



# KIT IGV REBUILD WITH CAVITY SENSOR

100273, 100330



**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 <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

IGV REBUILD WITH CAVITY SENSOR Removal and installation.

The following instruction includes IGV worm gear and IGV throat removal and replacement. It is critical that the correct IGV component selection for the specific compressor model is made. (See the last page for component model compatibility.)

## 2 - Removing Refrigerant from Compressor:

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

## 3 - Tools Needed:

The following tools are necessary to disassemble and reassemble IGV assemblies:

- 2.5, 4 & 8 mm Hex keys
- Worm Gear Collar removal tool (DTC part number 100246)
- EXV Driver Module (SPORLAN SMA-12 or similar) with IGV Motor drive cable.
- Needle nose pliers
- Loctite 243 (Blue in color)
- Circlip (retainer ring) pliers (External)
- ½" Drive ratchet
- Torque wrench - 5 Nm (3.7 ft.lb) to 22Nm (18 ft.lb)
- 15/16" wrench or slotted socket

4 - IGV Disassembly Instructions:

1. Isolate compressor electrically and tag out as appropriate.
2. Remove and recover refrigerant from compressor.
3. Disconnect IGV Motor Cable and Suction Sensor connector.
4. Remove IGV from compressor.
5. Using pliers or EXV driver module and cable connected to IGV power feed through, move vanes to turn worm gear and align set screw so it is visible through access hole in housing.
6. Unbolt and separate 4 pin feed through from IGV housing.
7. Remove wiring from feed through terminals. NOTE: record wire (color) positions to pins. Expected: 1 = Red, 2 = Grey, 3 = Yellow, 4 = Black (See Table 1).

Table 1 – Wiring order

Color	Pin#
Red	1
Grey	2
Yellow	3
Black	4

8. Remove set screw completely from worm shaft. NOTE: This screw may be very tight due to Loctite. **Hex key size is 2.5 mm. Do not use ball end hex key.**
9. Remove IGV motor by sliding away from worm gear. Support bottom of motor to prevent damage to the motor shaft. A tap on the motor locating screw with a hammer may help release the motor shaft from the worm gear.
10. Slide Locking Collar Tool into housing and over worm shaft. Ensure drive pins are engaged.

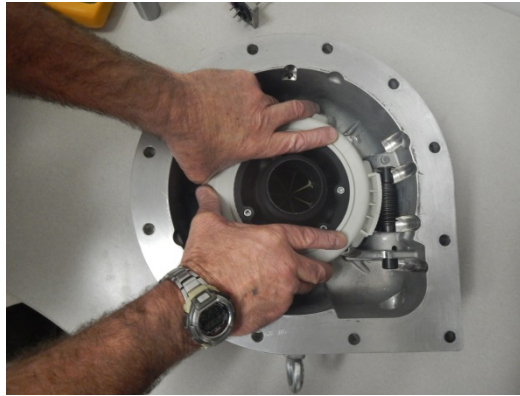


Figure 1

⚠ IMPORTANT NOTE: Locking Collar is Left Hand thread. Turn clockwise when viewed from motor end to unscrew.

11. Remove worm screw by rotating IGV Throat clockwise by hand or rotate worm shaft by hand and 'screw' out.





Rotate outer housing of Drive Assembly to remove worm gear.

Figure 2

12. Remove the four socket head screws that retain IGV Throat assembly and lift entire assembly from IGV housing.
13. Clean IGV housing and threads.

**⚠ Warning:** Fitting incorrect IGV components for the specific compressor model will result in physical damage to compressor. See the last page for model parts compatibility.

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#### 5 - IGV Assembly Instruction:

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1. Ensure that all components and threads are clear, clean and oil free.
2. Install bottom (small) worm gear bearing in housing. This may need a very light tap.

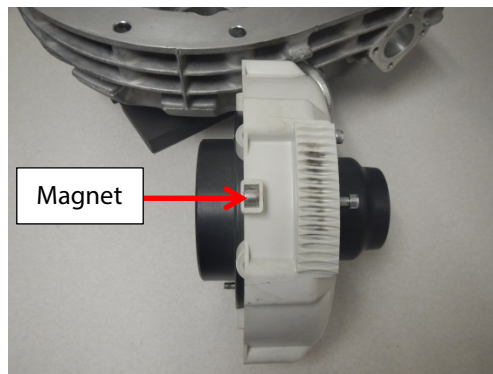


Figure 3 - IGV Position Indicator Magnet

3. Ensure that IGV position indicator magnet is in place in IGV Throat assembly.
4. Place IGV Throat assembly in position in IGV housing with threads below IGV motor mount.
5. Add a drop of Loctite (243 blue) to IGV Throat screw threads and install screws. Torque to 6.5Nm (4.8ft.lb).
6. Rotate outer ring of drive assembly and ensure that guide vanes move freely. Assembly must rotate over span where vanes are open (perpendicular to gas flow) and fully closed.
7. Fit top (large) bearing to worm screw and install retainer circlip.



