



Scroll Compressors

Replacement Guidelines



EMERSON
Climate Technologies



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1 Compressor Replacement

The following is intended to assist the service engineer to ensure the correct method for fitting of a new scroll compressor where replacement is necessary. In the event that a compressor needs replacement it is vital to diagnose and rectify the system fault which caused the problem in order to avoid the need for further replacements. It is important to ensure that when a scroll compressor replacement is required, certain procedures are carried out in the same manner as when first built and installed by the original manufacturer.

The main areas to note are correct torque values for service valves and the use of correct rubber mounts for the application. For ease and clarity the following procedure has been provided as a pictorial sequence (*Our thanks to Space Engineering Ltd, in the UK who provided the photo sequence*).


In the case of a motor burn, the majority of contaminated oil will be removed with the compressor. The rest of the oil is cleaned through the use of suction and liquid line filter driers. A 100% activated alumina suction filter drier is recommended but must be removed after 72 hours. It is highly recommended that the suction accumulator be replaced if the system contains one. This is because the accumulator oil return orifice or screen may be plugged with debris or may become plugged shortly after a compressor failure. This will result in starvation of oil to the replacement compressor and a second failure.

2 Scroll Compressor Replacement Procedure

<p>1</p> <p>Begin by removing any waste or rubbish from the plant housing...</p>	<p>2</p> <p>... clean away any dirt or debris.</p>	<p>3</p> <p>Remove all valve caps...</p>
		
<p>4</p> <p>... inspect for cracks or damage...</p>	<p>5</p> <p>... and store safely.</p>	<p>6</p> <p>Select compressor, fit service gauges, check pressures.</p>
		


7

Isolate the oil supply to the faulty compressor.




8

Electrically isolate the compressor (3 phase supply)...




9

... and the supply to the crankcase heater).




10

Fully 'front seat' the discharge and suction valves, isolate the compressor from the system.




11

Recover the compressor's contained refrigerant to a reclaim container.




12

Release the suction...



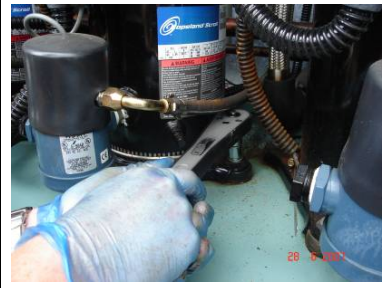
13

... and discharge Rotalock nuts and oil management.




14

Remove compressor bolts...



15

... and discard the existing rubber mounts and sleeves.



16

Fit replacement hard rubber mounts to new compressor. Kit Part Number 8030450



17

... ensuring correct placement of washers and metal sleeve.



18

Refit mounting bolts and tighten to correct torque (see table). 2 mm gap between bolt & rubber.



22

Apply thread lock paste to compressor discharge and suction connections.



23

Refit Rotalock nuts and using the correct valve retaining tool...



24

... tighten to correct torque (see table). Ensure valve position does not stress the pipe work.



25

Remove oil sight glass and assemble oil management. Evacuate the compressor using vacuum pump.



26

Open the oil supply to the compressor.



27

'Back seat' the discharge and suction service valves to remove service gauges.



28

Leak test the Rotolock fittings.

29

Refit all valve caps.

30

Restore the electrical power supplies.

31

Clear and correctly dispose of all waste.

32

Correct tools (L to R)
Valve retaining bar
Discharge torque spanner
Suction torque spanner
½" drive torque wrench

33

All Done!

(Return in 7 days to check torque settings)

Torque Settings

Application	Torque Nm
Compressor Mounting Bolt M8	12-14
Rotolock 3/4" - 16UNF	40-50
Rotolock 1" - 14UNF	70-80
Rotolock 1 1/4" - 12UNF	120-135
Rotolock 1 3/4" - 12UNF	135-160
Rotolock 2 1/4" - 12UNF	165-190
Sight glass	25

Copeland Replacement Part No's

Description	Part No.
Hard Mounts and Ferrules	8030450
PTFE Suction Gasket	2495939
PTFE Discharge Gasket	2495928
PTFE DTC Injection Gasket	8536083
DTC Injector Complete	8530541

NOTE: New PTFE gaskets are supplied and fitted to new compressors.



