



# KIT Inlet Guide Vane (IGV) REPAIR KITS

100222-100232, 100223-4, 100224-4, 100229-4, 100246, & 100262.



**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>
--	---	---	---

## 1 - Introduction:

IGV REPAIR KITS 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 Table 3 for component model compatibility.)

## 2 - Removing Refrigerant from Compressor:

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

## 3 - Suggested Tools:

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

- 2.5, 4, & 8 mm Allen keys
- Worm Gear Collar removal tool (DTC part number 100246)
- Stepper Motor Driver
- Needle-nose pliers
- Hammer
- Loctite 243 (Blue in color)
- Circlip (retainer ring) pliers (External)
- 1/2" Drive ratchet
- Torque wrench – Must be able to measure torques between 5 Nm (44 in.lb.) to 22Nm (18 ft.lb.)
- Turbocor Service Monitoring Tool (SMT)

4 - Disassembly Instructions:

1. Isolate compressor power as described in compressor Service Manual.
2. Disconnect the IGV Motor Cable and Suction Sensor connector.
3. Remove the 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.

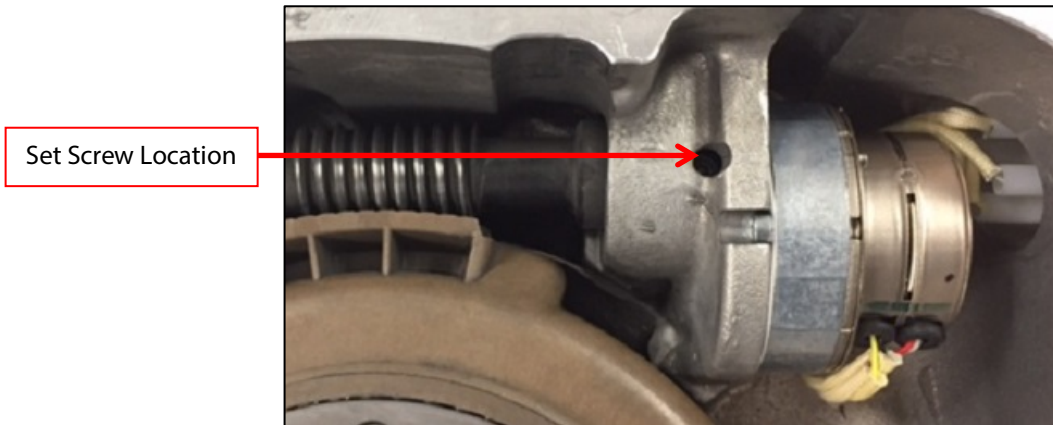


Figure 1. Set Screw Removal Location

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).

Color	Pin#
Red	1
Grey	2
Yellow	3
Black	4

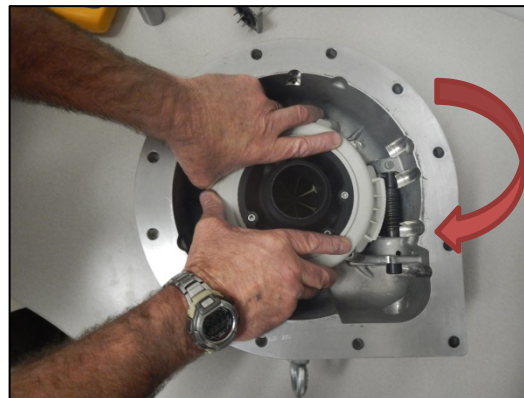
7. Remove the set screw completely using a 2.5 mm Allen key to release the motor from the worm gear.
  - **NOTE:** Set screw may be difficult to release as it will have Loctite applied. Do not use a ball end Allen key.
8. Remove the IGV Motor assembly by pulling away from worm shaft. Support the bottom of the 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 the Locking Collar Tool into housing and over the worm shaft. Ensure the drive pins are engaged (refer to Figure 2).



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 the worm gear by rotating the IGV Throat clockwise by hand or rotate the worm shaft by hand (refer to Figure 3).



Rotate outer housing of Drive Assembly to remove worm gear.

Figure 3. Worm Gear Removal

11. Remove the four socket cap screws that retain the IGV Throat assembly and lift the entire assembly from the IGV Housing.
12. Inspect the IGV Housing assembly for residue/contaminations or foreign objects.
13. Remove the small lower worm gear bearing from the housing. Perform this step by pushing the bearing out from the port below the bearing (refer to Figures 4 and 5).