Figure 4 - Install Circlip

8. Install worm screw into housing by 'screwing' worm along IGV Throat gear. Locate worm gear shaft into bottom (small) bearing.
  9. Place threaded lock collar on 4 pins of Collar tool. NOTE: Ensure flat side of collar is against tool.
  10. Install collar into housing and torque to 5 Nm (3.7 ft.lb).
- ⚠ IMPORTANT NOTE: Locking collar is left hand thread. Turn counter-clockwise when viewed from motor end to tighten (do not use Loctite on collar).
11. Rotate worm screw by hand until set screw hole in worm gear is visible through access hole in casting. Worm gear must turn freely.
  12. Wrap and loop wires as shown in Figure 5 and put into feed through hole in housing.



Figure 5 – IGV Motor Wiring

13. Install motor by sliding shaft into top of worm gear and locating motor locating screw in motor mount slot. Ensure flat of motor shaft is aligned with set screw hole in worm gear.
- ⚠ Wrap and loop wires as shown and pass out through hole in housing.

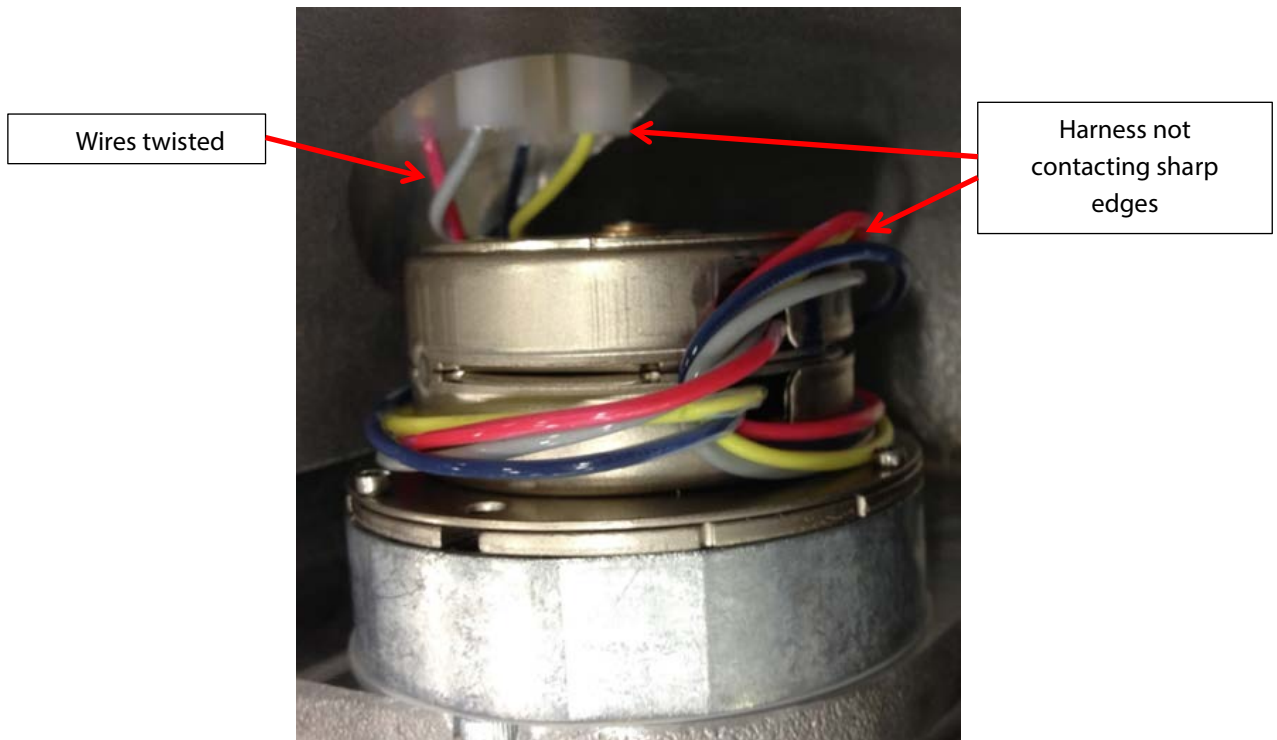


Figure 6 – IGV Motor Wiring Contact Points



Figure 7 – IGV Motor Locating Screw

14. Place a drop of Loctite (243 blue) on the new set screw supplied. Locate set screw into set screw hole in worm gear. Carefully tighten set screw. Entire motor should 'rock' backwards and forwards within motor locating slot after tightening set screw.

