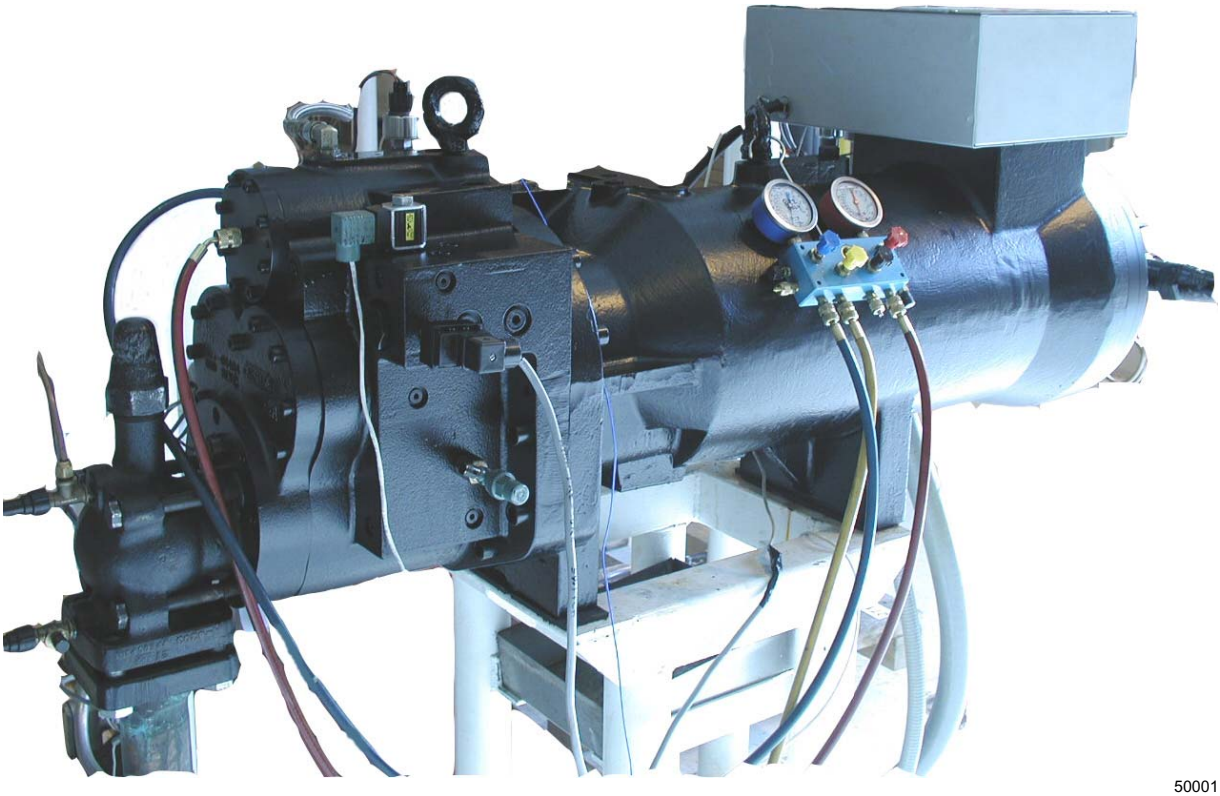
YORK®	DXS SCREW COMPRESSORS	
SERVICE INSTRUCTIONS	Supersedes: Nothing	Form 230.10-M1 (404)

YCAS/YCWS/YCRS CHILLER
DXS COMPRESSOR LOADING/UNLOADING AND HIGH CURRENT TROUBLESHOOTING AND REPAIR INSTRUCTION



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USING THE MANUAL

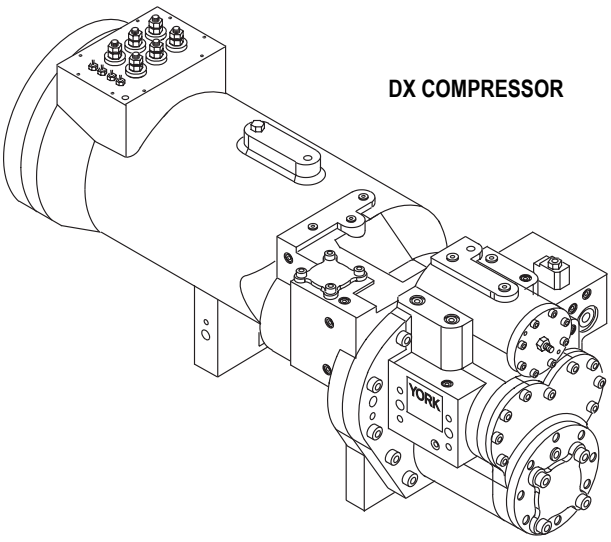
This manual is designed to enable the technician to field repair the majority of problems encountered with a DXS screw compressor. It is very rare for a compressor to seize or fail a motor. Problems typically encountered are the result of improper loading/unloading operation, which show up as nuisance trips, chilled liquid control problems, or high motor current faults at start.

