer to Figure 7 (DC Bus Bar Removal) for this and the following step.
16. Remove and discard the fasteners that secure the DC Bus Bars from the SCRs. Then remove the DC Bus Bars.

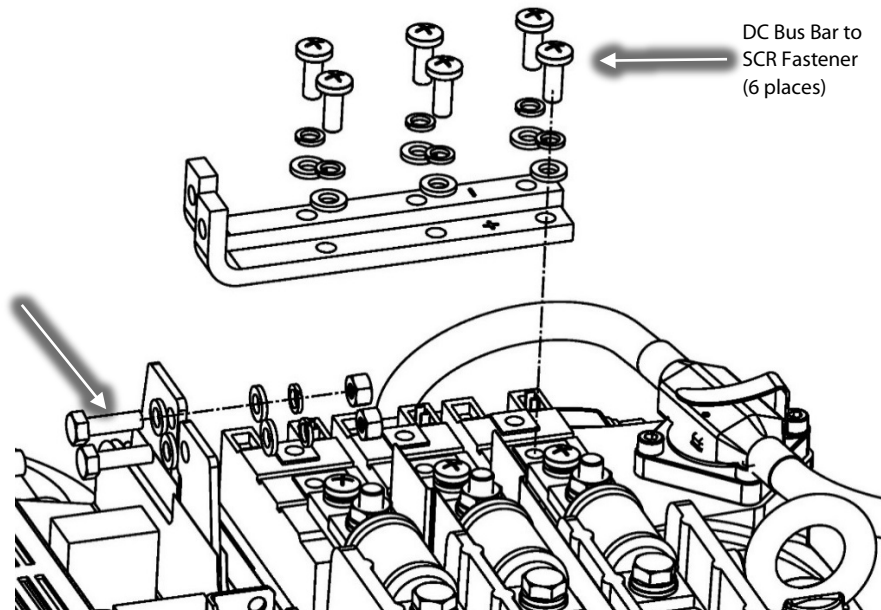


Figure 7 – DC Bus Bar Removal

17. Remove the fasteners that connect the Fast-Acting Fuses to the SCR's and, noting their orientation, the 3-Phase input wires to the Soft Start AC/DC cable harness. Refer to Figure 8 (Fuse Block Assemblies).
18. Remove the fasteners from each of the three (3) fuse block assemblies and set aside the fuse assemblies. Refer to Figure 8 (Fuse Block Assemblies) and Figure 9 (Mylar Removal).

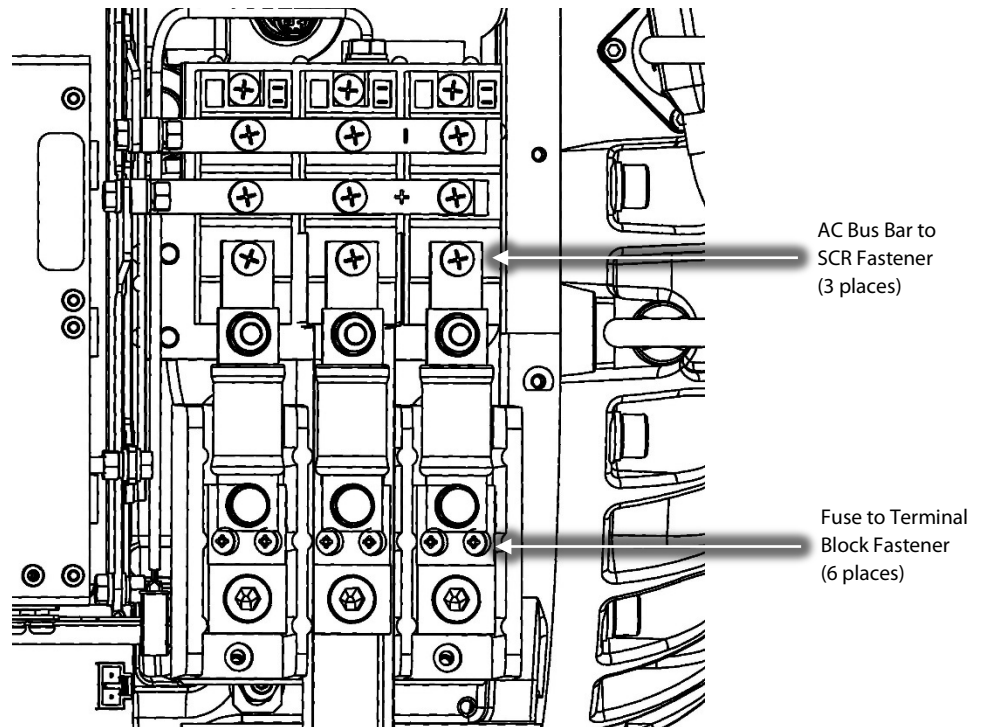


Figure 8 – Fuse Block Assemblies

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

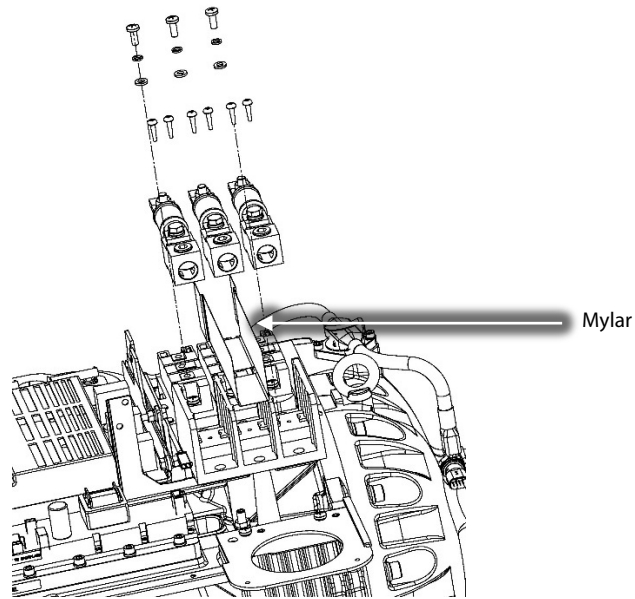


Figure 9 – Mylar Removal

20. 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).