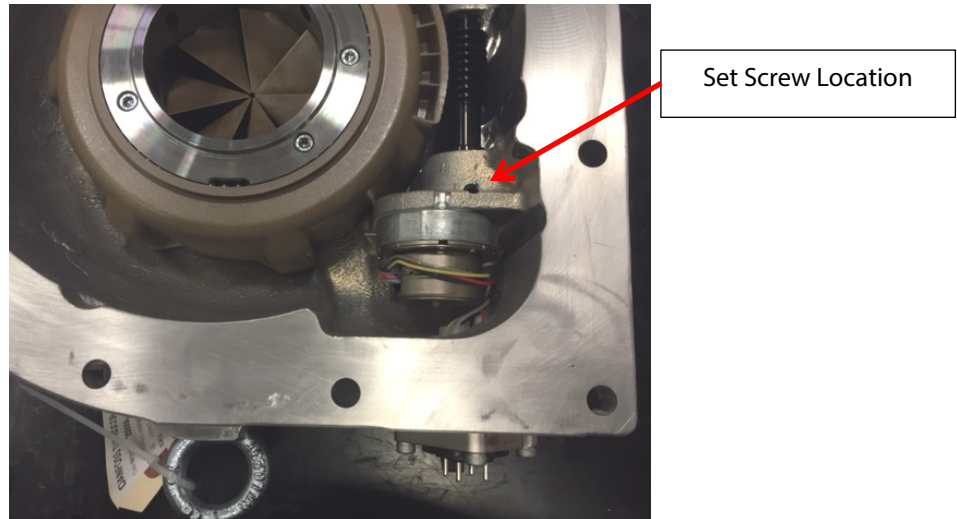


Figure 8 – Tighten Set Screw

15. Place 'O' Ring on IGV motor feed through.
16. Install wires onto feed-through pins taking care to connect correct color sequence. See Table 1.

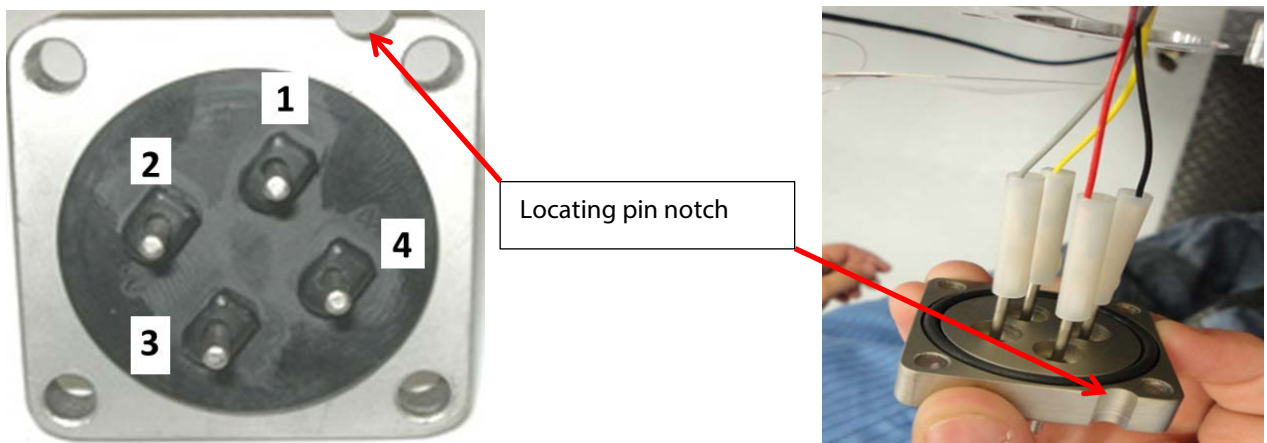


Figure 9 - Feed Through Notch

17. Twist the feed through 4 full counterclockwise rotations to bundle the wires together.
18. Place IGV motor power feed through into position on housing locating pin. As the feed through goes into place, wrap the harness around the IGV motor and ensure it is not contacting the edges of the IGV motor.

⚠ Check that wiring is clear of housing and edges of motor.

19. Install feed through screws and IGV motor cable retainer clip. Tighten 3 screws, leaving the fourth screw with the retainer clip slightly loose.
20. Connect EXV driver tool, drive vanes to fully open position and then to fully closed position to verify functionality.
21. Install the IGV to the compressor. Tighten the bolts to 22Nm (18 ft.lb) in a cross pattern.
22. Connect the IGV motor harness and the Suction sensor connector.
23. Tighten the IGV motor harness retaining clip.
24. Leak test and evacuate the compressor prior to charging with refrigerant.