Figure 4. Worm Gear Removal




Figure 5. Lower Worm Gear Bearing Removed

---

#### 5 - Assembly Instructions:

---

 **WARNING:** Fitting incorrect IGV components for the specific compressor model will result in physical damage to the compressor. See Table 3 for model parts compatibility.

1. Ensure that all components and threads are clear, clean, and oil free.
2. Install the lower (small) worm gear bearing into the housing. This may require a very light tap with a hammer.
3. Ensure the IGV position indicator magnet is in place in the IGV Throat assembly (refer to Figure 6).

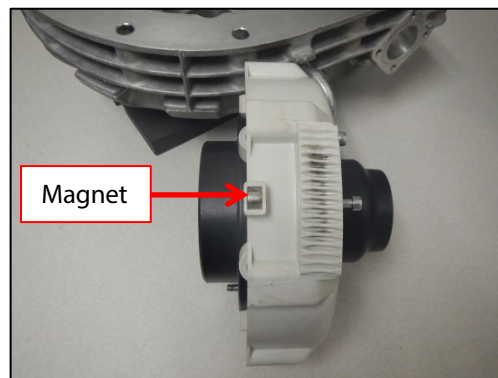


Figure 6. IGV Position Indicator Magnet

4. Place the IGV Throat assembly into the IGV Housing orientating the IGV Throat threads directly below the IGV Motor Mount.
5. Add a drop of Loctite (243 blue) to the IGV Throat screw threads and install the screws. Torque to 6.5Nm (458 in.lb.).
6. Rotate the outer ring of the drive assembly and ensure that the guide vanes move freely. The assembly must rotate over a span where the vanes are open (perpendicular to gas flow) and fully closed.
7. Fit the upper (large) bearing to the worm gear and install the retainer circlip (refer to Figure 7).



Figure 7. Install Circlip

8. Install the worm gear into the housing by “screwing” the worm along the IGV Throat gear. Locate the worm gear shaft into the bottom (small) bearing.
9. Place the threaded lock collar on four pins of the Collar tool.
  - **NOTE:** Ensure flat side of collar is against tool.
10. Install the collar into the housing and torque to 5 Nm (44 in.lb).

⚠ **IMPORTANT NOTE:** Locking collar is a left-hand thread. Turn counter-clockwise when viewed from motor end to tighten (*do not* use Loctite on collar).

11. Rotate the worm gear by hand until the set screw hole in the worm gear is visible through the access hole in the casting. The 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 8) ready to be inserted in the worm gear.

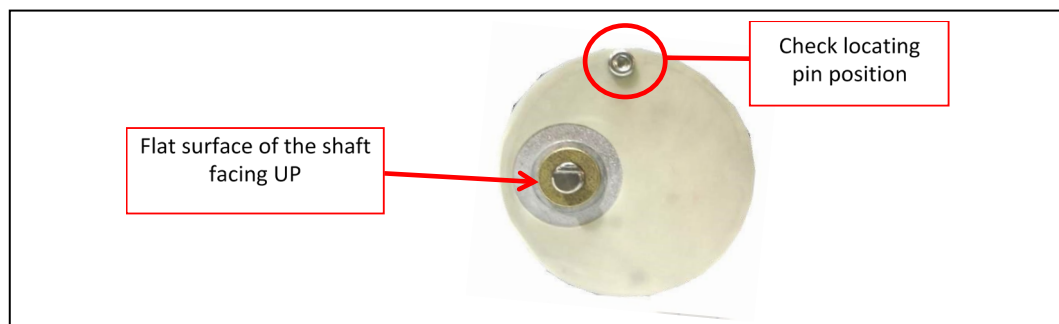


Figure 8. Shaft Position

14. Install the motor into the housing and align the motor shaft flat surface with worm gear adapter.
15. Ensure the motor locating pin is aligned with the notch in the housing flange (refer to Figure 9).

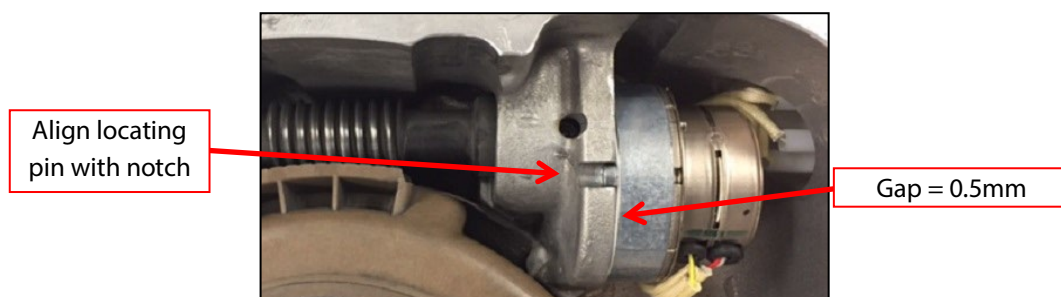


Figure 9. IGV Motor

16. Put one drop of Loctite 243 on the threads of the 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 the removed motor has ¼ spade terminals and the new motor has round connectors, cut the spade from the feed through pins with side cutters.