Repair procedures outlined in this manual do not cover motor failures, bearing failures, or noisy compressors, which generally cause too much contamination and internal damage to allow field repair of the compressor. These failures typically cause compressor housing and screw rotor damage, which requires replacing expensive components. The repair procedures provided in this manual focus on replacing the capacity control valve and dis-assembly of the compressor to repair problems that do not cause extensive internal damage to the compressor.

General tests outlined in the diagnosis procedure will help the technician focus on the cause of the problem and identifying the correct repair procedure to use. In some cases, the repair procedure may not be readily identified and factory assistance may be needed or multiple procedures outlined in the manual will need to be pursued.

Loading/unloading diagnosis will always start with testing the compressor loading/unloading operation using one of the two methods described. If a loading/unloading problem is found, the first step will always be to replace the capacity control valve and oil filter before opening the compressor and pursuing internal repairs. In most cases, compressors with loading/unloading problems can usually be repaired by simply replacing the capacity control valve and oil filter.

DIAGNOSTIC PROCEDURES



GENERAL

To determine if the compressor is loading/unloading correctly, use one of the following procedures, depending on the system operating conditions. Record the results in the checksheet provided on page 6.

AMPERAGE METHOD #1

(See Figs. 1, 2 & 3)

1. Run the compressor to a full 75 steps (full load).
2. Measured voltage ≅ 10-12 VDC to the capacity control valve solenoid.

   Micropanel % fully loaded amps (FLA) will typically be ≅ 70-85% FLA on the display. The % FLA could be higher or lower depending upon ambient temperature.

3. Unplug the wiring (remove power) to the capacity control solenoid valve.
4. If unloading has occurred, the % FLA current will decrease:
   a. Air Cooled Chillers ≈ 25-35% decrease
   b. Water Cooled Chillers ≈ 20% decrease

   Micropanel % FLA unloaded currents will be ≅ 45-60% FLA on the display.

5. If the current does not change sufficiently from unloaded to fully loaded, change the capacity control valve and oil filter before considering other repair procedures.

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FIG. 1 - Run Compressor to Full 75 Steps

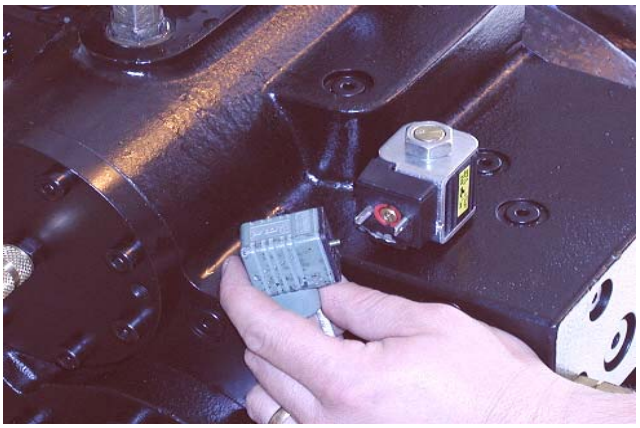

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FIG. 2 - Remove Power to the Capacity Control Solenoid Valve

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FIG. 3 - Determine Decrease in Loaded to Unloaded % FLA

AMPERAGE METHOD #2

(See Fig. 4)

NOTE

This method should be used if the load is low and the chiller pulls down temperature before the compressor loads up under control of the micro.

1. Remove the signal wiring to the slide valve of the specific compressor at the I/O expansion board.
2. Connect the (-) signal wire to the 12v return of the power supply board. Connect the (+) signal wire to +12v of the power supply board.

NOTE

Care must be taken to assure clip leads/ wires do not short together or to other circuitry.

3. Check the voltage to assure there is at least 10 vdc to the slide valve.

Micropanel % fully loaded amps (FLA) will be ≅ 70-85% FLA, on the display. The % FLA could be higher or lower depending upon ambient temperature.