6 - IGV throat assemblies' figures:

- The following identifies the IGV throat assemblies



TT300 All R134a except N series



TT300 N Series R134a



TT350, TG310



TT300 R22 (Thicker upper  $\varnothing$  wall)



TT400 (Except TT400P)



TT500 All

Figure 10 – IGV Throat Identification

7 - IGV O-Ring Installation:

1. Ensure the area for installation is clean and free from all contamination.
2. Remove each O-Ring to be installed from its package and inspect for defects such as blemishes, abrasions, cuts, or punctures.
3. The slight stretching of the O-Ring when it is rolled inside out will help to reveal some defects not otherwise visible.
4. After inspection and prior to installation, lubricate the O-Ring with a light coat of SUPER "O" LUBE which has been shipped with your O-Ring.
5. Assembly must be made with care so that the O-Ring is properly placed in the groove and not damaged as the housing is closed.



6. Avoid rolling or twisting the O-Ring when maneuvering it into place.
7. Keep the position of the O-Ring mold line constant.

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#### 8 - Cavity Sensor Removal:

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1. Isolate and lockout 3 phase compressor power.
2. Remove and recover refrigerant from compressor.
3. Remove service side cover.
4. Remove BMCC and Serial Driver modules and set aside.
5. Remove screws that secure the PWM Module to the main compressor housing, and pull module from housing.
  - It is NOT required to disconnect PWM bearing feed cables from feedthroughs.
6. Disconnect and remove all connectors from back plane, including ground wire screw at right hand top of backplane circuit board.
7. Remove screw from lower right of circuit board.
  - Do NOT remove screw from center bottom or top left of the backplane circuit board.
8. Remove the two upper screws that secure the Backplane assembly frame to compressor housing.
9. Withdraw the Backplane Assembly from the service-side housing and set aside.
10. Using a (24 mm or 15/16") wrench or slotted socket, remove the motor cavity sensor.

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#### 9 - Cavity Sensor Installation Instruction:

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1. Clean housing, O-ring and groove in sensor head.
2. Apply lube to O-ring.
3. Install 'O' ring into groove.
4. Insert the sensor and screw in by hand.
5. Using a 24 mm or 15/16" combination wrench or slotted socket, tighten the sensor to 10Nm (7 lbf-ft).
6. Leak test and evacuate compressor.

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#### 10 - Backplane installation Instruction:

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1. Position the plastic stand-offs to the main compressor housing and loosely install backplane housing screws.
2. Install backplane grounding screw with metal washer in lower right corner of backplane circuit board. Tighten to 3Nm (2 lbf-ft). Tighten remaining screws.
3. Attach the grounding ring terminal from the IGBT interface cable to the screw at the upper right corner of the Backplane and tighten to 3Nm (2 lbf-ft).
4. Reconnect all plugs in correct locations.
  - NOTE: To ensure correct connection. Verify printed codes on the cable plugs match with the cable sockets on the Backplane.

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#### 11 - PWM, BMCC and Serial Driver modules Installation Instruction:







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- NOTE: Ensure heat transfer paste present between PWM and housing.
1. Align the PWM Amplifier Module's heat sink with the two guide pins in the main compressor housing.
  2. Insert the PWM Amplifier Module into the connector on the Backplane.
  3. Secure the PWM Amplifier Module's heat sink to the main compressor housing with three screws.
  4. Verify that the module's heat sink is firmly seated against the main compressor housing.
  5. Install BMCC and Serial Driver modules.
  6. Test run compressor and check for proper cavity temperature indication.



12 - Kit Contents

IGV REBUILD	
Kit numbers	Compressor models
100273	TG310
100330	TT500E

QTY	Part(s) Description	Picture(s)
1	IGV Drive Assembly (Throat)	See Figure 10
1	WORM IGV	
1	COLAR - IGV WORM BEARING	
1	CIRCLIP - Ø17 RETAINING RING EXTERNAL	
1	BEARING, BALL - RADIAL Ø10 ID x Ø19 OD - NO LUBE	
1	BEARING, BALL - RADIAL Ø17 ID x Ø30 OD - NO LUBE	
1	SCREW M5X 8 S/SET FLT POINT Z/P	
4	SCREW - M5x60mm SHCS ZP	
1	'O' RING (IGV Housing) NOTE: TG310 'O' Ring has a green identifying dot.	
1	'O' RING (Suction) NOTE: TG310 'O' Ring has a green identifying dot.	
1	'O' RING (Feed through) NOTE: TG310 'O' Ring has a green identifying dot.	
2	LUBRICATION-SUPER "O" LUBE-2G	
1	CAVITY TEMPERATURE SENSOR	
1	'O' RING or SEAL NOTE: TG310 'O' Ring has a green identifying dot.	



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