The above scroll compressor replacement procedure shows replacement typically for ZB medium temperature application. For replacement of Copeland ZF Scroll typically low temperature application the same procedure can be used but for one exception. The ZF scroll has a DTC valve fitted or for older models possibly capillary injection.

IMPORTANT: Liquid line feed to the compressor injection port has to be isolated and compressor evacuated before attempting to remove the injector.

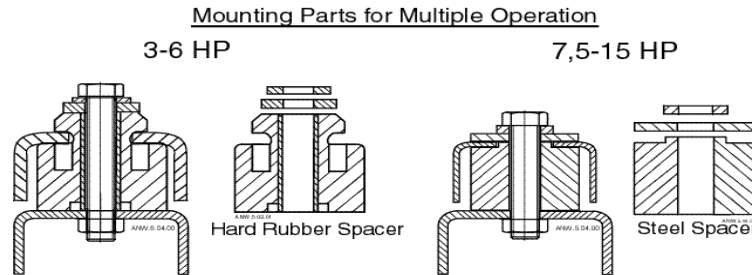
Assembly Procedure

- 1 Verify Coil Spring is seated in the “Groove” located in the well on top of the compressor.
- 2 Thread the Discharge Temperature (DTC) valve onto the injection stub on the side of the compressor.
Torque setting 24-27N/M (216-240 in/Lbs)
- 3 Press the DTC bulb into the well on top of the compressor until the DTC bottoms out in the well.
- 4 Snap the Thermo. cap onto the DTC bulb on top of the compressor.
- 5 The copper tube from the DTC bulb should be approximately 0.125mm (1/8”) from the top of the compressor.

Compressor Mounts

New compressor mounts are recommended when a compressor is replaced. When purchasing a replacement scroll compressor soft mounts are included. These soft mounts should not be used for multiple compressor pack / rack application.

Scroll compressors used in pack / rack design must use harder mounts which allow more load to be transmitted via the feet. This will give flexibility and minimise the risk of resonance to connecting pipe work.



Hard Rubber Mount Set Part Number 8030450 Steel Mount Set Part Number 8522911

Approved Oils

Copeland only approves the use of the following polyolester lubricants: **Mobil Arctic EAL 22CC** or **Emkarate RL32-3MAF**. Either oil can be used for top up and are suitable for use with both HCFC and HFC systems.

Service Refill Quantity

Model Name			HP	Oil charge supplied [l]	Oil charge Service [l]
		ZB15	2	1,0	1,0
		ZB19	2,5	1,0	1,0
ZF09	ZS21	ZB21	3	1,24	1,12
ZF11	ZS26	ZB26	3,5	1,24	1,12
ZF13	ZS30	ZB30	4	1,95	1,83
ZF15	ZS38	ZB38	5	1,95	1,83
ZF18	ZS45	ZB45	6	1,77	1,66
ZF24	ZS56	ZB56	7,5	4,14	4,05
ZF33	ZS75	ZB75	10	4,14	4,05
ZF40	ZS92	ZB92	13	4,14	4,05
ZF48	ZS11M	ZB11M	15	4,14	4,05



Lubricant Handling

Polyolester lubricant products should pose little or no significant adverse health effects when properly used or handled properly. Prolonged repeated skin contact should always be avoided. The lubricant supplier should be contacted for specific health and safety documentation.

3 System Evacuation and Charging Procedure

Evacuating the system only on the suction side of a scroll compressor can occasionally result in a temporary no-start condition for the compressor. The reason for this is that the floating seal could axially seal with the scroll set, with the higher pressure on the floating seal. Consequently, until the pressures equalize, the floating seal and scroll set can be held tightly together.

