



KIT O-RINGS FOR IGBT ASSEMBLY (FOR ALL TT/TG COMPRESSORS EXCEPT TT300/TG230)

100310-1



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

O-RINGS FOR IGBT ASSEMBLY Removal and installation (Excluding TT300/TG230 compressors). Fits compressors TT350, TT400, TT500, TT700, TG230, TG310, TG390, and TG520.

2 - Removing Refrigerant from Compressor:

- Isolate the compressor and recover refrigerant from compressor in accordance with local codes and practices.

3 - O-rings Removal Instructions:

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

- Isolate compressor power and lock out in accordance with local codes and practices.
- Remove the mains cover only.
- Using an appropriately rated volt meter, confirm that the AC voltage is isolated.
- 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

- Remove the top cover by releasing the nine (9) screws 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. Remove the Capacitor Cover by releasing the six (6) screws that secure the cover.

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

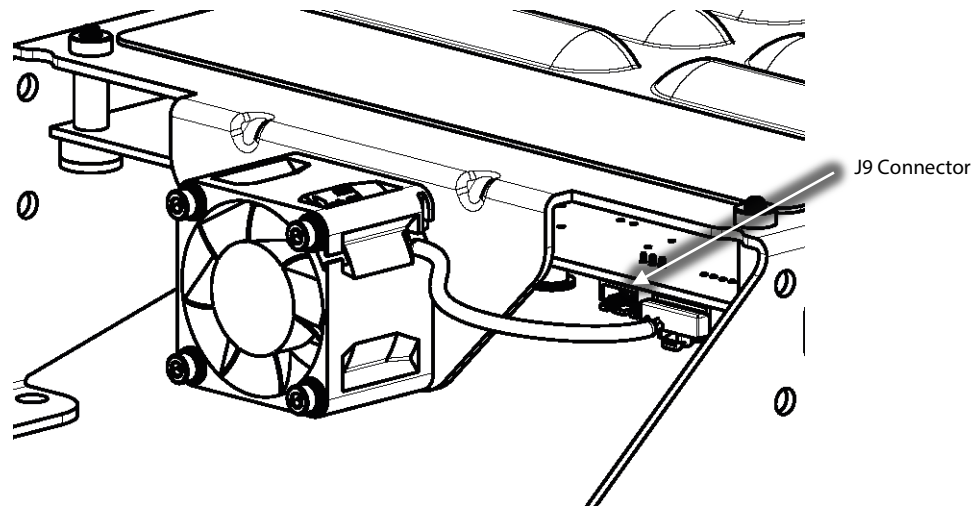


Figure 1 – Soft Start J9 Connector

9. Remove the cable tie securing the Soft Start ground cable to the AC/DC cable.
10. Disconnect the Soft Start ground wire 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).

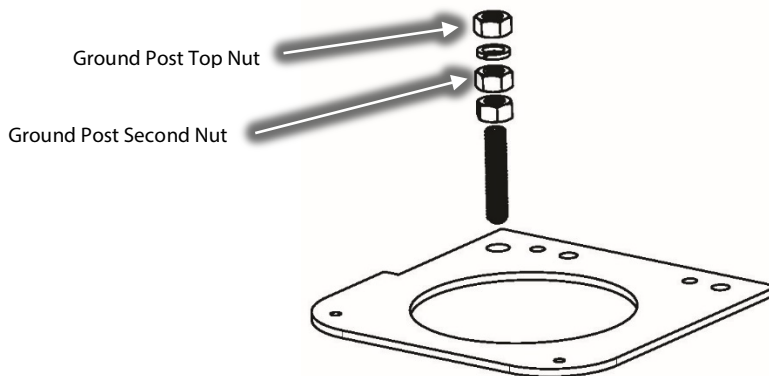


Figure 2 – Ground Location

- Remove the fasteners that secure the Soft Start mounting bracket to the compressor. Refer to Figure 3 (Soft Start Mounting Screws).

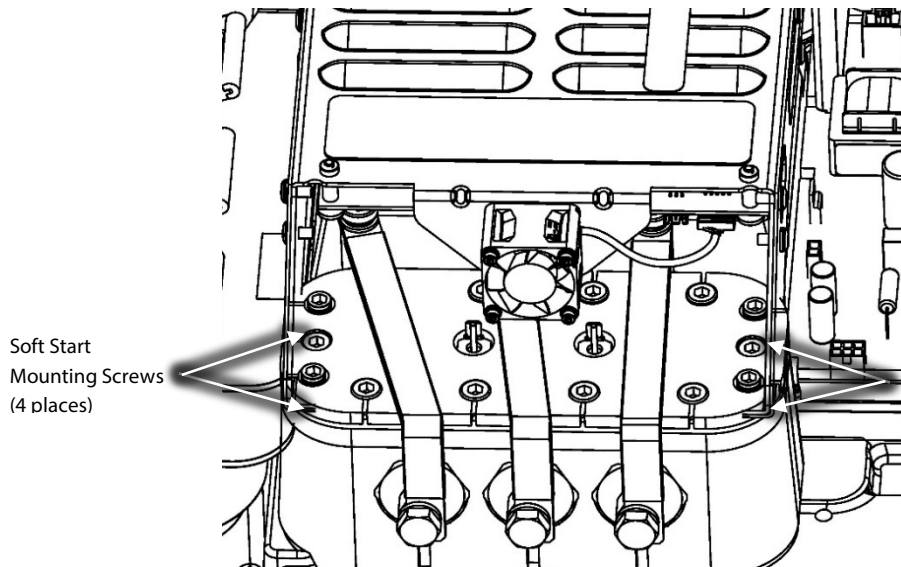


Figure 3 – Soft Start Mounting Screws

- 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).