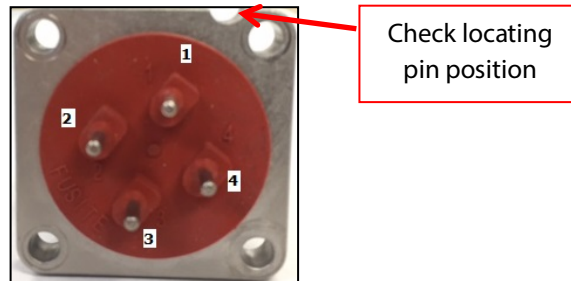


Figure 10. Locating Pin Position

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 with Table 2. Also reference your notes from removal.
19. Loop wires as shown in Figure 11.

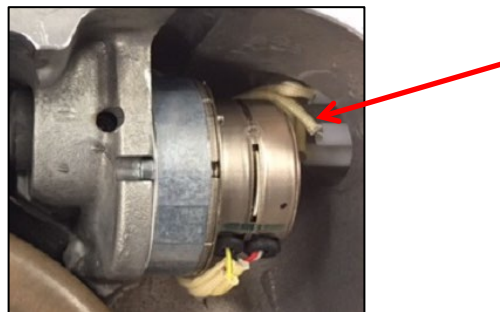


Figure 11. Wire Wrap



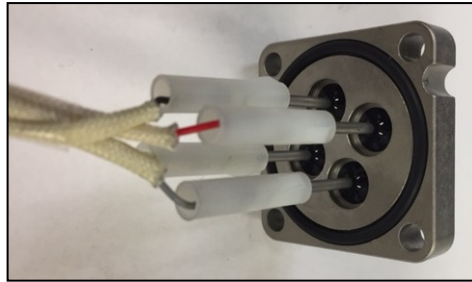
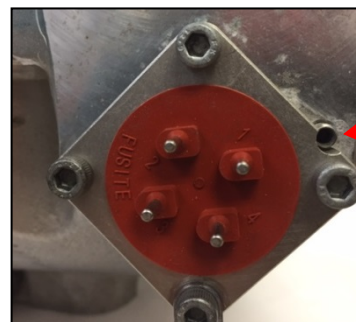


Figure 12. IGV Motor Wires Connected

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 (44 in.lb.) while leaving the fourth screw with the retainer clip slightly loose (refer to Figure 13).



Locating pin and notch

Figure 13. Feed Through Orientation

- ⚠ 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 (16 ft.lb.) in a crisscross 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 the system with the proper refrigerant as required.
    - **NOTE:** All IGV assemblies except TT300N are fully open when the ball is in the top position. TT300N is fully open when the ball is at the bottom of the indicator window.

6 - IGV Throat Assembly Styles:

- The following identifies the IGV Throat assemblies



TT300 All R134a except N series, TG230 All



TT300 N Series R134a



TT350, TG310



TT300 R22 (Thicker upper  $\varnothing$  wall)



TT400 (Except TT400P), TG390 All



TT500, TT700, TG520 All



TT400P

Figure 14. 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. 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.

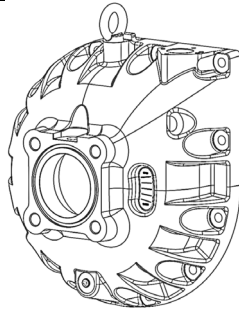
8 - IGV Available Parts Table:

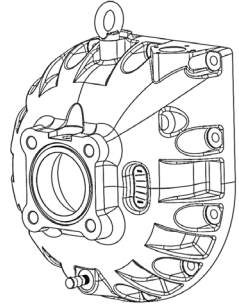
- The following table shows compatibility, identification, and part numbers for all available parts.