4. Unplug the wiring (remove power) to the capacity control solenoid valve.

FIG. 4 - Determine Decrease in % FLA Loaded to Unloaded

5. If unloading has occurred, the % FLA current will decrease:
   a. Air Cooled Chillers ≈ 25-35% decrease
   b. Water Cooled Chillers ≈ 20% decrease

Micropanel % FLA unloaded current will be ≅ 45-60% FLA on the display.

6. If the current does not change sufficiently from unloaded to fully loaded, change the capacity control valve and oil filter before considering other repair procedures.

REPLACING THE CAPACITY CONTROLS SOLENOID VALVE

CHANGING THE CAPACITY CONTROL SOLENOID VALVE

1. Pump down the compressor and close off all service valves.
2. Recover the remaining refrigerant in the compressor. Evacuation ports are shown in Fig. 5.
3. Unplug wiring (remove power) to the capacity control valve solenoid. See Fig. 7.
4. Check valve body and solenoid torque when removing (see Figs. 6 and 7)
   a. Valve **body**: NOT to EXCEED **10** ft. lbs.
   b. Valve **coil**: NOT to EXCEED **3** ft. lbs.

NOTE

Exceeding the specified torque will result in capacity control solenoid valve malfunction.

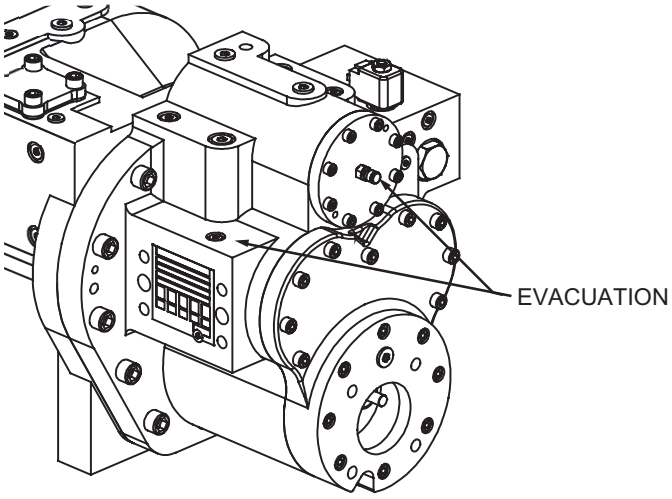

FIG. 5 - Evacuation Ports Location

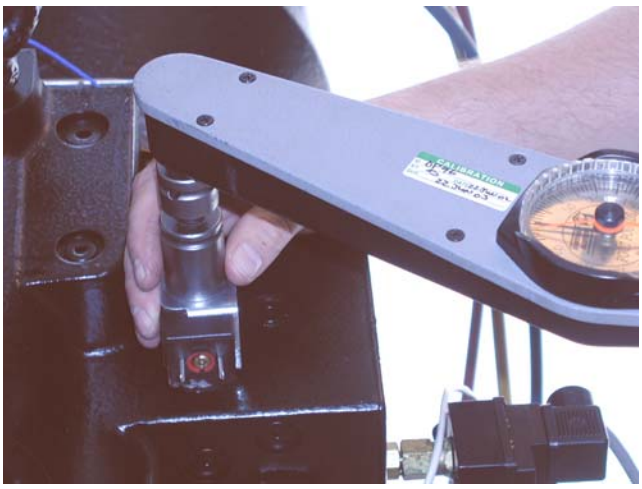

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FIG. 6 - Check Torques

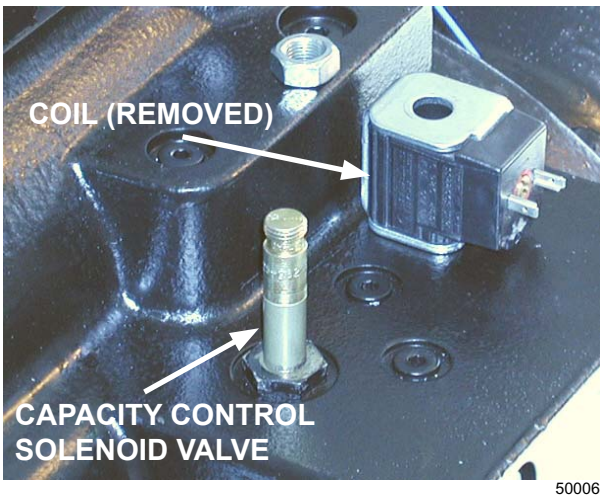

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FIG. 7 - Change Solenoid. Apply Specified Torques When Replacing