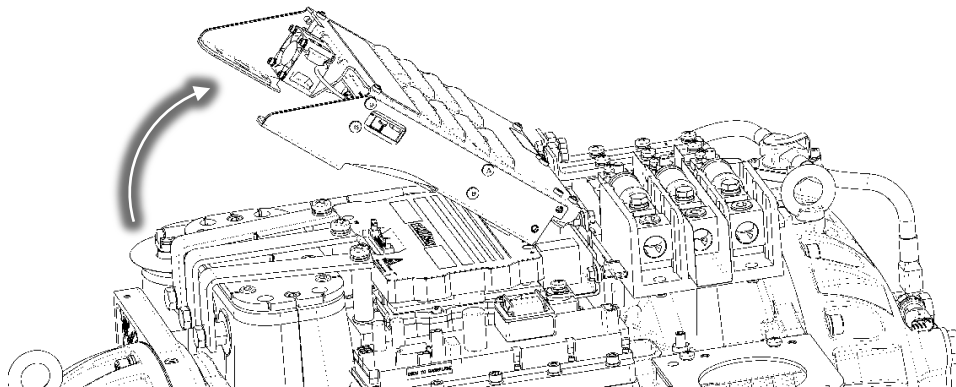


Figure 4 – Soft Start Lift

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

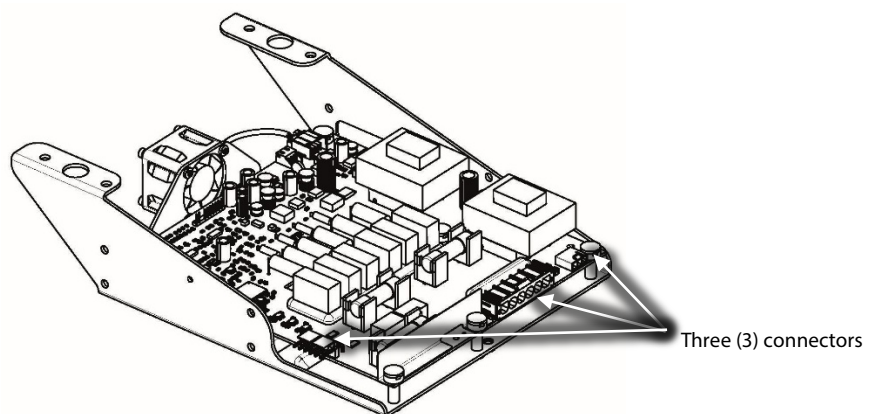


Figure 5 – Soft Start Harness Removal

- Unplug the SCR Gate cable harness and AC Input Cable from the AC Bus and SCRs noting their orientation. Refer to Figure 6 (SCR Gate Cable and AC/DC Harness Connections) for the location of the connectors.

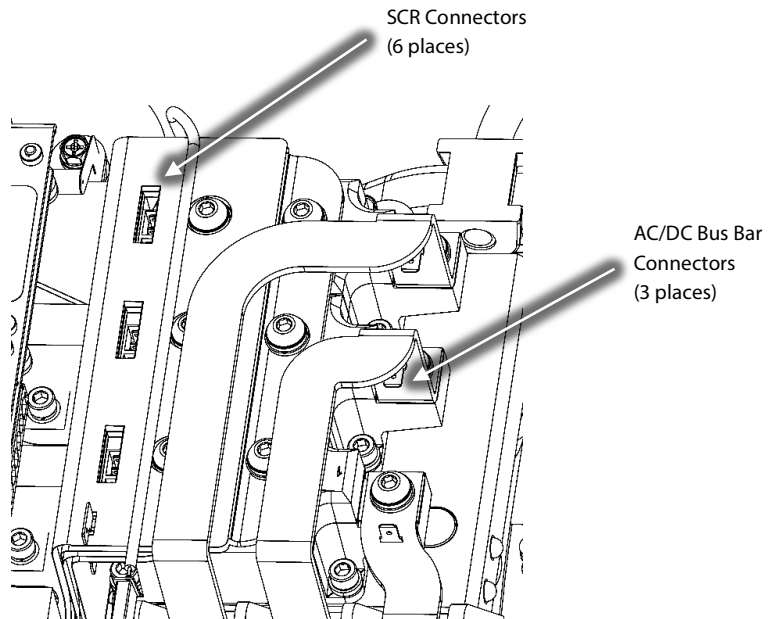


Figure 6 – SCR Gate Cable and AC/DC Harness Connections

- Remove the AC Mains Input Terminals and Bus Bars. Refer to Figure 7 (AC Mains Input Terminals and Bus Bar Removal).

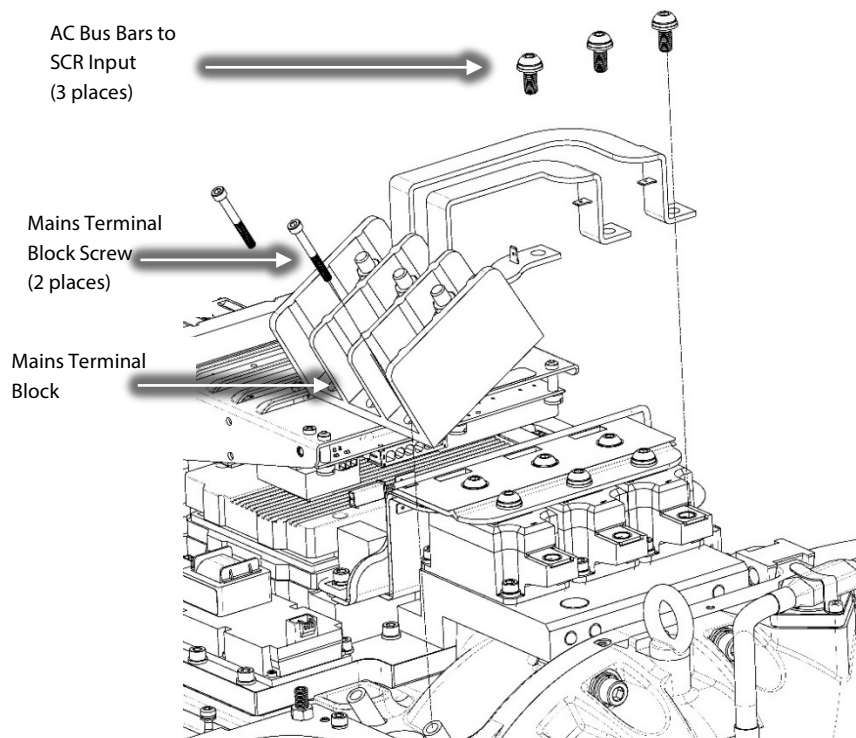


Figure 7 – AC Mains Input Terminals and Bus Bar Removal

- Disconnect the three (3) snubber capacitors from the Inverter noting the leg orientation of one leg is longer than the other. Refer to Figure 8 (Snubber Capacitor Removal).