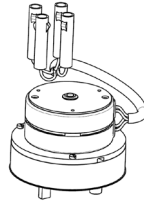
<b>Table 3 – IGV Available Parts and Part Numbers</b>										
	TT300 (N)	TT300 (R22)	TG230 (All) & TT300 (All others)	TG310 (All)	TT350 (All)	TT400 (P)	TG390 (All) & TT400 (All others)	TG520, TT700 & TT500 (All)	Kit Number	Identification
Collar Extractor Tool	X	X	X	X	X	X	X	X	100246	Required for IGV Repairs
Housing assembly	X	-	-	-	-	-	-	-	100224 100224-4	Taper internal suction connection
Housing assembly	-	X	X	X	X	X	X	-	100223 100223-4	Step internal suction connection
Housing assembly	-	-	-	-	-	-	-	X	100229 100229-4	Larger diameter suction connection
Throat assembly	X	-	-	-	-	-	-	-	100226	Plastic inlet Slotted intake
Throat assembly	-	X	-	-	-	-	-	-	100225	Black: Long thick Inlet Ø wall
Throat assembly	-	-	X	-	-	-	-	-	100227	Black: Long, thin Inlet Ø wall
Throat assembly	-	-	-	X	X	-	-	-	100228	Blue
Throat assembly	-	-	-	-	-	X	-	-	100230	Black: Short thin Inlet wall
Throat assembly	-	-	-	-	-	-	X	-	100231	Gold
Throat assembly	-	-	-	-	-	-	-	X	100232	Steel
Worm Gear & Motor Kit	X	X	X	X	X	X	X	X	100222	
Worm Gear & Motor Kit W/ Tool	X	X	X	X	X	X	X	X	100262	
Motor	-	X	-	-	-	-	-	-	100035	Refrigerant Specific
Motor	X	-	X	X	X	X	X	X	100035-1	O Rings: Green Dot
IGV Motor Feed Through	-	X	-	-	-	-	-	-	100321	Refrigerant Specific
IGV Motor Feed Through	X	-	X	X	X	X	X	X	100321-1	O Rings: Green Dot
Press/Temp Sensor Suction	-	X	-	-	-	-	-	-	100036	Refrigerant Specific
Press/Temp Sensor Suction	X	-	X	X	X	X	X	X	100036-1	Green Dot
O Ring Kit IGV	-	X	-	-	-	-	-	-	100051	Refrigerant Specific
O Ring Kit IGV	X	-	X	X	X	X	X	X	100051-1	Green Dot

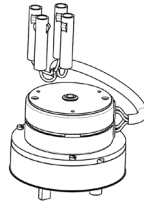
9 - Kit Contents:

IGV Throat Repair Kits		
Kit numbers	Compressor models	
100225	See Table 3	
100226	See Table 3	
100227	See Table 3	
100228	See Table 3	
100230	See Table 3	
100231	See Table 3	
100232	See Table 3	
QTY	Part(s) Description	Picture(s)
1	IGV Drive Assembly	See Figure 14

IGV Housing Repair Kits OEM Models		
Kit numbers	Compressor models	
100223	See Table 3	
100224	See Table 3	
100229	See Table 3	
QTY	Part(s) Description	Picture(s)
1	IGV HOUSING	
1	COVER- IGV-INDICATOR	
1	PLUG 1/8-27 NPT FLUSH SEAL S/HD	
1	ROLLER CHROME STEEL; 6.0 DIA. MM CL. G20 ISO 3290	

IGV Housing Repair Kits Retrofit Models		
Kit numbers	Compressor models	
100223-1	See Table 3	
100224-1	See Table 3	
100229-1	See Table 3	
QTY	Part(s) Description	Picture(s)
1	IGV HOUSING	
1	COVER- IGV-INDICATOR	
1	ROLLER CHROME STEEL; 6.0 DIA. MM CL. G20 ISO 3290	
1	VALVE - SHRAEDER - 1/8"-27 NPT	

IGV Worm Gear & Motor Repair Kit		
Kit numbers	Compressor models	
100222	See Table 3	
QTY	Part(s) Description	Picture(s)
1	WORM IGV	
1	COLLAR - IGV WORM BEARING	
1	MOTOR - IGV 12VDC STEPPER	
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	

IGV Worm Gear & Motor Repair Kit		
Kit numbers	Compressor models	
100262	See Table 3	
QTY	Part(s) Description	Picture(s)
1	WORM IGV	
1	COLLAR - IGV WORM BEARING	
1	MOTOR - IGV 12VDC STEPPER	
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	
1	EXTRACTOR – WORM GEAR	

IGV Extractor Worm Gear Kit		
Kit numbers	Compressor models	
100246	See Table 3	
QTY	Part(s) Description	Picture(s)
1	EXTRACTOR - WORM GEAR	