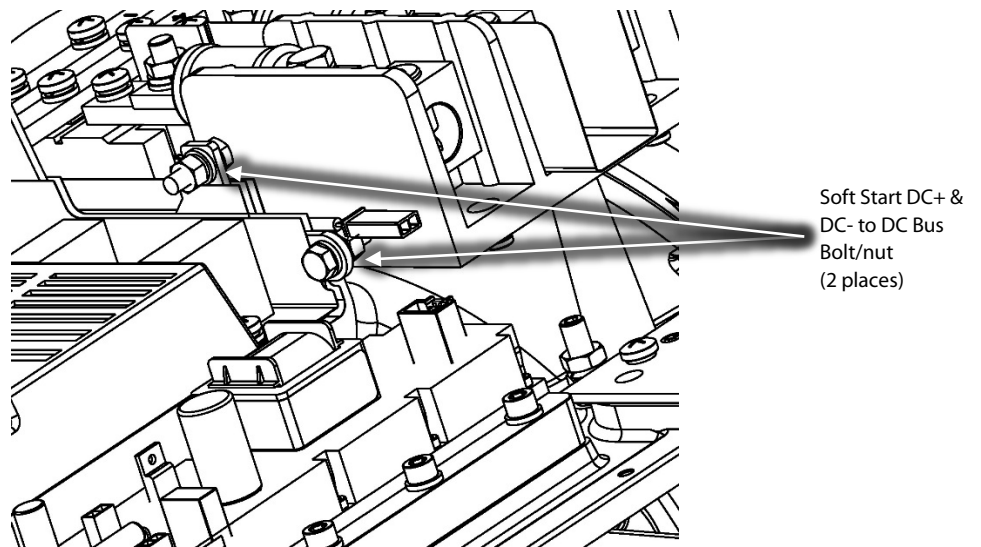


Figure 10 – Soft Start Harness Removal

21. 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).

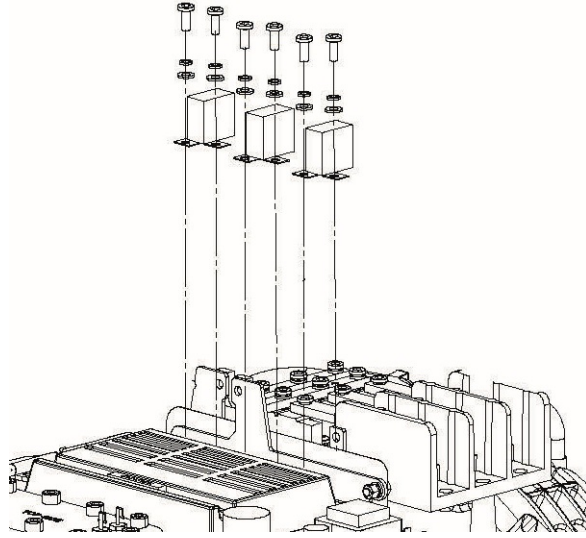


Figure 11 – Snubber Capacitor Removal

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

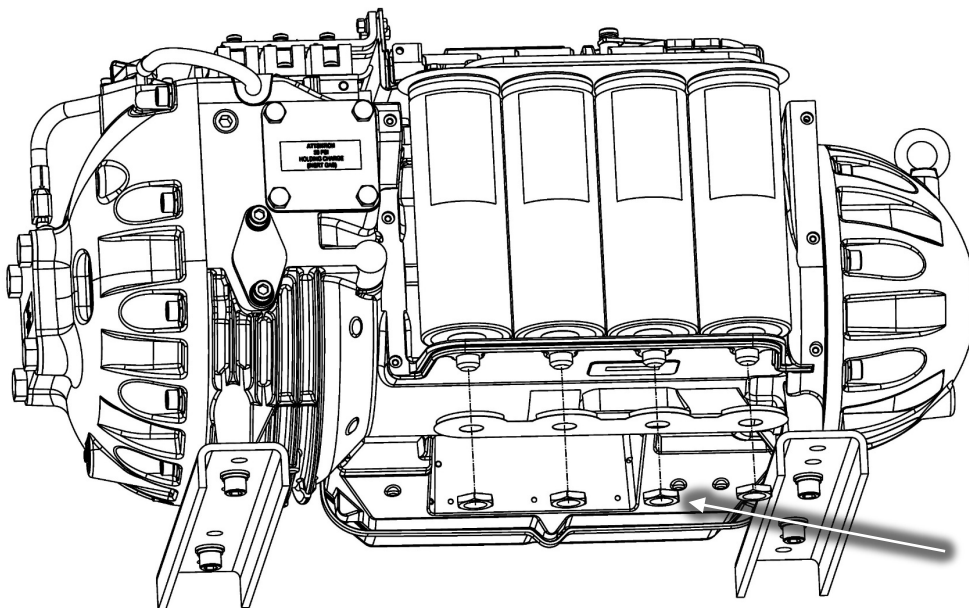


Figure 12 – Capacitor Nut Removal

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

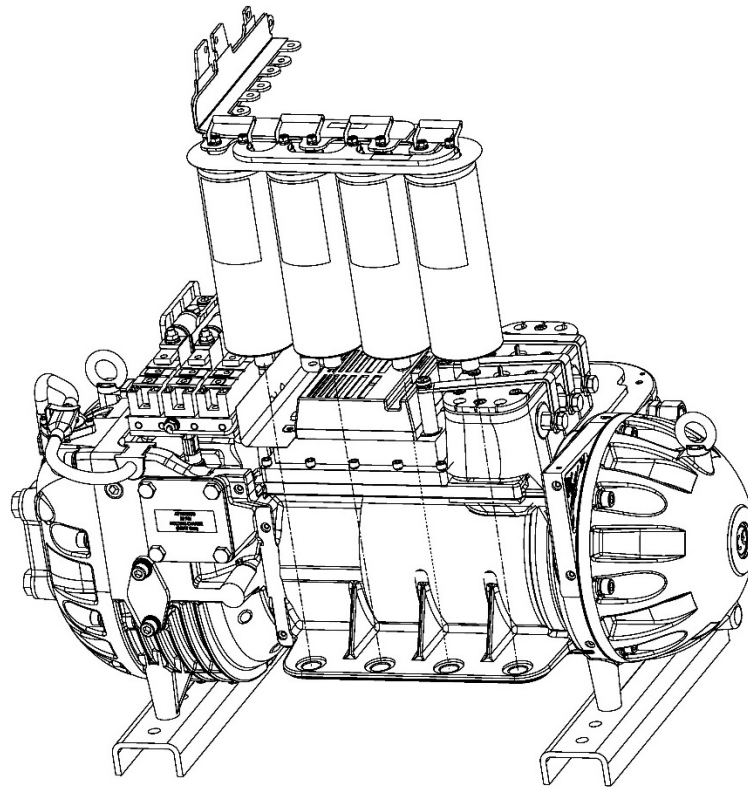


Figure 13 – Capacitor Assembly Removal

24. Remove and discard the insulating Mylar from the Inverter. Refer to Figure 14 (Capacitor Mylar Removal).

**NOTE:** If this is a Rev. “G” or later compressor, or if the compressor already contains the 613 Inverter, this step is not required as the Mylar is built into the DC bus bars.