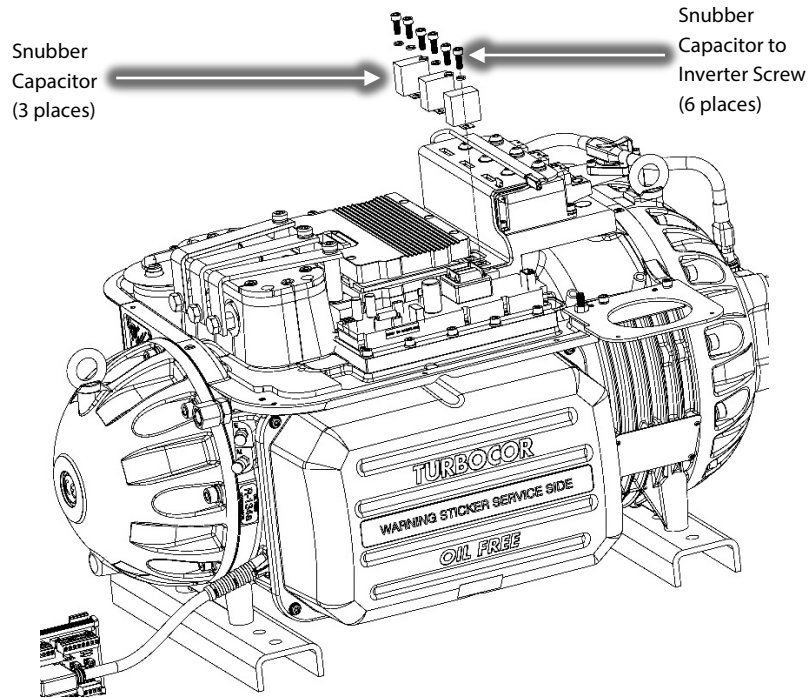


Figure 8 – Snubber Capacitor Removal

- Remove the six (6) DC bus screws from the SCRs. Refer to Figure 9 (SCR Bus Screw Removal).

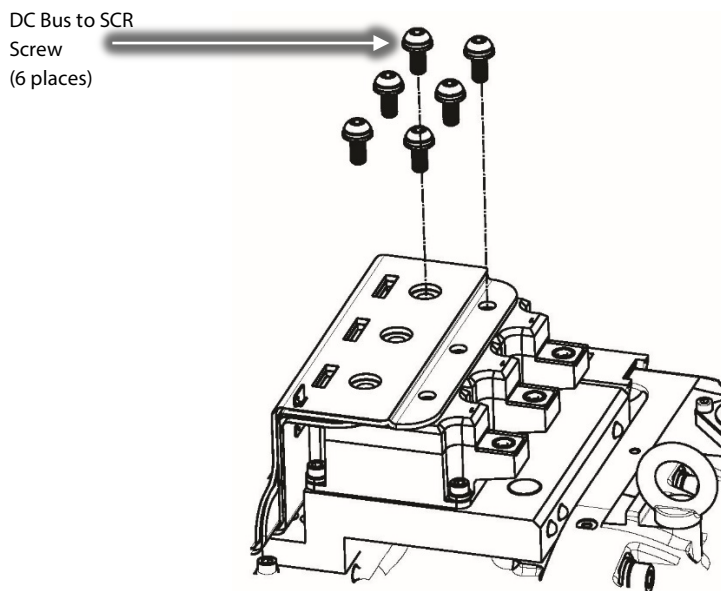


Figure 9 – SCR Bus Screw Removal

18. Remove the nylon nuts and foil at the base of the DC capacitor assembly, under the main compressor housing. Refer to Figure 10 (Capacitor Nut Removal).

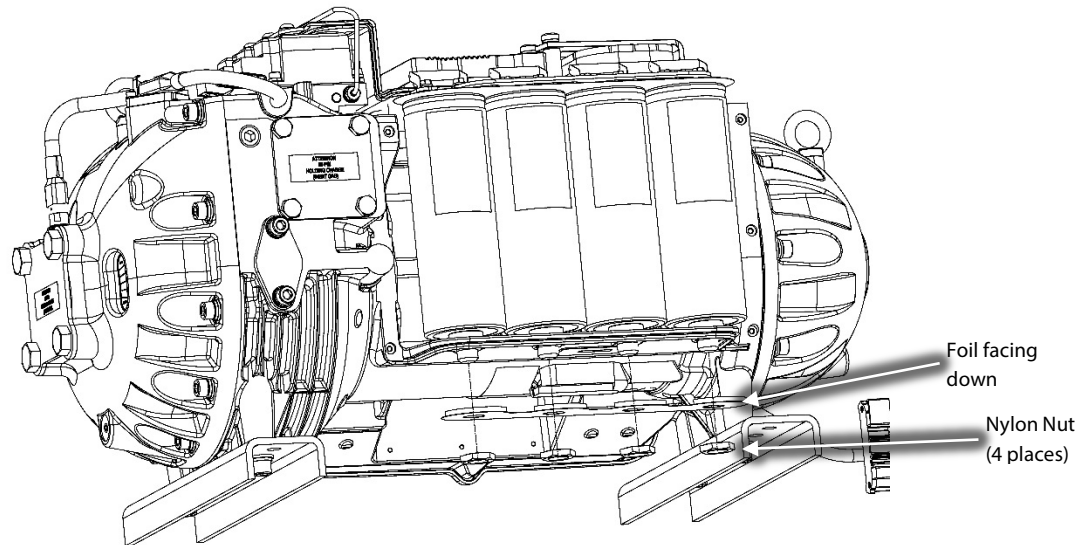


Figure 10 – Capacitor Nut Removal

19. Carefully lift the DC Bus Bars and capacitors out as an assembly. Do not remove the bleed resistors or capacitors from the bus bars. Refer to Figure 11 (Capacitor Assembly Removal).