5. Remove the old valve.
6. Install the new valve, coil and nut. DO NOT torque the valve beyond 10 ft./lbs. DO NOT torque the coil nut beyond 3 ft./lbs. See Figs. 6 and 7.
7. Evacuate the compressor to 500 microns using both evacuation fittings.
8. Return the compressor to service and retest compressor loading and unloading.
9. If loading and unloading problems exist after the valve change, continue with the following steps and refer to Fig. 8.
10. Check the "Closed Thread Drain Port" (CTDP) pressure located above the name plate of the compressor while the compressor is running and compare to the suction pressure measured with a gauge. The location is the same point used for evacuating the compressor.
    a. CALCULATED PRESSURE = 1.2 x suction pressure (PSIG).
    b. If the pressure calculated (CTDP) is greater than the calculated pressure, proceed to the section "Repair Procedures for Compressors Operating Fully Loaded (Bypass Line Installation).
11. Use the checksheet on page 6 for recording data while testing the operation of the compressor.

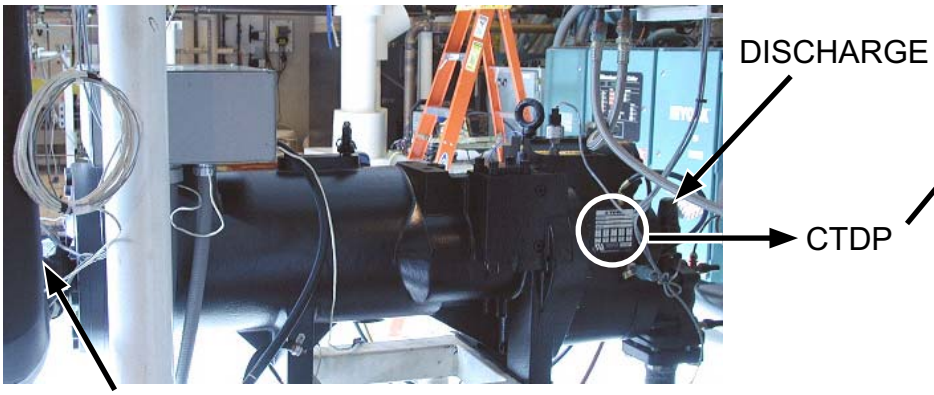

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FIG. 8 - Check Pressure At Port

CHECK SHEET	
CHILLER MODEL _____ CHILLER SYSTEM #_____	
CHILLER SERIAL # _____ COMPRESSOR MODEL/SERIAL #_____	
FAULT STEPS	**READINGS**
Chiller % FLA At 75 Steps, or + 12 VDC on the Solenoid	% FLA
Chiller % FLA with Capacity Control Solenoid Disconnected	% FLA
Record Actual Torque of Capacity Control Valve, When Removed	Ft./Lbs
Indicate If A Replacement Capacity Control Valve Was Installed	□ Yes □ No
Indicate If Replacement Capacity Control Valve Cured Unloading Problems	□ Yes □ No
If Capacity Control Valve Did Not Solve the Problem, Complete the Following	
Check Closed Thread Port Pressure (CTDP)	PSIG
Calculated Pressure = 1.2 x Suction Pressure	PSIG
Is CTDP Pressure Greater Than the Calculated Pressure?	□ Yes □ No

Some 3 and 4 compressor chillers manufactured in 1999 and 2000 may appear to load all compressors by approximately Step 10. If this occurs, check I/O Board #2 for resistor pack U41. If U41 is installed, turn power off and carefully remove it by rocking it back and forth until the legs break off. Be sure none of the remaining pieces of leg short together or to other components. Remove any long pieces of leg with a side cutter. Repower the chiller and the problem should be corrected.

REPAIR PROCEDURES FOR COMPRESSORS OPERATING FULLY LOADED (BYPASS LINE INSTALLATION)

EQUIPMENT AFFECTED:

YCAS/YCWS/YCRS DXS124, DXS136, and DXS 145 Compressors (DXS112 compressors cannot be fitted with a bypass line).

SYMPTOM:

Compressor %FLA change from fully unloaded to fully loaded changes only a few % and %FLA appears to indicate the compressor is close to full load. Some compressors may nuisance trip on high current at start depending on differential pressure across the compressor. Changing the capacity control valve had no effect and it is verified that the loading does not change even though the signal to the capacity control solenoid is varied from 0-10VDC. Measured pressures as outlined in the compressor Loading/Unloading Diagnosic Procedure are ≥ 1.2 x suction.