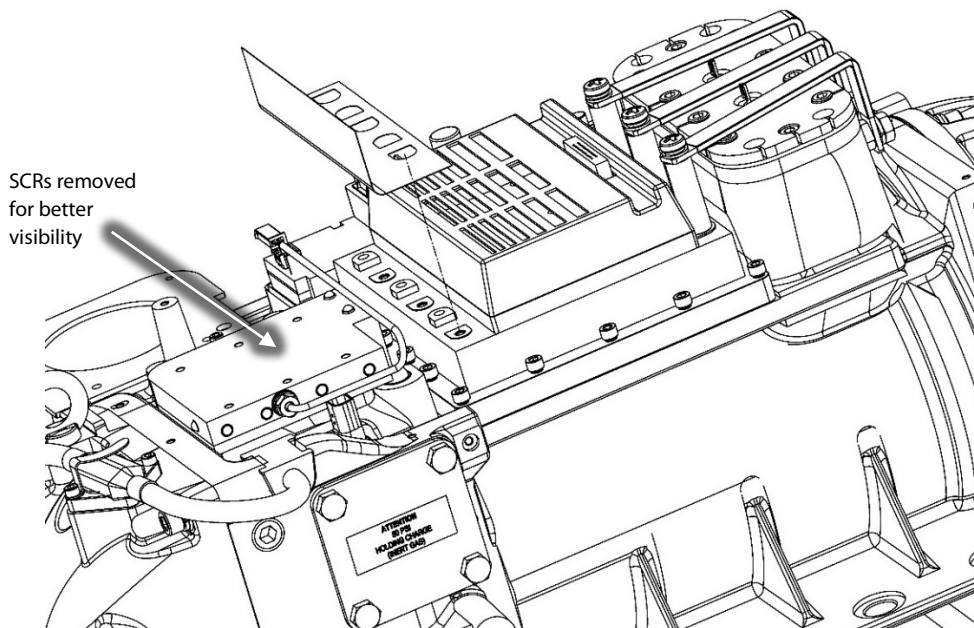


Figure 14 – Capacitor Mylar Removal



25. Disconnect the two (2) connectors from the Thermistor Sensor Feedthroughs. Refer to Figure 15 (Motor Bus Bar Removal).
26. To remove the Motor Bus Bar, remove the three (3) M8x70 fasteners attaching the Bus Bars to the Inverter. Then remove the three (3) nuts or screws (depending on the installed feedthrough) from the Motor Bus Bars to the High-Power Feedthroughs. Continue to Step 27 for Stainless Steel Feedthroughs. For PPS (Polyphenylene Sulfide) Feedthroughs, continue to Step 28.
27. For Stainless Steel Feedthroughs, hold the inner nut with a wrench while loosening the outer feedthrough nut. Failure to do so could place an excessive load on the feedthrough causing internal damage. Continue to Step 29.
28. For the PPS Feedthroughs, use a wrench to hold the feedthrough body to prevent any rotation when loosening. Failure to do so, may loosen the feedthrough. Continue to Step 29.
29. Discard the Motor Bus Bars along with the associated fasteners. Refer to Figure 15 (Motor Bus Bar Removal) for examples of both versions.

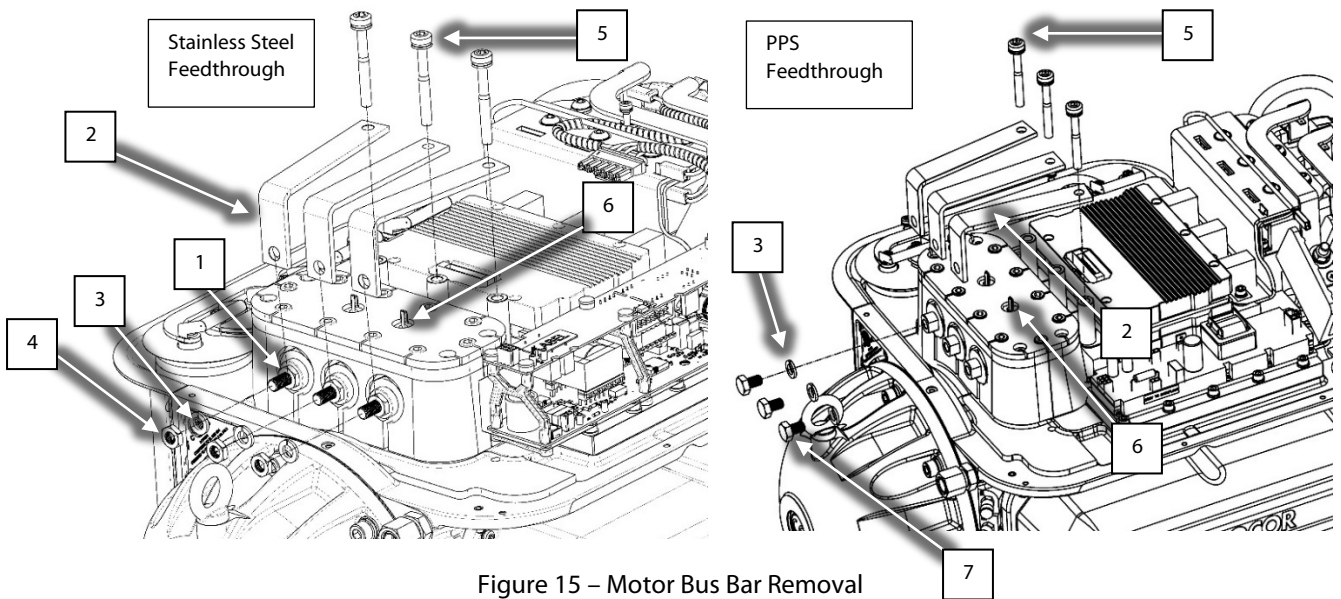


Figure 15 – Motor Bus Bar Removal

No.	Component	No.	Component
1	Inner Nut (3 places)	5	Motor Bus Bar to Inverter Screw (3 places)
2	Motor Bus Bar (3 places)	6	Thermistor Connector (2 places)
3	Lock Washer (3 places)	7	Bus Bar to High-Power Feedthrough Fastener (3 places)
4	Outer Nut (3 places)		

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

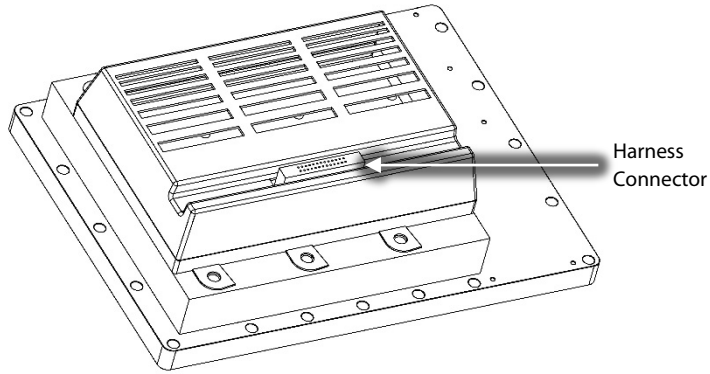


Figure 16 – Inverter Harness Removal

31. Disconnect all wiring connections from the 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 as it will not be reused.