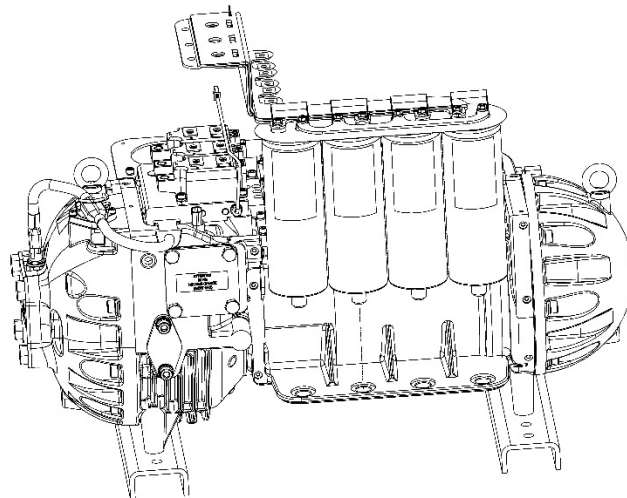


Figure 11 – Capacitor Assembly Removal

20. Loosen the screw containing the Retainer Clip and rotate the clip to allow for the connector to be removed. Refer to Figure 12 (Retainer Clip Rotation).

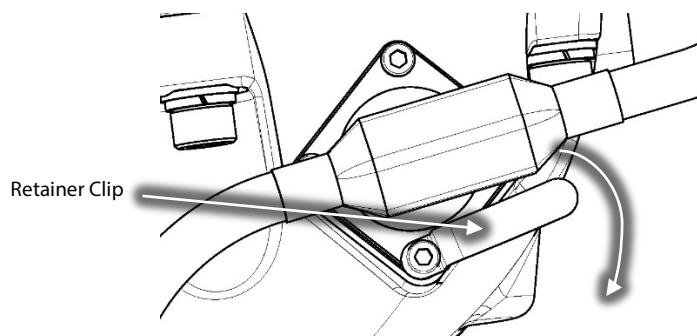


Figure 12 – Retainer Clip Rotation

21. Disconnect the compressor cable harness from the IGV Motor, Suction and Discharge Sensors, and SCR Temperature Sensor. Refer to Figure 13 (Compressor Cable Harness Removal).

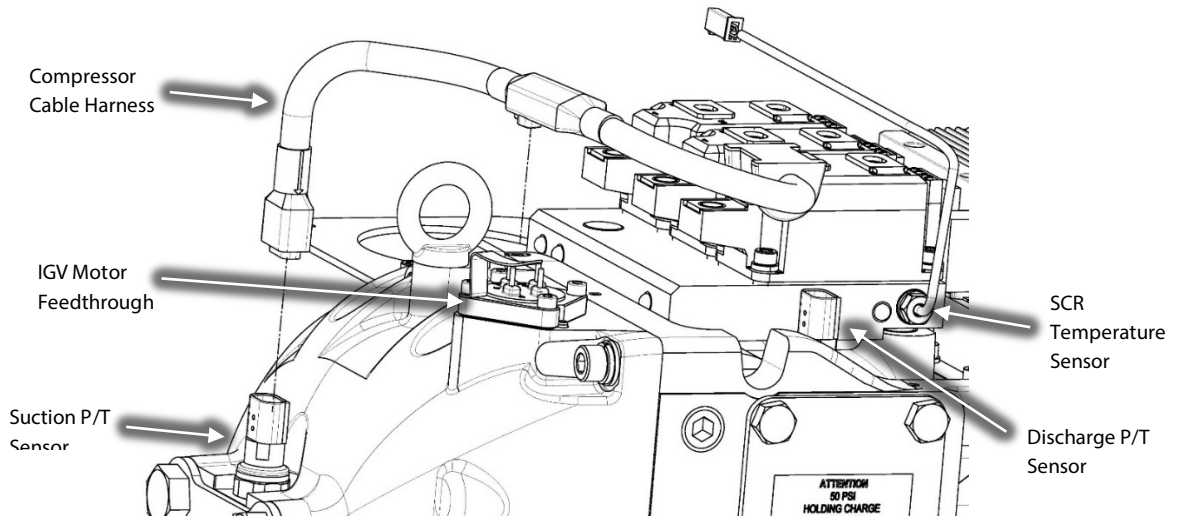


Figure 13 – Compressor Cable Harness Removal

22. Remove the four (4) screws that secure the SCR Cooling Manifold to the IGBT Heat Sink Plate. (Refer to Figure 14 (SCR Manifold Removal)).
23. Carefully remove the SCR Cooling Manifold from the IGBT Heat Sink Plate and the SCR Manifold Return Brass Fitting. Refer to Figure 14 (SCR Manifold Removal).

NOTE: Removal of the SCR Cooling Manifold will require the manifold to be rocked back and forth to disengage it from the SCR Manifold Return Brass Fitting. If necessary, use a flat-blade screwdriver to gently pry the manifold upward. Use extreme caution to not damage any of the components.