The installation should be evacuated down to 0.3 mbar / 0.22 Torr or lower. Subsequently, the factory holding charge of dry air in the compressor is released to the ambient. The shutoff valves are opened and the installation, including the compressor, are once more evacuated as described after the system has been recharged with dry nitrogen.

Highest demands are placed on the leak proof design of the installation and also on the leak testing methods (please refer to EN378).

Rapid charging on the suction side of scroll compressors can occasionally result in a temporary no-start condition for the compressor. The reason for this is that if the flanks of the spirals happen to be in a sealed position, rapid pressurization of the low side without opposing high side pressure can cause the spirals to seal axially. Consequently, until the pressures eventually equalize, the spirals can be held tightly together, preventing rotation. The best way to avoid this situation is to charge on both the high and low side simultaneously at a rate which does not result in axial loading of the spirals.

Qualified Refrigerants

R404A, R507, R22 and R134a are qualified for all refrigeration scroll compressors.

The ZB compressor family is also qualified for R407C.

It is essential that the glide of R407C refrigerant blends be given careful consideration when adjusting pressure controls.

4 Performance / Visual Checks

When having to replace a compressor installed in a pack design it is worthwhile to visually check the condition of the remaining compressors, the rubber mounts and associated pipe work.

Check the gauge pressure readings.

- Is the pack operating correctly?
- Is the operation within the manufacturer's specification? (Check with the application envelope shown on the following pages).
- Ensure the low pressure switch is set correctly if system pump down is applied. If the setting is too low the compressor might be operating outside its operating envelope.

Compressor mounts

- Check to see that all mounts are secure and not damaged.
- Are the correct hard mounts fitted?

Lubrication

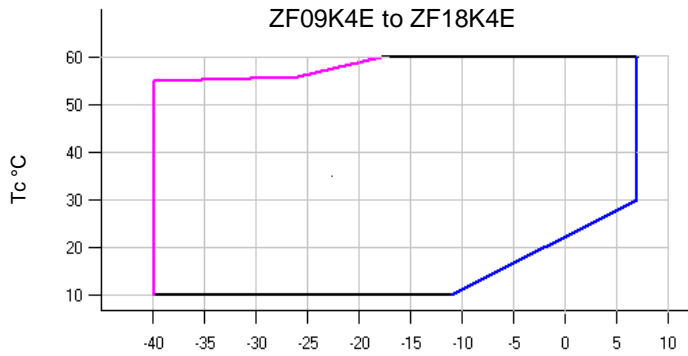
- Check that the regulator oil levels are correct including oil reservoir.
- Check the oil is still in an acceptable condition i.e. check for dirt and acidic content.



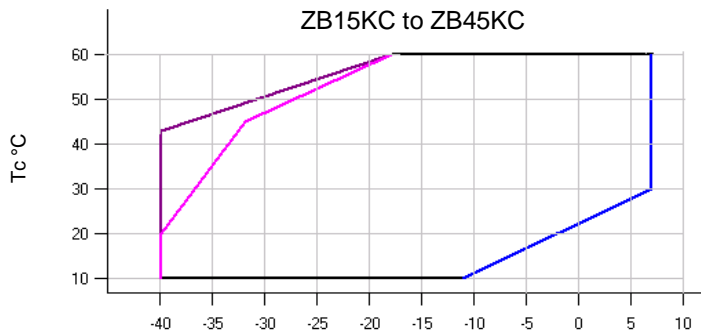
Electrical

- Check all electrical connections for tightness.
- Check contactors for spring tension and contactor wear. If connectors are pitted, replace, DO NOT FILE.
- Check overload functioning correctly.
- Check the compressor run current values.
- Check operation of crankcase heater, if fitted.

R404A Application Envelopes



Minimum evaporating temp. with: Te °C Maximum evaporating temp.
 25°C Suction Gas Return + Liquid Injection



Minimum evaporating temp. with: Te °C Maximum evaporating temp.
 25°C Suction Gas Return
 10K Suction Superheat

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