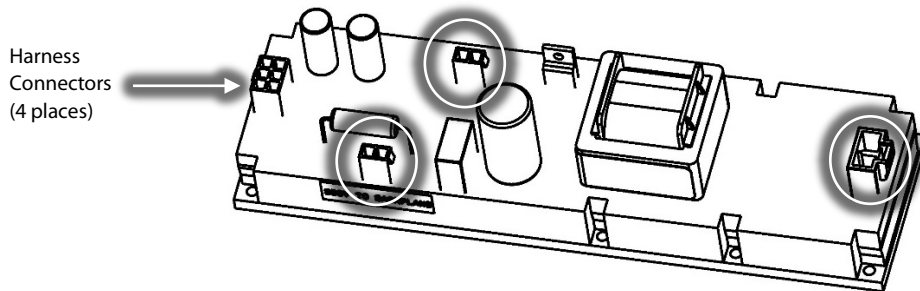


Figure 17 – DC-DC Harness Removal

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 18 (Cable Harness Compressor Controller Removal).

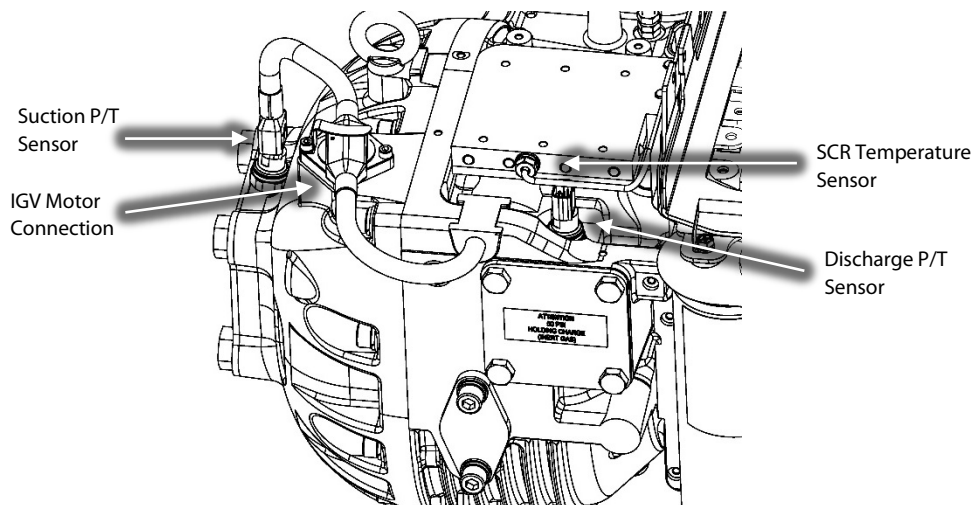


Figure 18 – Cable Harness Compressor Controller Removal

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

34. Remove and discard the fasteners that secure the Inverter to the compressor main housing. Refer to Figure 19 (Inverter Removal).
35. Carefully, remove the Inverter assembly. The Inverter assembly and the two (2) O-rings underneath will not be reused.

**NOTE:** The SCR Cooling Manifold will be attached to the IGBT Heat Sink Plate.

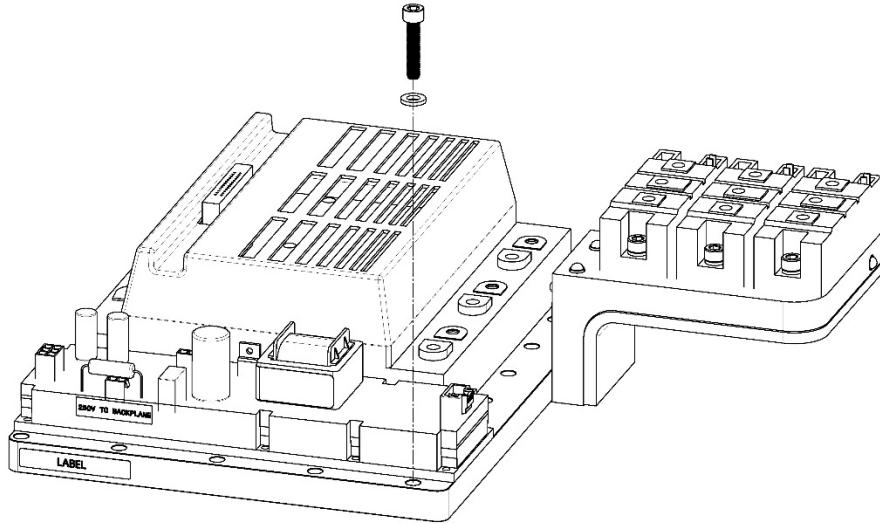


Figure 19 – Inverter Removal

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). Retain for use with the new Inverter assembly.

**NOTE:** Do not completely remove the foam insulation, only pull back what is needed to access the fasteners. Use caution when removing the portion of insulation as it could tear when separating from the SCR Cooling Manifold.

37. Remove and discard the M6x20 fasteners indicated in Figure 20 (SCR Cooling Manifold Removal) and carefully remove the SCR Cooling Manifold. Retain the SCR Cooling Manifold and SCRs for use with the new Inverter assembly.

**NOTE:** The SCRs do not need to be removed from the SCR Cooling Manifold.

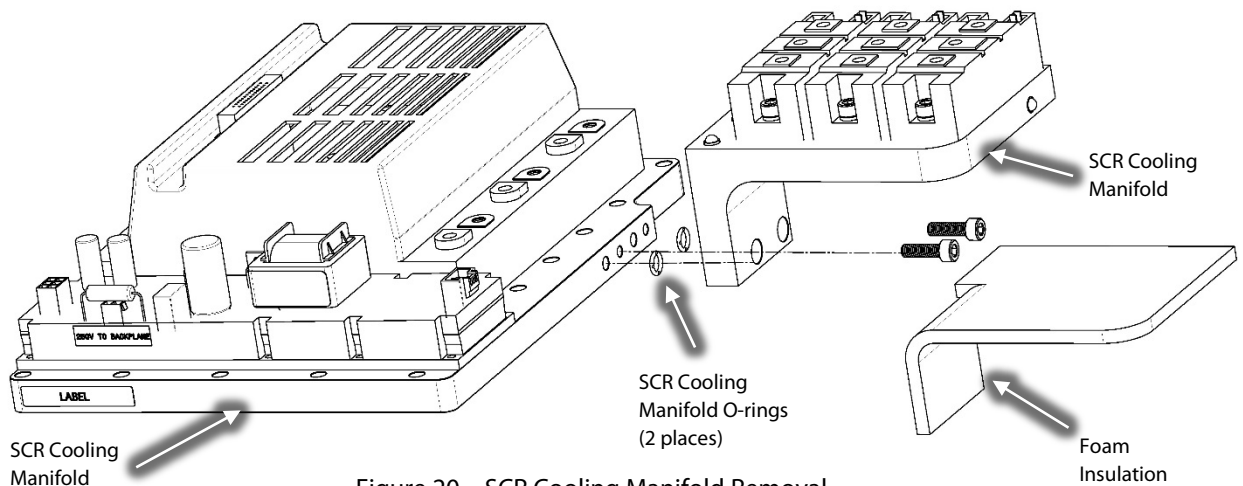


Figure 20 – SCR Cooling Manifold Removal

4 - INVERTER ASSEMBLY Installation Instruction:

1. Apply O-Lube to the O-rings provided and install them into the SCR Cooling Manifold. Refer to Figure 21 (SCR Cooling Manifold O-ring Installation).

