




KIT Inlet Guide Vane (IGV) REBUILD WITH CAVITY SENSOR

100267, 100270, 10273, 100275, 100330

 <p>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>			
<p>Consult the appropriate Danfoss Turbocor (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>

1 - Introduction:

IGV REBUILD WITH CAVITY SENSOR removal and installation instructions.

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
- Stepper Motor Driver
- Worm Gear Collar removal tool (DTC part number 100246)
- Service Monitor Tool with IGV Motor drive cable.
- Needle-nose pliers
- Hammer
- Loctite 243 (Blue in color)

- Circlip (retainer ring) pliers (External)
- ½” Drive ratchet
- Torque wrench– Must be able to measure torques between 5 Nm (3.7 ft.lb) to 22Nm (18 ft.lb)
- 15/16” wrench or slotted socket
- Turbocor Service Monitoring Tool

4 - Disassembly Instructions:

1. Isolate compressor power as described in compressor Service Manual.
2. Disconnect IGV Motor Cable and Suction Sensor connector.
3. Remove IGV assembly from compressor.
4. Using a stepper motor driver, turn the worm shaft and Vane Drive assembly to position the motor shaft so that locking set screw is aligned with the hole shown in Figure 1. Use needle-nose pliers or similar tool to turn the worm gear if a stepper motor driver is not available.

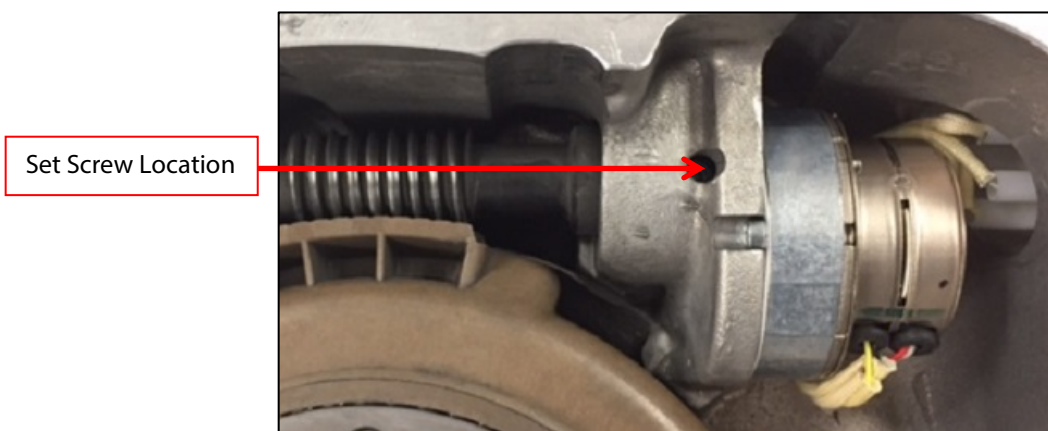


Figure 1. Set Screw Removal Location

5. Unbolt and separate the four-pin Feed Through from IGV Housing.
6. Disconnect the four wires from the four-pin Feed Through. Note and record position of wire colors to their corresponding pins. Expected: 1 = Red, 2 = Grey, 3 = Yellow, and 4 = Black (See Table 1).

Table 1 - Wiring Order	
Color	Pin#
Red	1
Grey	2
Yellow	3
Black	4

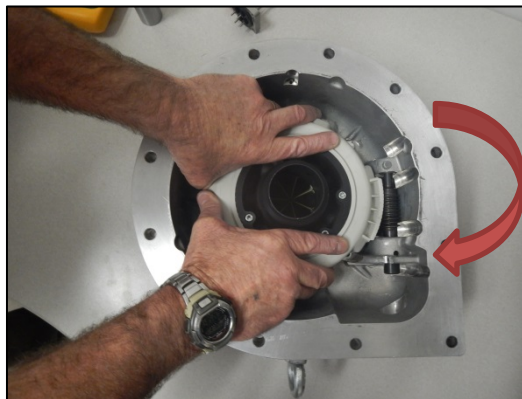
7. Remove the set screw completely using a 2.5 mm Allen key to release the motor from the worm gear.
 - **NOTE:** Set screw may difficult to release as it will have Loctite applied. Do not use ball end Allen key.
8. Remove IGV Motor assembly by pulling away from worm shaft. Support bottom of IGV Motor 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.
9. Slide Locking Collar Tool into housing and over worm shaft. Ensure drive pins are engaged.



Figure 2. Locking Collar Tool Usage

⚠ **IMPORTANT NOTE:** Locking Collar is left-hand thread. Turn clockwise when viewed from motor end to unscrew.

