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DOC. TYPE	Maintenance Bulletin
AUTHOR	M. LISH
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TITLE:	**F400 Maintenance Instructions Addendum to Maintenance Instruction: KW-540 Open Drive Compressors for Transport Applications**

This document is to serve as an addendum to the BITZER Maintenance Instruction KW-540 titled "Open Drive Compressors for Transport Applications." KW-540 addresses the maintenance of the BITZER "BiFa" or 4FC/6FC series of transport compressors. The F400 compressor is a newer design compressor for the same type of application. This document will add F400-specific maintenance items not covered in KW-540. Unless otherwise noted, all maintenance topics covered in KW-540 do apply toward the F400.

Oil Management

The F400 compressor uses a BITZER technology known as our "Centrifugal Disk Lubrication" technology in lieu of the oil pump which is standard on all of the 4NFC/6NFC compressors. Therefore sections of KW-540 pertaining to the oil pump may be disregarded when servicing an F400 compressor.

MAINTENANCE ITEM: Monthly check that the oil in the compressor is relatively clear and within 1/3 to 2/3 of the height of the sight glass. Change/adjust oil level only as necessary.

Adding oil to the F400 compressor: The ideal method for adding oil to the F400 compressor is by using a pump to add the oil through the provided crankcase oil fill port (which is equipped with a Schrader valve). This can be done without opening up the system. Oil pumps may be purchased from most industrial supply companies. The Schrader valve connection on the F400 compressor is a ¼"=18 NPTF fitting. See Figure 1. To identify the crankcase oil fill port.

**Only use BITZER BSE55 POE oil or approved alternative.

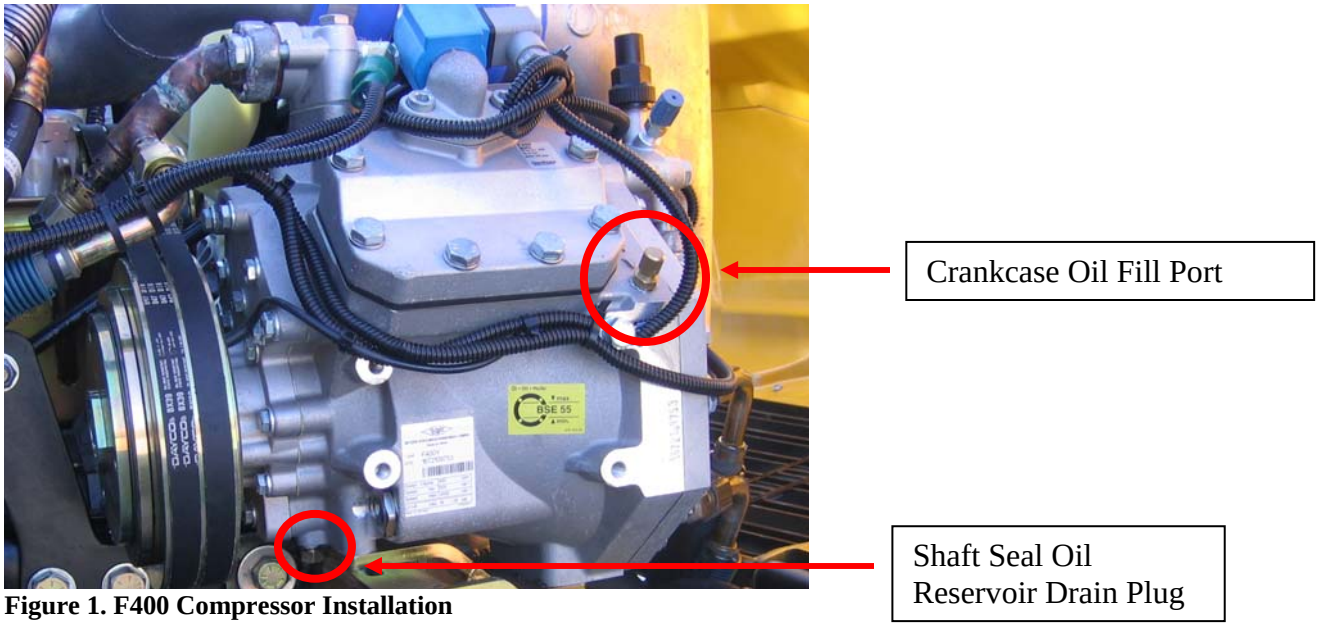

Figure 1. F400 Compressor Installation

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Shaft Seal & Oil Seepage

The shaft seal of the F400 compressor fundamentally functions and serves the same purpose as the shaft seal of the 4FC/6FC series compressor. Detailed installation and service instructions for handling the F400 shaft seal is located in its own maintenance document: KW-571-x.

All shaft seals of all brand compressors are designed to slowly seep oil. This slow seeping of oil is necessary in order to lubricate the shaft seal properly and to prevent its dry operation and resulting failure.

The method by which the oil that seeps through the shaft seal for lubrication purposes is captured is different between the Bitzer 4NFC/6NFC and the F400 compressors. The 4NFC/6NFC Series uses a felt bandage to absorb this oil. Rather than the felt band, the F400 uses an integrated oil reservoir to capture this oil. This reservoir is NOT connected to the crankcase and is thus under only atmospheric pressure. It must be periodically drained however. If it is not properly drained it can result in improper operation of the shaft seal.