GENERAL:

The cause of the problem is a pressure leak from the bearing cavity, which prevents the capacity control valve from venting oil pressure to allow unloading. Once the compressor loads, it is no longer able to unload. Prior to proceeding with the following instructions, verify the unloading signal and check the capacity control valve operation and CTDP pressure using the procedure discussed earlier in this manual. The repair procedure plugs an internal passage in the compressor and provides an alternate bypass line for venting oil pressure from the capacity control valve.

TOOLS:

Small hammer or mallet, adjustable torque wrench, allen wrench 5/16, allen wrench 3/16, adjustable wrench.

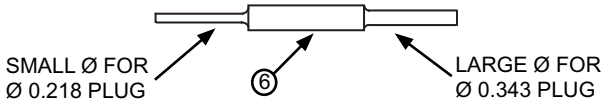
PARTS LIST:

Order the appropriate kit for the compressor from BALT RPC using the Table below:

COMPRESSOR	PARTS KIT
DXS 124	364-51135-003
DXS 136	364-51135-002
DXS 145	364-51135-001

Individual parts supplied in each kit are listed below:

TABLE 1 - PARTS LIST		
ITEM	QTY	DESCRIPTION
1	1	6-8 C5OXS straight thread elbow
2	1	Ball Plug
3	1	4-6 F5OG5-S reducer-expander
4	1	6FS5BUS straight thread connector
5	1	Bypass line pipe
6	1	Tool, Ball plug installation



REPAIR PROCEDURE:

1. Run the compressor, close the liquid stop valve, pump the compressor down to approximately 5 psig, and turn the compressor off.
2. Isolate the compressor from the system by closing the suction, economizer, oil line, and discharge stop valves. Some chillers may not have economizer and suction stop valves. In this case, only the discharge and oil line valves will be closed.
3. Recover refrigerant from compressor or the low side of the system on systems that do not have a suction service valve. Use evacuation ports on both the oil filter and side of the compressor to assure all gas is removed. See Fig. 9.

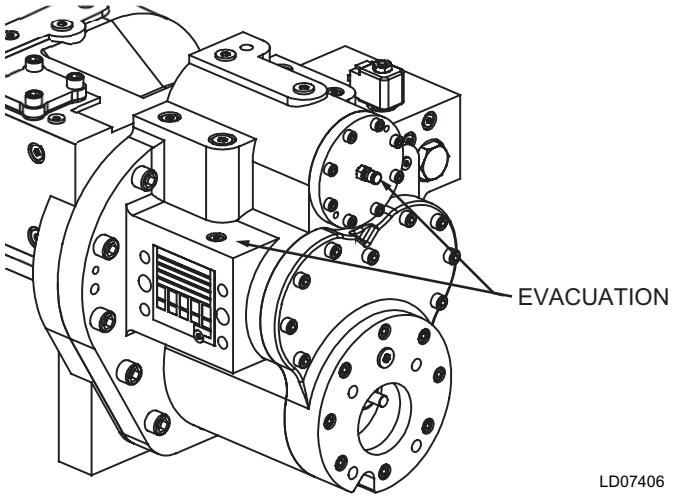


FIG. 9 - Evacuation Ports Location

4. Remove two existing plugs (Fig. 10) from Locations 1 and 2, on the compressor.

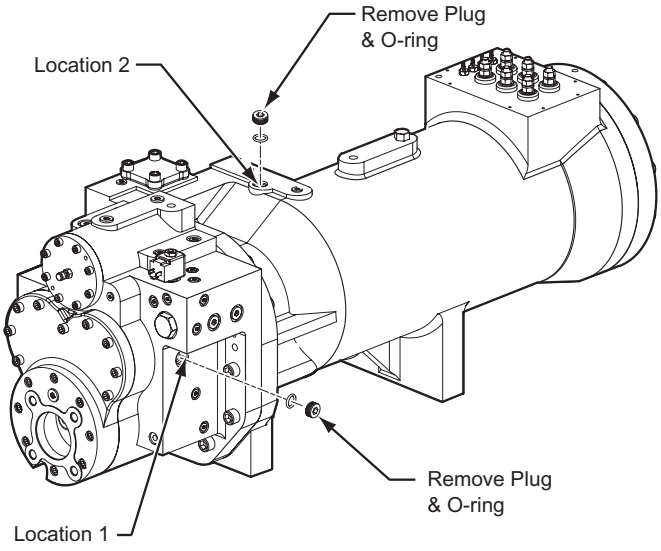


FIG. 10 - Plug Location

5. Refer to Fig. 11 for placement of the parts required to complete the bypass line installation. This is shown to aid in the installation steps that follow. Parts are identified in Table 1 on Page 7.