10. Remove worm screw by rotating IGV Throat clockwise by hand or rotate worm shaft by hand.



Rotate outer housing
of Drive Assembly to
remove worm gear.

Figure 3. Worm Gear Removal

11. Remove the four socket head screws that retain IGV Throat assembly and lift entire assembly from IGV Housing.
12. Inspect the IGV Housing assembly for residue/contaminations or foreign objects.

⚠ **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.

5 - Assembly Instructions:

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

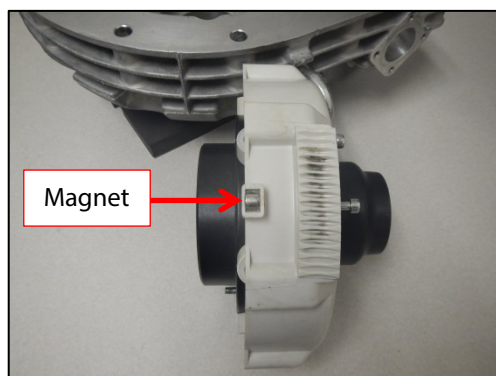


Figure 4. IGV Position Indicator Magnet

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 (4.8 ft.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 5. Install Circlip

8. Install worm gear into housing by “screwing” worm along IGV Throat gear. Locate worm gear shaft into bottom (small) bearing.
 9. Place threaded lock collar on four 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 gear by hand until set screw hole in worm gear is visible through access hole in casting. Worm gear must turn freely.
 12. Insert the IGV Motor wires through the Feed Through hole.
 13. Check the position of the flat surface of the shaft relative to the locating pin. The flat surface should be oriented facing up, (refer to the Figure 6) ready to be inserted in the worm gear.

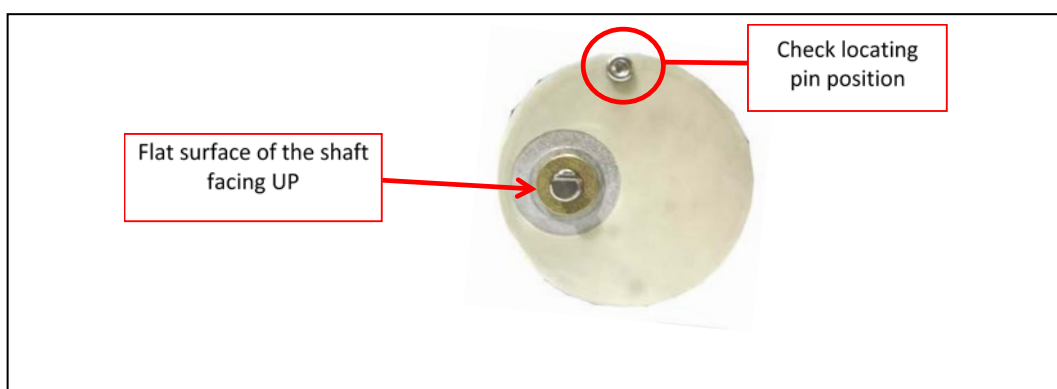


Figure 6. Shaft Position

14. Install the motor into the housing and align the motor shaft flat surface with worm gear adapter.

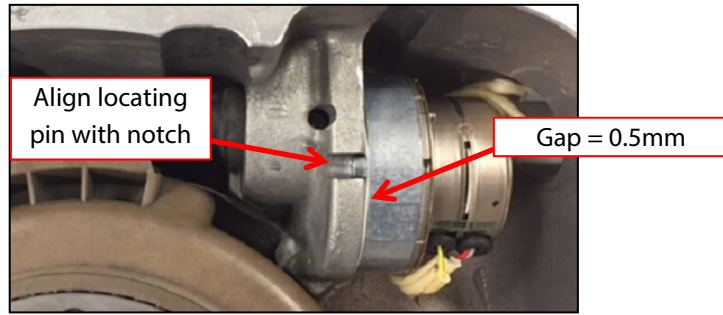


Figure 7. IGV Motor

15. Ensure that the motor locating pin is aligned with the notch in the housing flange.
16. Put one drop of Loctite 243 on threads of small set screw. While pushing in on the backside of the motor, secure the worm gear to the flat surface of the motor shaft using a 2.5 mm Allen key. Rock the motor backwards and forwards while tightening screw to ensure full and correct tightening of screw.
17. Clean, lubricate, and install the O-ring on the Feed Through before connecting the wires. If removed motor had ¼ spade terminals and new motor has round connectors, cut spade from feed through pins with side cutters.