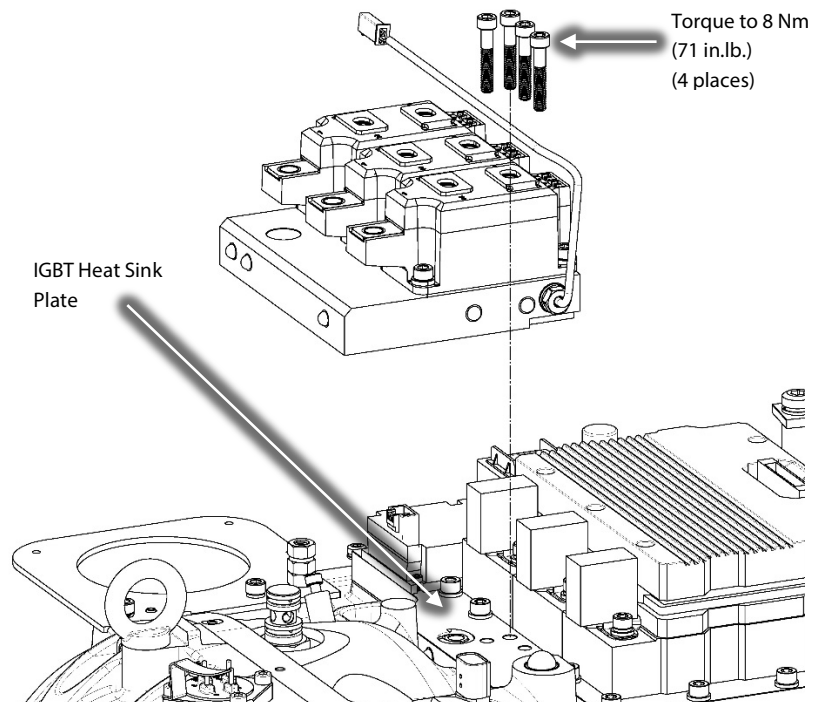


Figure 14 – SCR Manifold Removal

24. Remove the Motor Bus Bar screws, copper tubes, and washers from the Inverter. Refer to Figure 15 (Copper Tube Removal).

NOTE: The Motor Bus Bars do not need to be removed. Figure 15 (Copper Tube Removal) is only used to provide clarification of the individual components.

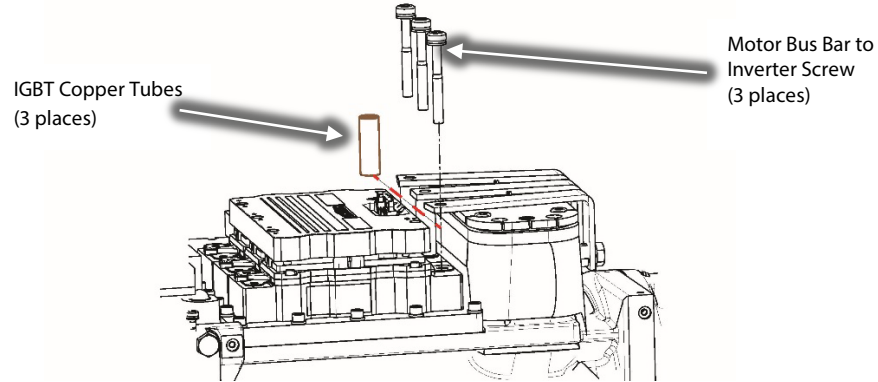


Figure 15 – Copper Tube Removal

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

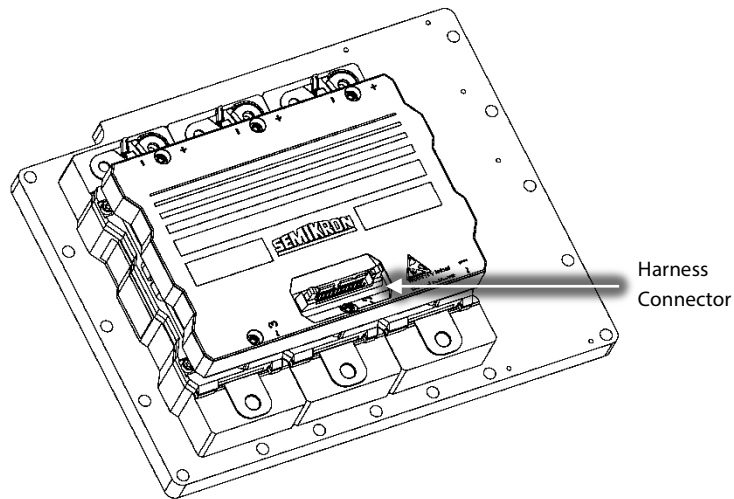


Figure 16 – Inverter Harness Removal

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

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

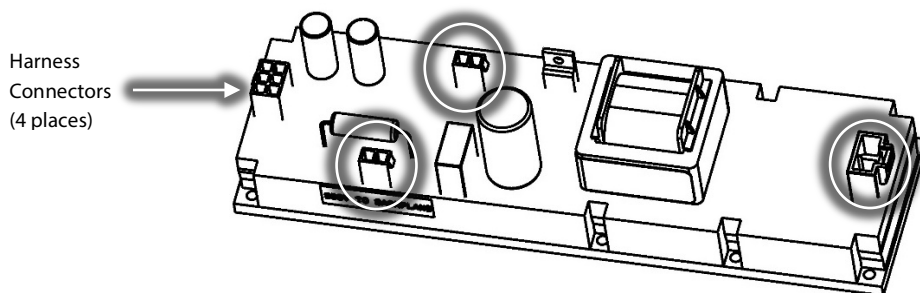


Figure 17 – HV DC-DC Harness Removal

27. Disconnect the wires from the Motor Winding Sensor. Refer to Figure 18 (Motor Winding Sensor Connector Removal).

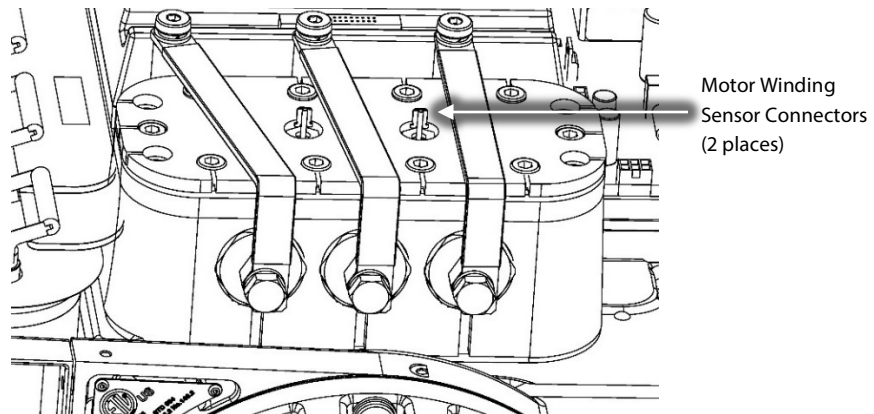


Figure 18 – Motor Winding Sensor Connector Removal

28. Carefully remove the small O-ring located on top of the Inverter Plate. Refer to Figure 19 (Inverter Plate Top O-ring Removal).