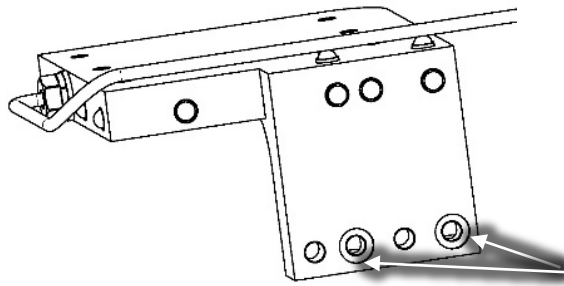


Figure 21 –SCR Cooling Manifold O-ring Installation

2. Reinstall the SCR Cooling Manifold to the Inverter cooling manifold using the new fasteners and torque to 7 Nm (62 in.lb.). Refer to Figure 22 (SCR Cooling Manifold Installation).
3. Reinstall the insulation onto the backside of the SCR Cooling Manifold.

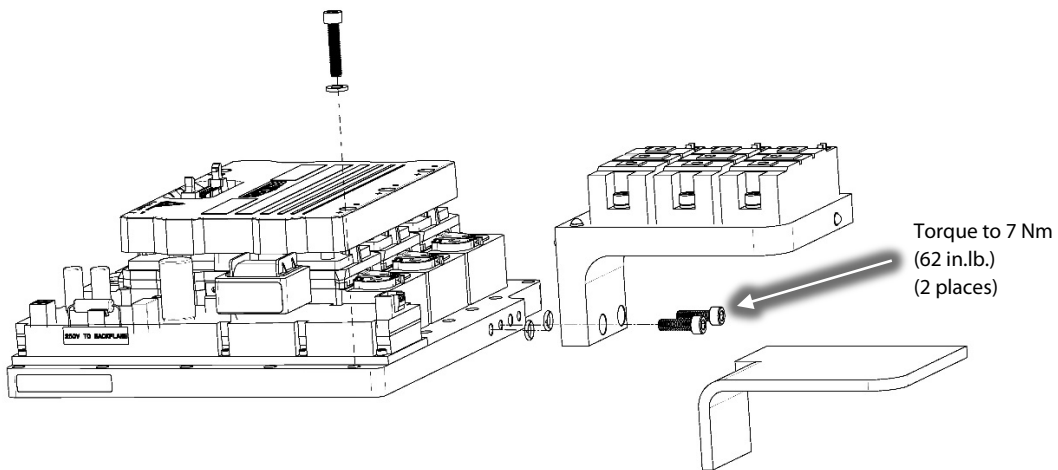


Figure 22 – SCR Cooling Manifold Installation

4. Clean the O-ring grooves in the compressor housing.
5. Apply O-Lube to the Inverter O-ring provided and place the O-ring in the compressor housing groove. Refer to Figure 23 (Inverter O-ring Installation).
6. Install the small O-ring into the motor cooling port.

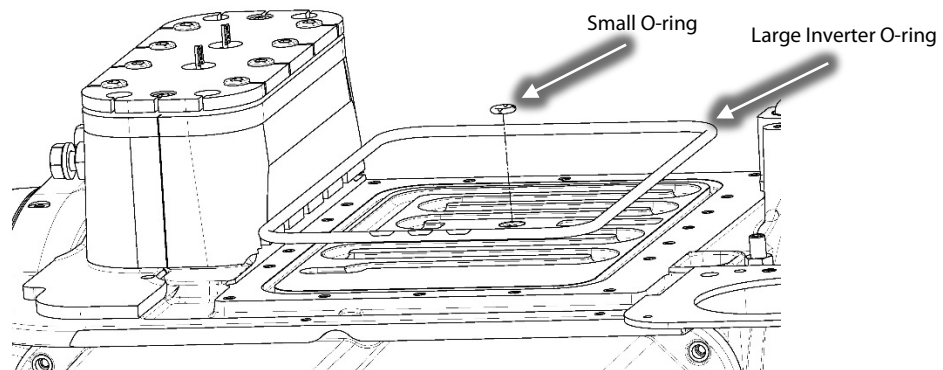


Figure 23 – Inverter O-ring Installation

7. Remove the backing material from the IGBT Heat Sink Plate of the new Inverter. Prevent damage to sealing surface.
8. Carefully, install the Inverter on the compressor housing with the SCR temperature sensor cable run underneath the SCR Cooling Manifold. Refer to Figure 24 (Inverter Installation).

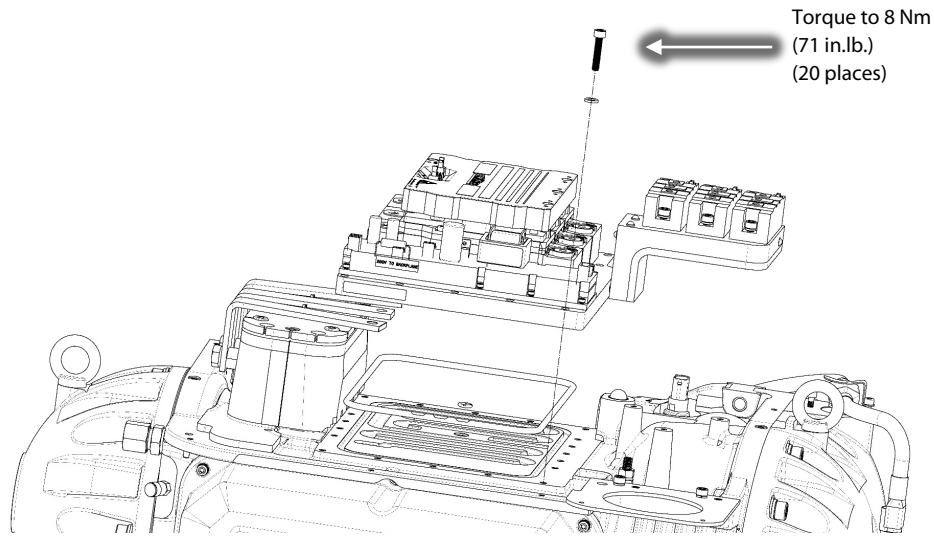


Figure 24 – Inverter Installation

9. Install the provided Inverter fasteners in a diagonal pattern and torque to 3 Nm (27 in.lb.) on the first pass then to 7 Nm (62 in.lb.) on the second pass. Refer to Figure 26 (Inverter Screw Locations).