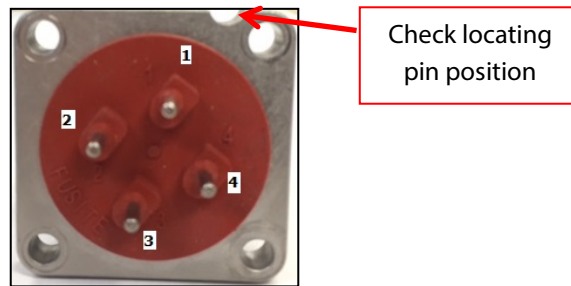


Figure 8. Locating Pin Position

Table 2 – Pin to Wire Reference		
	All except TT300N	TT300N
Color	Pin Number	Pin Number
RED	1	2
GREY	2	1
YELLOW	3	3
BLACK	4	4

- **NOTE:** Winding connections are 1-2 & 3-4.

18. Insert the motor wires onto the feed through pins in accordance to the above chart. Also reference your notes from removal.

19. Loop wires as shown in Figure 9.



Figure 9. Wire Wrap

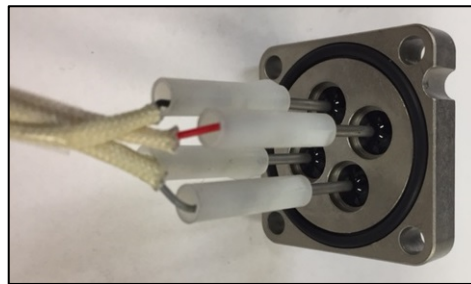


Figure 10. IGV Motor Wires Connected

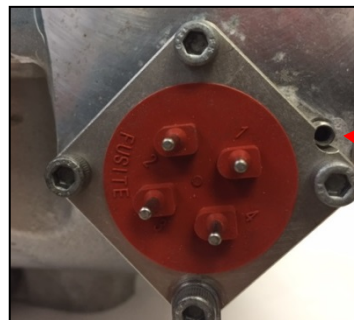


Figure 11. Feed Through Orientation

Locating pin and notch

20. Install the Feed Through using the four socket cap screws and install the IGV Motor Cable Retainer Clip under one of the screws. Tighten only three of the screws to 5Nm (3.7 ft.lb) while leaving the fourth screw with the retainer clip slightly loose.

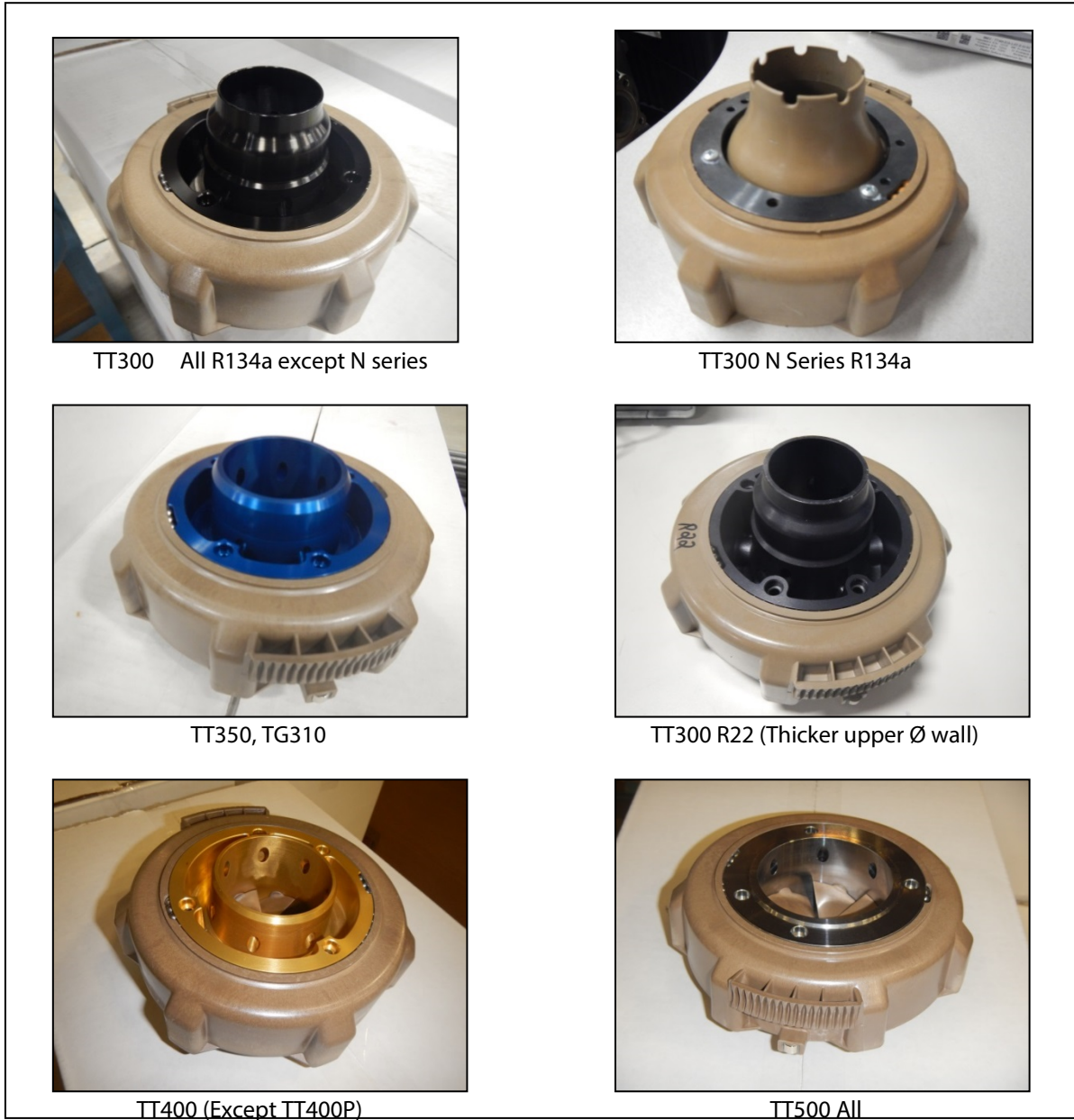
⚠ Check that wiring is clear of housing and edges of motor.