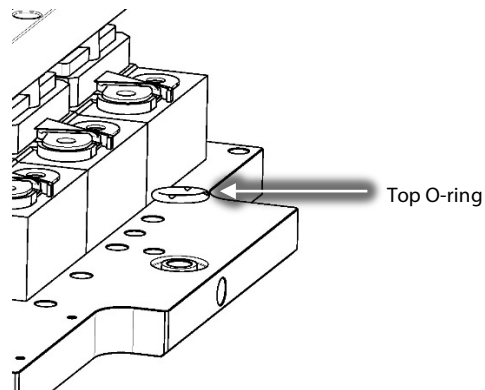


Figure 19 – Inverter Plate Top O-ring Removal

29. Remove the 20 fasteners that secure the Inverter to the compressor main housing. Refer to Figure 20 (Inverter Removal).

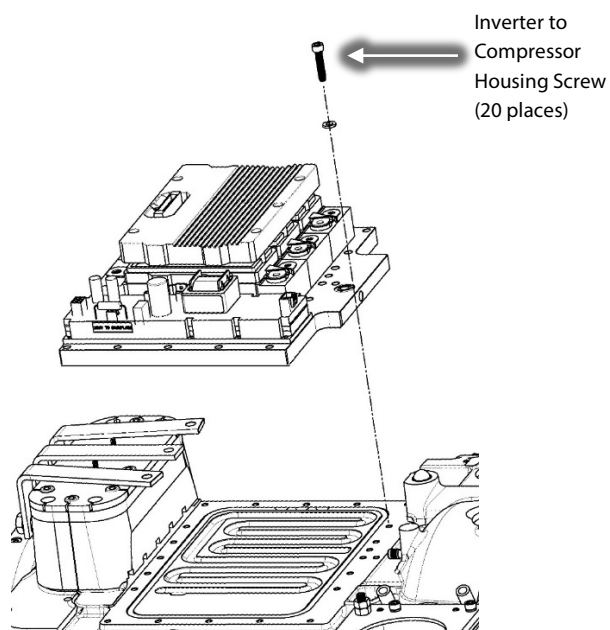


Figure 20 – Inverter Removal

30. Remove and discard the large Inverter O-ring from the compressor housing. (Refer to Figure 21 (Inverter O-ring Removal)).

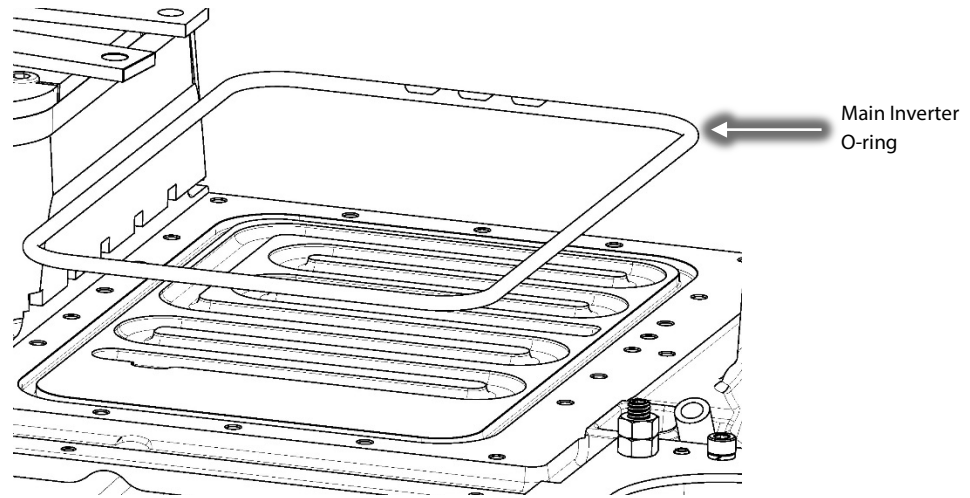


Figure 21 – Inverter O-ring Removal

31. Remove the two (2) O-rings from the SCR Manifold Return Brass Fitting. Refer to Figure 22 (SCR Manifold Return Brass Fitting O-rings).

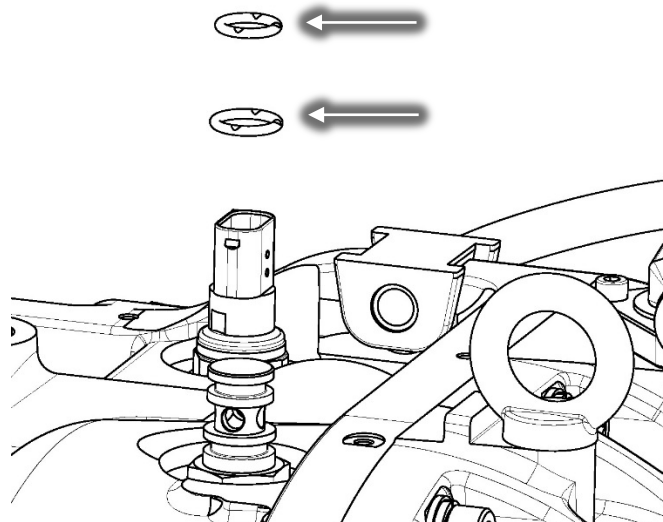


Figure 22 – SCR Manifold Brass Fitting O-ring Removal

4 - O-rings Installation Instructions:

1. Clean the O-ring groove in the main compressor housing and SCR Manifold Return Brass Fitting with a lint-free cloth.
2. Apply O-lube and install the O-rings onto the SCR Manifold Return Brass Fitting.
3. Apply O-lube and install the Inverter O-ring in the compressor housing groove.
4. Install the new M6X30 screws into the Inverter assembly with the exception of the four (4) M6X35 SCR Manifold screws and carefully lower the assembly onto the compressor housing. Use the installed screws to properly line up the inverter. Refer to Figure 23 (Inverter Screw Locations).