The use of O-ring lubrication is recommended on all o'rings during the following assembly procedure. O-ring's should be coated with a light film of YORK "L" oil before installation. NEVER use sealant on an o-ring.

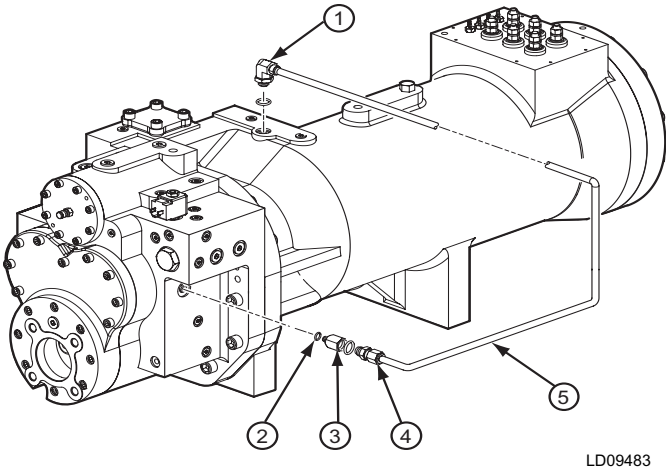


FIG. 11 - Parts Location

6. Insert Ball Plug (Item 2) into Location 1 (refer to Figs. 10 and 11) on discharge case. Fig 12 shows the ball plug and how it functions.

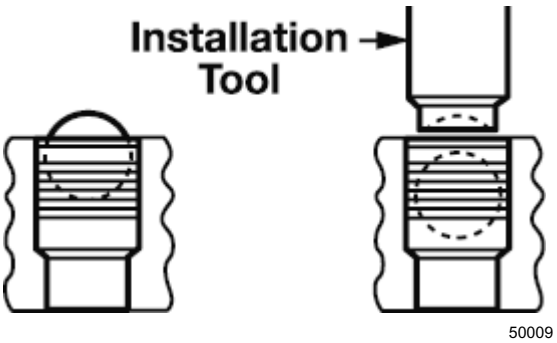


FIG. 12 - Using Ball Plug Installation Tool

7. The plug is to be inserted to a depth past the intersecting port (refer to Fig. 13).

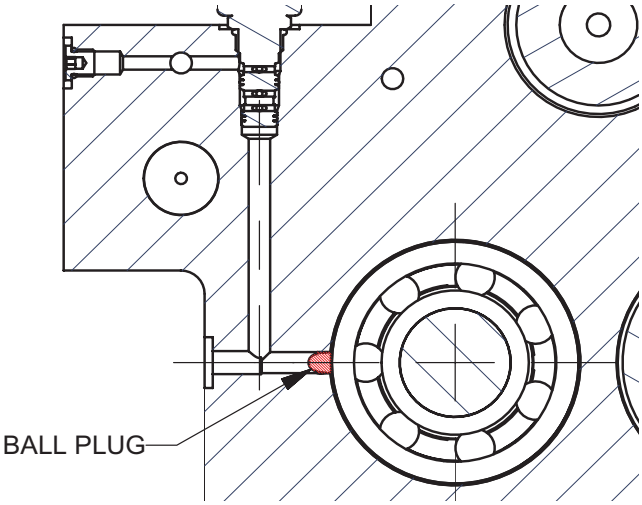


FIG. 13 - Inserting Ball Plug Past Port

8. Using the installation tool (item 6, page 7), gently tap the the ball into the plug with a hammer (refer to Figs. 12 & 14).

FIG. 14 - Tapping Ball Plug into Position

CAUTION

When using the ball plug installation tool, the ball plug diameter required is Ø0.218 on compressors shipped prior to 09/99 and Ø0.343 thereafter. Most compressors will use the large ball plug and it should be obvious on an older compressor that the large plug is incorrect. The kit will contain both size ball plugs.

9. Assemble Items 3 and 4 together as shown in Fig. 15. The two fittings should be made finger tight and then tightened a little more using a wrench.