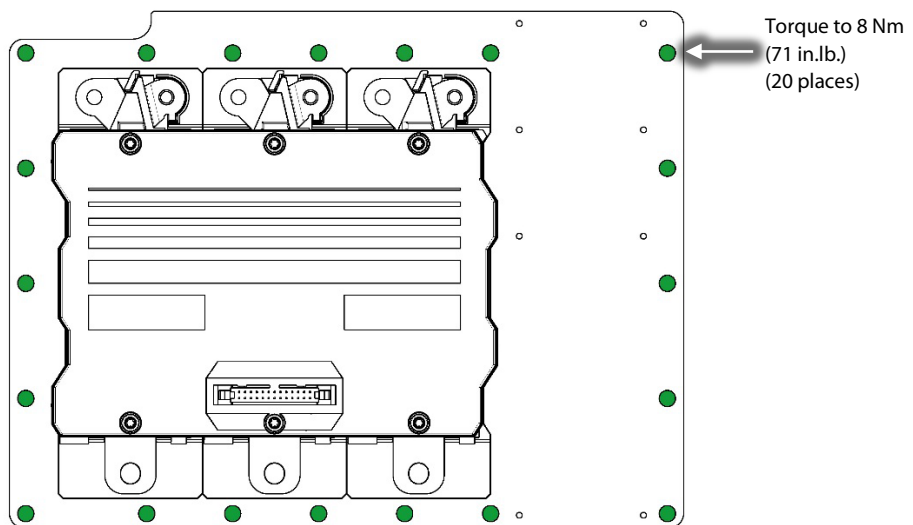


Figure 25 – Inverter Screw Locations

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. Place the new motor bus bars in their correct locations; they are designed to align to individual bolt patterns and should not be forced.
13. Loosely install the three (3) M8x70 fasteners that secure the motor bus bars to the inverter output through the copper tubes. Continue to Step 14 if the compressor contains PPS High-Power Feedthroughs. Continue to Step 15 if the compressor contains Stainless Steel High-Power Feedthroughs.
14. For the PPS High Power Feedthroughs, install the three (3) M10x16 fasteners and lock washers that secure the motor bus bars to the PPS High-Power Feedthroughs and torque to 14 Nm (10 ft.lb.). Be careful not to over tighten the bolts to the power feedthroughs. Continue to Step 16.

15. For the Stainless Steel Feedthroughs, install the three (3) M10 nuts and lock washers that secure the motor bus bars to the Stainless-Steel High-Power Feedthroughs and torque to 15.5 Nm (11.5 ft.lb.). Be careful not to over tighten the nuts to the power feedthroughs. Continue to Step 16.

**WARNING:** Be sure that the inner nut is backed out at least one revolution from the feedthrough, otherwise damage to the feedthrough could occur.

**WARNING:** While torqueing the High-Power Feedthrough outer nut, it is important to hold the inner nut with a wrench. Failure to do so could place an excessive load on the feedthrough causing internal damage. Also, the feedthrough itself could move which could allow it to be over torqued.

16. Torque the three (3) M8x70 fasteners that secure the motor bus bars to the inverter output to 14 Nm (10 ft.lb.).
17. Reconnect the two (2) connectors to the Thermistor Sensor Feedthroughs.
18. Install the new Manifold Mylar on the DC Bus Bar as shown in Figure 27 (DC Bus Bar Spare Mylar Placement).

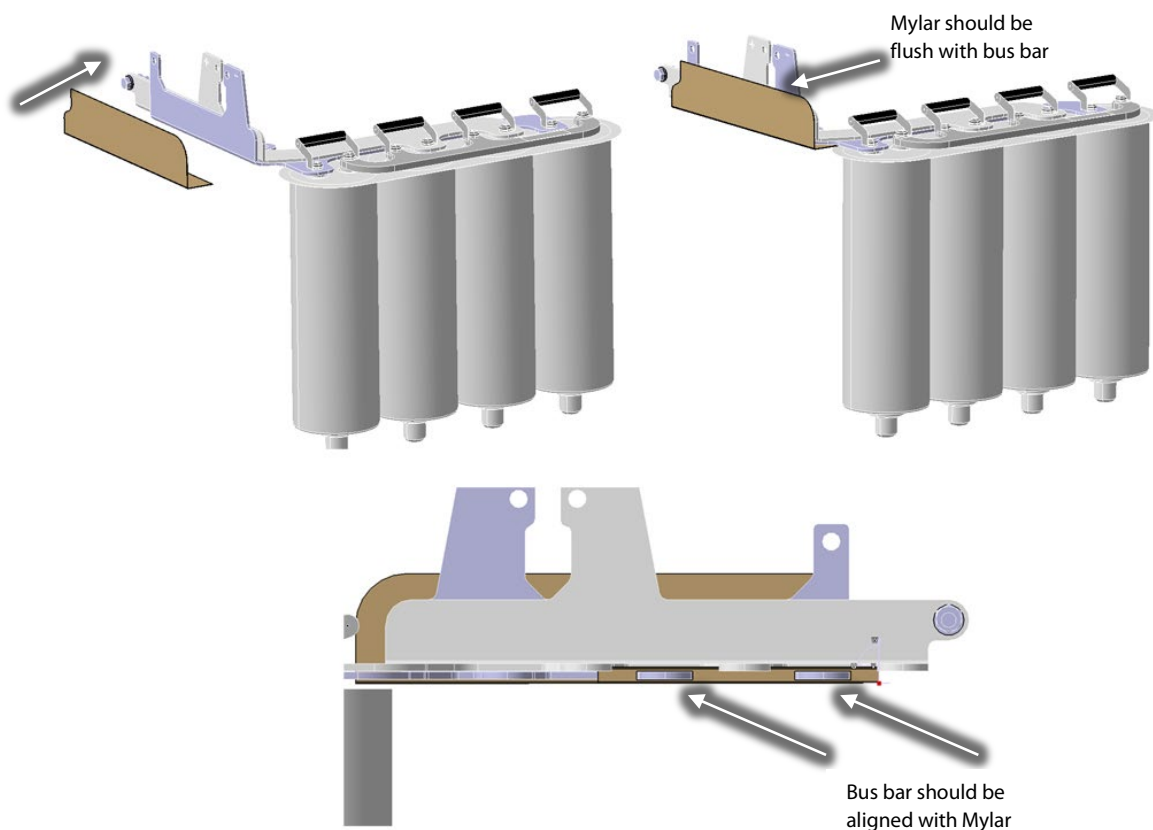


Figure 26 – DC Bus Bar Spare Mylar Placement

19. Reinstall the DC Bus Bar and capacitor assembly over the Inverter.
20. 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).
21. 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 specification. Refer to Figure 28 (Capacitor Nut Installation).