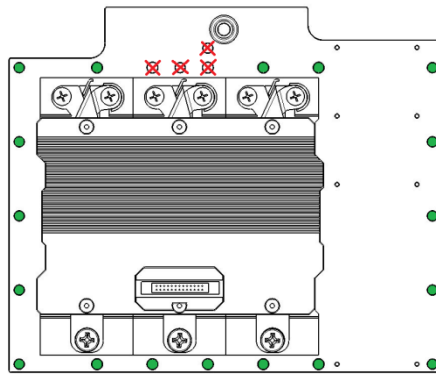


Figure 23 – Inverter Screw Locations

5. Once the Inverter is in place, finger-tighten the Inverter screws 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.
6. Clean the O-ring groove on top of the Inverter Cooling Manifold with a lint-free cloth.
7. Apply O-Lube to the provided SCR Heat Sink O-ring and place in the O-ring groove in the IGBT Heat Sink Plate and install. Refer to Figure 24 (IGBT Heat Sink Plate O-ring Install).

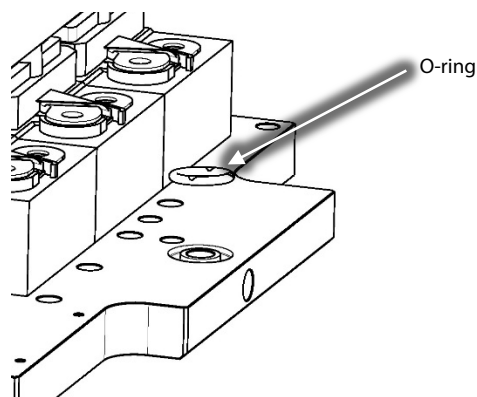


Figure 24 – IGBT Heat Sink Plate O-ring Install

8. Install two (2) new O-rings on the SCR Manifold Return Brass Fitting (smaller one on top). Apply O-lube to each O-ring before installation. Refer to Figure 25 (SCR Manifold Return Brass Fitting O-ring Install).

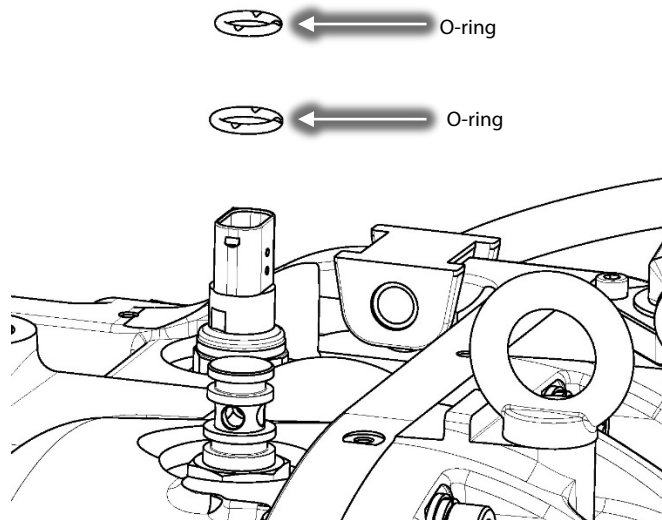


Figure 25 –SCR Manifold Return Brass Fitting O-ring Install

9. Carefully install the SCR cooling plate over the SCR Manifold Return Brass Fitting.

NOTE: Before proceeding, ensure that the SCR Cooling Plate is fully seated onto the SCR Manifold Return Brass Fitting.

10. Install the four new (4) M6X35 SCR Cooling Manifold screws and torque to 8 Nm (71 in.lb.).
11. Leak test and evacuate the compressor to appropriate level and accepted industry standards.
12. Install the three (3) copper tubes and torque the screws to specification. Refer to Figure 26 (Motor Bus Bar Installation).

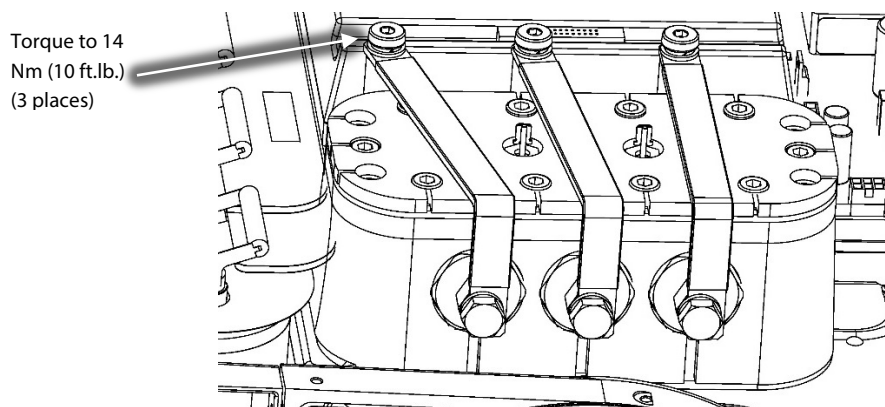


Figure 26 – Motor Bus Bar Installation

13. Route the Compressor Cable Harness, including the SCR Temperature Sensor Cable, in the same position/location they were prior to removal.
14. Connect the compressor cable harness to the IGV Motor feed through, suction and discharge sensors, and SCR Temperature sensor.

15. Rotate the Retainer Clip until it is directly above the IGV Connector and torque the screw to 5 Nm (44 in.lb.). Refer to Figure 27 (Retainer Clip Rotation).