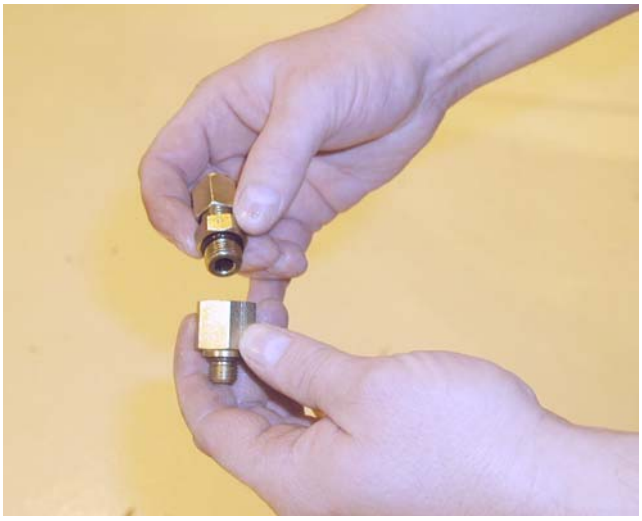


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FIG. 15 - Assemble Fittings 3 & 4

10. Install the sub-assembly at Location 1 as shown in Fig. 16. Screw the assembly into the compressor and torque to 11 foot-pounds.

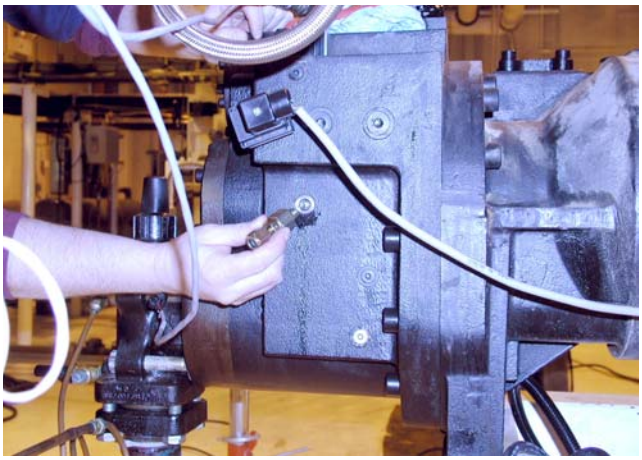

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FIG. 16 - Assemble Fittings 3 & 4

11. Install Item 1 at Location 2 as shown in Fig. 17. Screw the fitting into the compressor and torque to 46 foot-pounds.

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FIG. 17 - Install Fitting on Compressor Case

12. Unscrew the ferrule and nut from the fittings that will interface with the pipe. Place the ferrule and nut onto the pipe, insert pipe into the fitting, and screw the ferrule and nut back in place. Install at both locations (Item 4, Fig.18 & Item 1, Fig. 19).

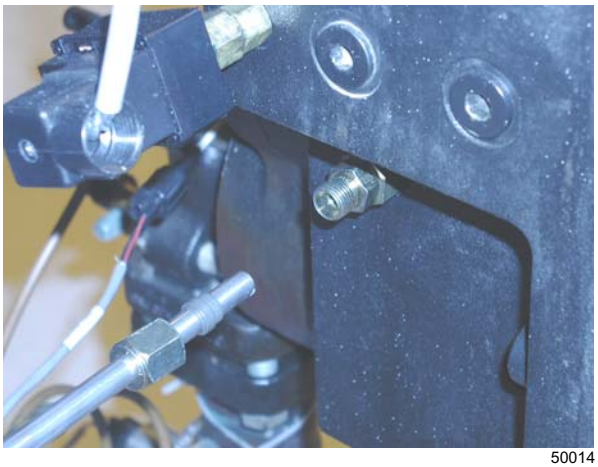

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FIG. 18 - Install Nut & Ferrule on Pipe

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FIG. 19 - Install Nut & Ferrule on Pipe

13. The completed piping will look like the example shown in Fig. 20.
14. Evacuate the compressor or low side of the system to 500 microns.
15. Replace the refrigerant recovered from the compressor or compressor/low side of the system.
16. Leak check the new compressor piping and connections.
17. Open the compressor valves to the system. Verify the compressor loads and unloads by running the compressor to 75 steps and removing the signal from the capacity control solenoid as described in the troubleshooting section for loading/unloading problems.