MAINTENANCE ITEM: Every 6 months, open the shaft seal oil reservoir drain plug as shown in Figure 1, and capture the oil. The oil should be relatively clear. If it is not, diagnose the cause. Replace any oil in the crankcase if the level drops below 1/3 of the sight glass after 10 minutes of run time.

IMPORTANT NOTE: DO NOT USE PAG OIL IN ANY BITZER COMPRESSOR. PAG oil is only intended for use in systems using certain "automotive" style compressors. Use of incorrect oil will cause failure. Only BITZER BSE55 or approved alternative oil may be used.

When replacing a shaft seal it is critically important to handle the seal with extreme caution. Even a fingernail scratch can cause a seal to leak at a higher than normal rate. We at BITZER recommend wearing rubber gloves when handling and installing new shaft seals.

Clutch Related

All F400 clutches are "body mounted" clutches. This means that the force from the belt is transmitted to the body of the compressor, rather than on the shaft and its supporting bearings. The servicing of a body-mounted clutch involves the critical task of adjusting the air gap. A proper "feeler gauge" must be used during service.

IMPORTANT NOTE: When servicing the clutch, it is critical that the correct installation & maintenance instructions be followed. BITZER uses 2 different manufacturers for our clutches. There should be a model number or series label on the clutch pulley. It will have a part number beginning with the following digits or a series label of one of the following: "KK45" or "LA400.1" or "LA400.2." These labels will correspond to the cover of the clutch installation/maintenance instructions. If in doubt or the clutch is not labeled, contact Bitzer or your A/C System provider for the proper instructions.

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IMPORTANT NOTE: When servicing the clutch, it is critical that the provided installation & maintenance instructions be followed. The most important aspect of properly replacing or servicing a clutch is the proper adjustment of the clutch air gap. Air gap specifications vary between clutch makers and models. A gap that is out of the specified range will cause failure of the clutch.

IMPORTANT NOTE: In addition to out of spec air gaps, low voltage is a leading cause of clutch failure. In most cases of improper clutch operation, the voltage should be one of the first items checked during diagnosis.

Following is a clutch troubleshooting guide and correction matrix:

Symptom	Possible Cause	Corrective Action
Clutch does not close and there is no current	Intermittent contact in the plug	Check plug
	Contact eroded	Clean contact
	Connection cable defect	Repair cable, replace coil
	Short-circuit in the coil	Replace coil
Clutch does not close but is receiving proper current	Insufficient supply voltage	Check supply from alternator/source
	Impurities in friction gap (foreign matter)	Disassemble clutch, clean, and reassemble
	Snap ring missing/improperly installed	Install snap ring, verify proper operation
Clutch slips when turned on	Insufficient supply voltage	Check supply from alternator/source
	Friction surface polluted by small amounts of grease/oil	Disassemble clutch, clean friction surface with alcohol, reassemble
	Heat penetration in the clutch by slipping belts, thus grease penetration in the bearing or overheating the clutch	Disassemble clutch, clean friction surface and/or replace damaged components. Reassemble and assure correct belt tension
	Incorrect distance between coil and rotor (not aligned/installed properly)	Disassemble and inspect the seating/installation of the clutch and the coil
	Clutch worn, working gap is too big	Replace clutch
Clutch does not open immediately when turned off (sticks), shrieking noise	Voltage supply not completely interrupted	Check circuit element for switching the coil ON/OFF and replace if necessary
Clutch does not open and voltage is proper	Clutch word and friction surfaces welded to each other	Replace clutch
Permanent grinding noise	Coil not correctly centered or not firmly tightened	Check coil, tighten bolts, and/or replace if damaged. Disassemble and check clutch

		for consequential damages.
	Friction surface polluted by grease or oily substance	Disassemble clutch, clean friction surface with alcohol, reassemble
	Compressor bearings defect, causing friction between coil and rotor	Replace bearings, check coil function. Replace if damaged. If clutch slips, replace whole clutch
	Blockage of compressor/liquid slugging	If both friction surfaces discolored, replace whole clutch
	Snap ring missing/improperly installed	Install snap ring, verify proper operation
Untrue run of the pulley, loud running noise	Bearing damage due to wear or incorrect mounting.	Check splines and proper mounting of clutch. Replace damaged components.
	Snap ring missing/improperly installed	Install snap ring, verify proper operation

Belt Tension & Alignment

It cannot be stressed enough that proper belt tension alignment is critical to the operation of any compressor. Belt tension specifications should be provided by the a/c system provider. The end user must maintain the proper belt tension and avoid overly slack or over tightened belts. Improper belt tension and alignment are leading causes of clutch and compressor failures.

Relevant BITZER Literature

The following list of literature contains additional maintenance and

KW-540-x	Maintenance Instructions
KE-540-x	Spare Parts List
KW-555-x	Tightening Torques for Screw Fixing Aluminum Compressors
KB-570-x	Operating Instructions for F400 Compressor
KW-571-x	Exchanging the Shaft Seal – F400
KT-510-x	Technical Information: Polyolester Oils BSE32 and BSE55 for Reciprocating Compressors

Linnig LA400.2 &LA600.2 Clutch Installation & Maintenance Instructions
Lang KK45.1 Clutch Installation & Maintenance Instructions

*All of the above literature (that begin with a K) may be found on the website: www.bitzerus.com
Any additional literature may be obtained by contacting our office by phone or email:
Customer Service: (770) 503-9440
customerservice@bitzerus.com