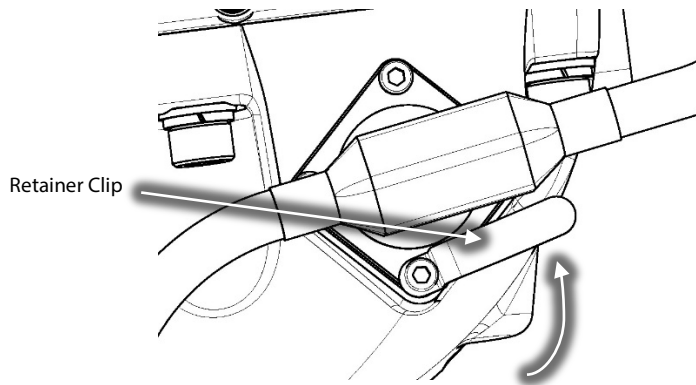


Figure 27 – Retainer Clip Rotation

16. Install the DC Bus Bar and Capacitor assembly over the Inverter.
17. Connect the snubber capacitors to the Inverter noting the leg orientation and torque to 7 Nm (5 ft.lb.) starting from the DC Bus Capacitor side. Refer to Figure 9 (Snubber Capacitor Removal).
18. Tighten the DC bus assembly to the SCRs and torque to 9 Nm (80 in.lb.).
19. 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 (5 ft.lb.). Refer to Figure 10 (Capacitor Nut Removal).
20. Connect the Motor Temperature Sensor, DC-DC, and Inverter Cables. Refer to Figure 17 (HV DC-DC Harness Removal).
21. Install the Mains Input Terminal.
22. Connect the three (3) AC wires from the Soft Start AC/DC cable harness to the appropriate AC bus bar.
23. Connect the SCR Gate cable harness to the SCRs in the same orientation as noted during its removal.
24. Connect all wiring harnesses to the Soft Start.
25. Place the Soft Start into mounting position, secure to the compressor, and torque to 5 Nm (44 in.lb.).
26. Route and connect the Soft Start ground wire to the ground post on the compressor housing at 3-phase connection point and torque the top nut to 10 Nm (7 ft.lb.).
27. Install covers.

Capacitor Cover

28. Place the Capacitor Cover and secure it with the long screw (M5 x 20) and flat washer in position number three (3) as shown in the following figure. Use five (5) remaining screws to secure the cover. Fasten according to the sequence in Figure 28 (Capacitor Cover Torque Sequence). Follow the sequence twice.

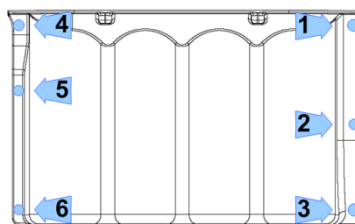


Figure 28 – Capacitor Cover Torque Sequence

Top and Mains Input Cover

29. Ensure that no residue remains on the contact surfaces of Top Cover and casting sides.

30. Place the Top Cover and secure it with the nine (9) M5x15 screws according to the following sequence. Follow the sequence twice. The first time, only fasten screws half way down to allow for adjustments. Torque to 13 in.lb. on the second pass. Refer to Figure 29 (Top Cover Torque Sequence).

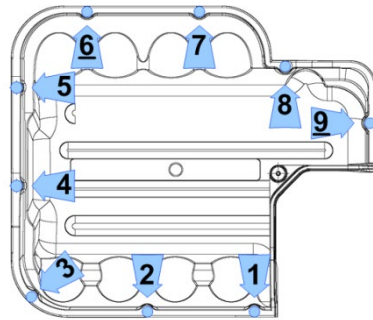


Figure 29 – Top Cover Torque Sequence

31. Ensure that no residue remains on the contact surfaces of the Mains Input Cover and casting sides.
32. Place the Mains Input Cover and secure it with the four (4) M5x15 screws. Tighten according to Figure 30 (Mains Input Cover Torque Sequence).

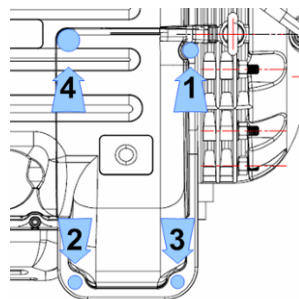




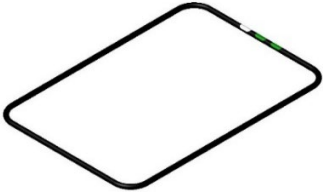




Figure 30 – Mains Input Cover Torque Sequence

33. Follow the sequence twice. The first time, only fasten screws to half way down to allow for adjustment. Torque to 13 in.lb. on the second pass. Fasten the # 4 screw only once and use caution as to not overtighten this screw.
34. Return the compressor to normal operation

5 - Torque Specifications

| Component | Torque Value |
|--|--------------------|
| Inverter to Compressor Housing Screw | 8 Nm (71 in.lb.) |
| Soft Start to Compressor Housing Screw | 5 Nm (44 in.lb.) |
| Motor Bus Bar to Inverter Screw | 14 Nm (10 ft.lb.) |
| Snubber Capacitors to Inverter Screw | 7 Nm (5 ft.lb.) |
| Nylon Nuts | 7 Nm (5 ft.lb.) |
| DC Bus to SCRs Screw | 9 Nm (80 in.lb.) |
| AC Bus Bar to SCR Screw | 9 Nm (80 in.lb.) |
| SCR Manifold Screw | 8 Nm (71 in.lb.) |
| IGV Feedthrough Screw | 5 Nm (44 in.lb.) |
| Mains Terminal Block Screw | 4 Nm (35 in.lb.) |
| Ground Post Top Nut | 15 Nm (11 ft.lb.) |
| Ground Post Second Nut | 7 Nm (62 in.lb.) |
| Cover Screw | 1.5 Nm (13 in.lb.) |

6 - Kit Contents

| QTY | Part(s) Description | Picture(s) |
|-----|-----------------------------|--|
| 1 | O-RING #2-112 |  |
| 2 | O-RING #2-113 |  |
| 1 | O-RING #2-377 |  |
| 18 | WASHER M6 FLAT |  |
| 18 | SCREW M6X30 SOCKET HEAD CAP |  |
| 4 | SCREW M6X35 SOCKET HEAD CAP |  |
| 1 | LUBRICATION-SUPER-O-LUBE-2G |  |



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