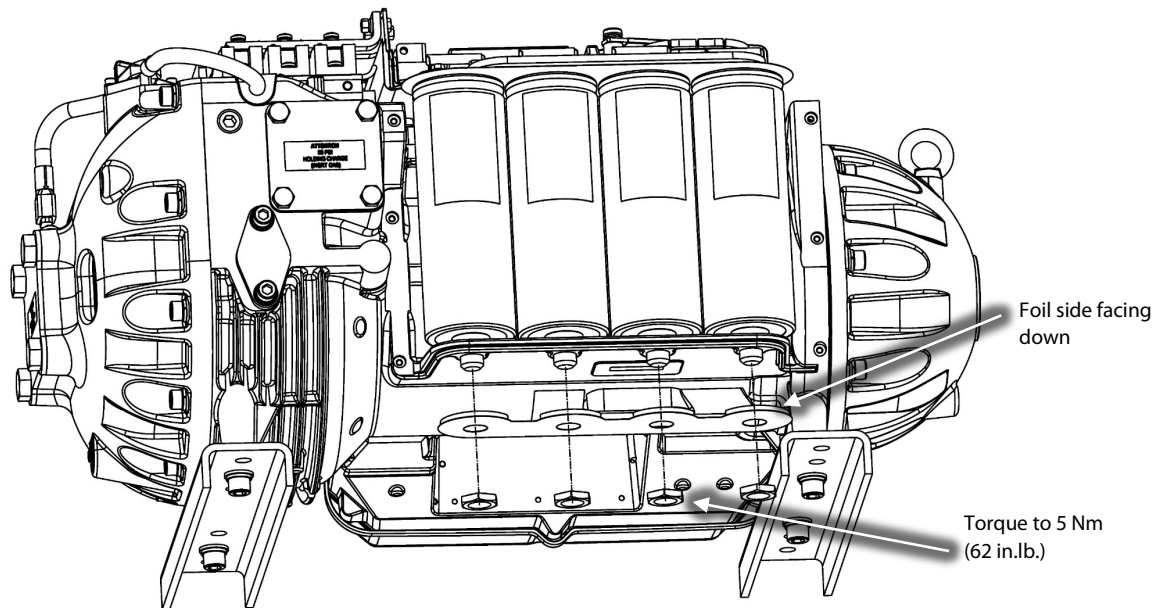


Figure 27 – Capacitor Nut Installation

22. 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.).
23. Reconnect the DC Bus Bars to the SCRs and torque to 5 Nm (44 in.lb.).
24. Reconnect the DC Bus Bars to the DC Bus and torque to 10 Nm (7 ft.lb.).
25. Reconnect all electrical connections to the DC-DC converter.
26. Reinstall the Mylar in the middle of the Terminal Block. Refer to Figure 29 (Main Power Mylar Insertion).

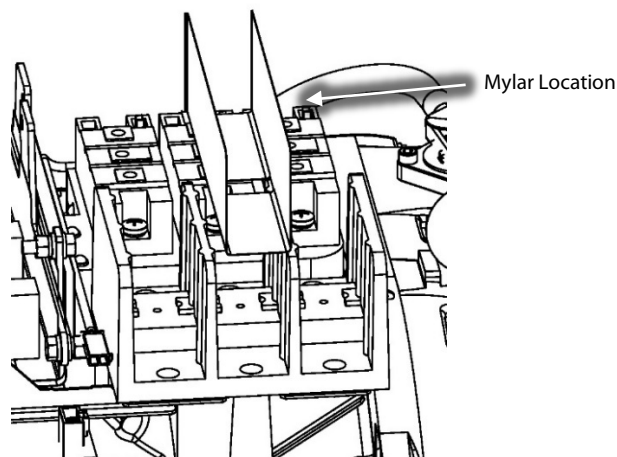


Figure 28 – Main Power Mylar Insertion

27. Reinstall the fuse assemblies to the SCRs and the Mains Input Terminal Block. Torque the fasteners of the fuse assemblies to specification. Refer to Figure 30 (Fuse Assembly Installation).

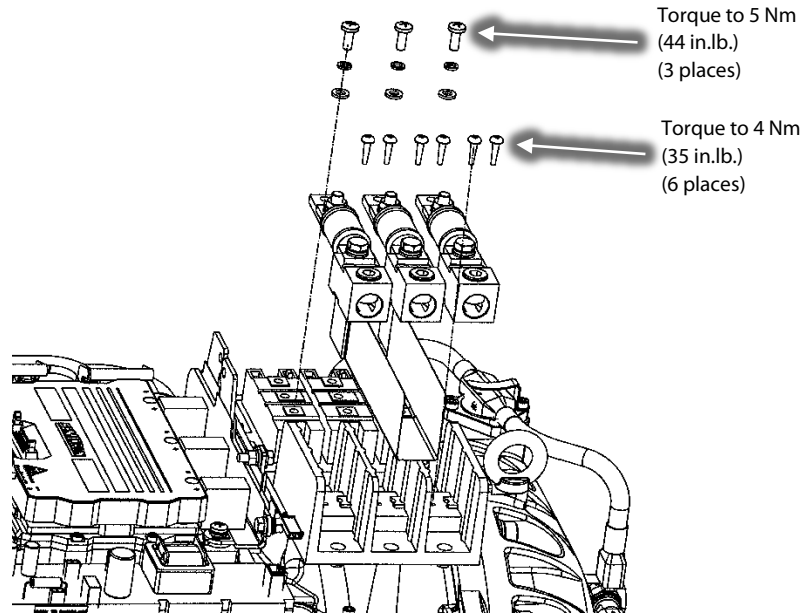


Figure 29 – Fuse Assembly Installation

28. Connect the SCR Gate cable harness to the SCRs noting its orientation.
29. Reconnect all wiring harnesses to the new Soft Start.
30. Peel the paper backing off the new phenolic washers and place them, adhesive-side down, on top of the compressor. (Refer to Figure 31 (Soft Start Placement).

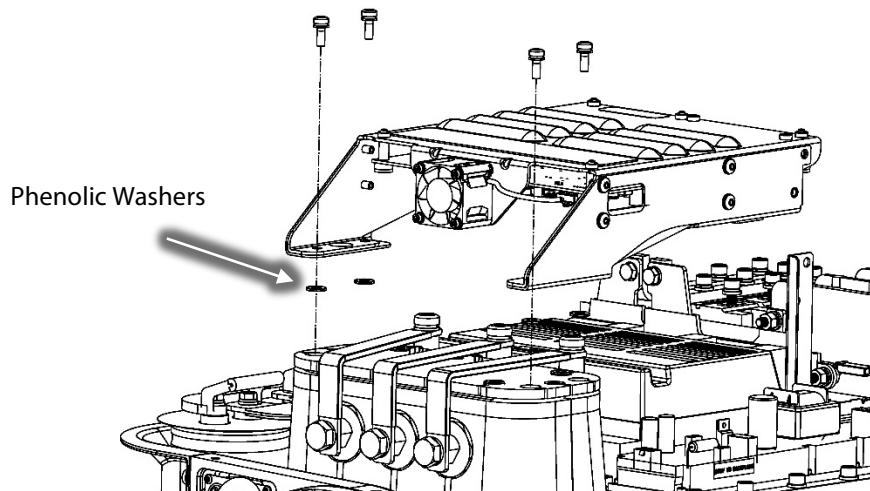


Figure 30 – Soft Start Placement

31. Place the new Soft Start into the mounting position, finger tighten the M5x15 fasteners and torque to 5 Nm (44 in.lb.).
32. Reroute and connect the Soft Start ground wire to the ground post on the compressor housing at the 3-phase connection point and torque the second nut to 7 Nm (62 in.lb.).
33. Install the mains input ground wire and lock washer. Torque the top nut to 10 Nm (7 ft.lb.).
34. Charge the compressor with refrigerant.
35. Install covers.