21. If available, test the motor operation with a stepper motor driver. Operation of the IGV can also be tested using the SMT driving the IGV manually (once the IGV has been mounted on the compressor).
22. Clean the mating surfaces of both the compressor and IGV.
23. Clean, lubricate, and install the O-ring.
24. Re-install the IGV on the compressor and finger-tighten the socket cap screws.
25. Tighten the bolts to 22Nm (18 ft.lb) in a criss-cross pattern.
26. Leak test and evacuate in accordance with good industry practices.
27. Plug in the four-pin Feed Through and Suction Pressure Temperature Sensor Harness.
28. Tighten the remaining Feed Through socket cap screw (the one securing the Motor Harness Retainer Clip).
29. Test run compressor to verify proper operation and movement of the IGV assembly.
30. Charge system with the proper refrigerant as required.

- **NOTE:** All IGV assemblies except TT300N are fully open when ball is in top position. TT300N is fully open when ball is at the bottom of the indicator window.

6 - IGV Throat Assembly Styles:

- The following identifies the IGV Throat assemblies



7 - IGV O-Ring Assembly:

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 the 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.

8 - Cavity Sensor Disassembly:

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.
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 Backplane, including the ground wire screw at right-hand top of Backplane Circuit Board.
7. Remove screw from lower right of Backplane Circuit Board.
 - Do NOT remove the 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.

9 - Cavity Sensor Installation Instructions:

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 (15/16") combination wrench or slotted socket, tighten the sensor to 10Nm (7 ft.lb).
6. Leak test and evacuate compressor in accordance with good industry practices.

10 - Backplane Installation Instructions:

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 ft.lb). 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 ft.lb).
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


11 - PWM, BMCC, and Serial Driver Modules Installation Instructions:

1. Ensure heat transfer paste is present between PWM and housing.
2. Align the PWM Amplifier Module's heat sink with the two guide pins in the main compressor housing.
3. Insert the PWM Amplifier Module into the connector on the Backplane.
4. Secure the PWM Amplifier Module's heat sink to the main compressor housing with three screws.
5. Verify that the module's heat sink is firmly seated against the main compressor housing.
6. Install BMCC and Serial Driver Modules.

7. Test run compressor and check for proper cavity temperature indication.

12 - Kit Contents:

IGV REBUILD	
Kit numbers	Compressor models
100267	TT300E
100270	TT350E
100275	TT400E
100273	TG Series
100330	TT500

QTY	Part(s) Description	Picture(s)
1	IGV DRIVE ASSEMBLY (THROAT)	See Figure 12
1	WORM IGV	
1	COLLAR - 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	
4	SCREW - M5X60MM SHCS	
1	O-RING (IGV HOUSING)	
1	O-RING (SUCTION)	
1	O-RING (FEED THROUGH)	
2	LUBRICATION-SUPER-O-LUBE-2G	
1	CAVITY TEMPERATURE SENSOR	
1	O-RING RING (CAVITY SENSOR)	

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