### Capacitor Cover

1. 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 the remaining fasteners to secure the cover. Fasten according to the sequence in Figure 32 (Capacitor Cover Torque Sequence). Follow the sequence twice.

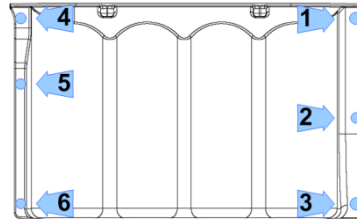


Figure 31 – Capacitor Cover Torque Sequence

### Top and Mains Input Cover

1. Ensure that no residue remains on the contact surfaces of Top Cover and casting sides.
2. 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 33 (Top Cover Torque Sequence).

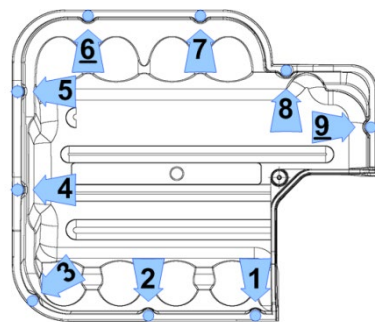


Figure 32 – Top Cover Torque Sequence

3. Ensure that no residue remains on the contact surfaces of the Mains Input Cover and casting sides.
4. Place the Mains Input Cover and secure it with the M5x15 fasteners. Tighten according to Figure 34 (Mains Input Cover Torque Sequence).

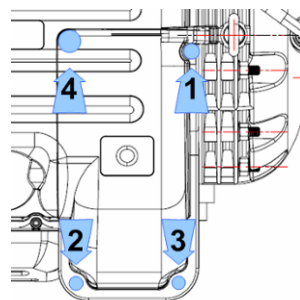


Figure 33 – Mains Input Cover Torque Sequence

5. 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.

### Compressor Nameplate

Once the conversion has been completed, the Compressor Nameplate will need to be changed. The Compressor Nameplate contains duplicate information from the existing one, except that it will be engraved with 380V as opposed to 400V.

1. Before removing the Compressor Nameplate, ensure the information on the new nameplate, matches the existing one.
2. Using a 2mm hex key, remove the Rivscrews that secure the secure the Compressor Nameplate to the compressor housing. Refer to Figure 35 (Compressor Nameplate).

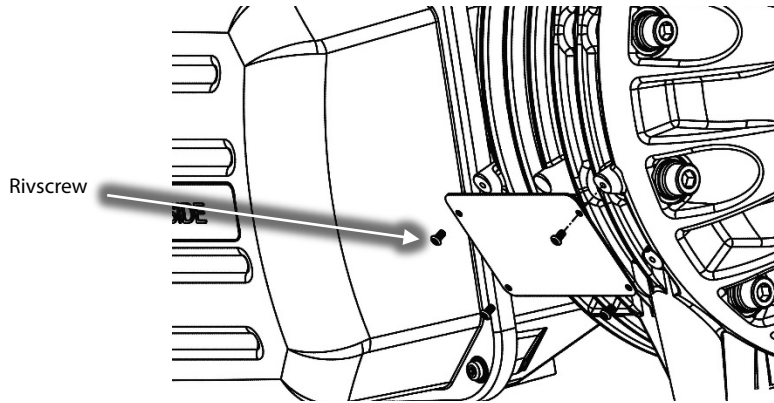


Figure 34 – Compressor Nameplate

**NOTE:** Do not discard the Rivscrews as they will be reused.




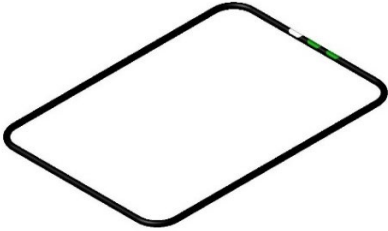





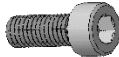
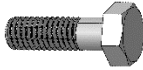


3. Remove and discard the old Compressor Nameplate.
4. If necessary, clean the compressor mounting surface.
5. Secure the new nameplate with the removed Rivscrews.

**NOTE:** If for some reason a Rivscrew is either lost or damaged, an appropriately sized self-tapping screw or blind rivet may be used. It is recommended that the fastener be plated (e.g., zinc) to minimize any corrosion due to dissimilar metals.

Fastener Torque Values	
Component	Torque Value
SCR Cooling Manifold to IGBT Heat Sink Plate	7 Nm (62 in.lb.)
Soft Start Mounting fasteners	5 Nm (44 in.lb.)
Inverter to compressor housing	8 Nm (71 in.lb.)
Motor Bus Bar to motor	14 Nm (10 ft.lb.)
Motor Bus Bar to Inverter	14 Nm (10 ft.lb.)
Soft Start DC+ & DC- to DC bus	10 Nm (7 ft.lb.)
Snubber capacitors to Inverter	7 Nm (62 in.lb.)
Nylon Nuts	7 Nm (62 in.lb.)
DC Bus Bar to DC bus	10 Nm (7 ft.lb.)
DC Bus Bars to SCR	5 Nm (44 in.lb.)
Fuse to SCR	5 Nm (44 in.lb.)
Fuse to Terminal Block	4 Nm (35 in.lb.)
Ground post top nut	10 Nm (7 ft.lb.)
Ground post second nut	7 Nm (62 in.lb.)
Cover	1.5 Nm (13 in.lb.)

5 - Kit Contents

KIT NAME: KIT – TT300 VOLTAGE UPGRADE – 400V TO 380V		
KIT #: 100521-1		
QTY	Part(s) Description	Picture(s)
1	IGBT ASSEMBLY (Includes 380V DC-DC Converter)	
1	MODULE SOFT START ASSY 380V	
3	MOTOR BUS BAR (A, B, and C)	
3	BOLT, M10x16	
3	WASHER M10, SPLIT LOCK	
3	SCREW M8x70	
4	SCREW M5X15 TORX PAN HEAD DBL SEMS	
3	NUT BRASS M10 X 1 X 5MM THICK	

1	INSULATOR, MANIFOLD	
2	O-RING #2-011	
1	O-RING #2-109	
1	O-RING #2-377	
32	WASHER M6 FLAT	
20	SCREW M6X30 S/HD CAP	
2	SCREW M6X20 SOCKET HEAD CAP	
9	WASHER M6 SPLIT LOCK	
3	NUT M6 HEX	
6	SCREW M6x16 SOCKET HEAD CAP	
3	SCREW M6x20 HEX HEAD CAP	
4	PHENOLIC WASHER 1/4"IDx1/2"ODx1/16 WITH PSA-ADHESIVE ON 1 SIDE	
1	LUBRICATION-SUPER-O-LUBE-2G	

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