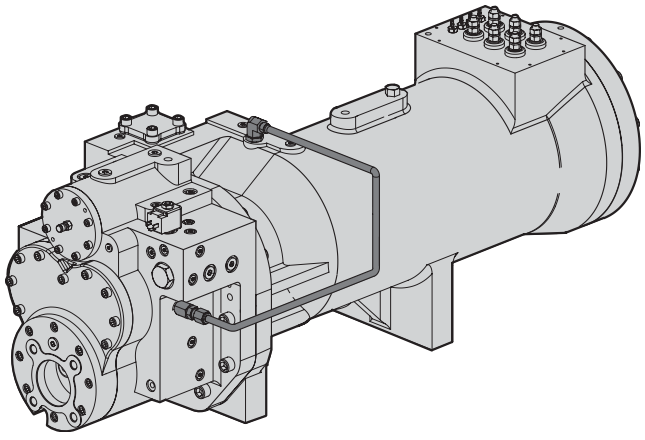

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FIG. 20 - Piping Installed on Compressor

REPAIR PROCEDURES FOR COMPRESSORS THAT DO NOT FULLY UNLOAD (REPLACING THE SLIDE VALVE RETURN SPRING)

EQUIPMENT AFFECTED:

YCAS/YCWS DXS112, DXS124, DXS136, and DXS145 Compressors

SYMPTOM:

Compressor starts partially loaded and %FLA change from fully unloaded to fully loaded is less than 20% on a YCAS chiller and less than 15% on a YCWS. Changing the capacity control valve had no effect and measured pressures as outlined in the Compressor Loading/Unloading Diagnosis procedure are less than 1.2X suction.

GENERAL:

The compressor may appear to vary loading very little with current running high when the compressor should be running fully unloaded. This is a result of a broken slide valve return spring. The severity of the problem will be a result of the number of breaks in the spring, and the amount the spring is shortened due to the segments winding together.

TOOLS:

12" wrench extension, 10mm Hex Socket, 14mm Hex Socket, and adjustable torque wrench.

PARTS LIST:

Order the appropriate kit for the compressor from BALT RPC using Table below:

COMPRESSOR	PART NUMBER
DXS112	364-51136-004
DXS124	364-51136-003
DXS136	364-51136-002
DXS145	364-51136-001

Kit contents are listed in Table 2 and shown in Fig. 21.

TABLE 2 - Kit Contents

ITEM	QTY	PART #	DESCRIPTIONS
1	1	028-13858-000	O-Ring 2-015
2	2	111R000050	SHCS ISO 4762 m 16 x 240
3	2	111R000051	SHCS ISO 4762 M 10 x 100 Fully Threaded
4	1	Variable	O-Ring
5	1	Variable	Spring, Capacity Control
6	1	Variable	Piston, Capacity Control

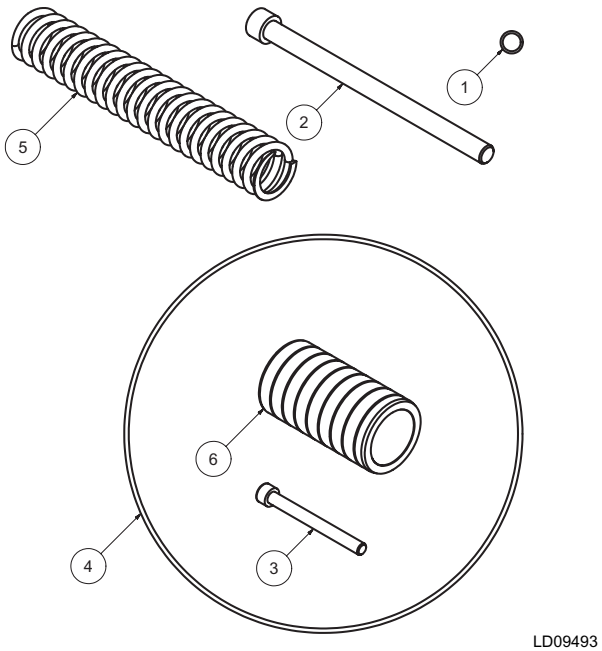

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FIG. 21 - Slide Vallve Return Spring Kit

REPAIR PROCEDURE

1. Run the compressor, close the liquid stop valve, pump compressor down to approximately 5 psig, and turn the compressor off.
2. Isolate the compressor from the system by closing the suction, economizer, oil line, and discharge stop valves. Some chillers may not have economizer and suction stop valves. In this case, only the discharge valve will be closed.
3. Recover the refrigerant from the compressor or low side of the system, if the compressor cannot be valved off. Use evacuation ports on both the oil filter and side of the compressor to assure all gas is removed. See Fig. 22.

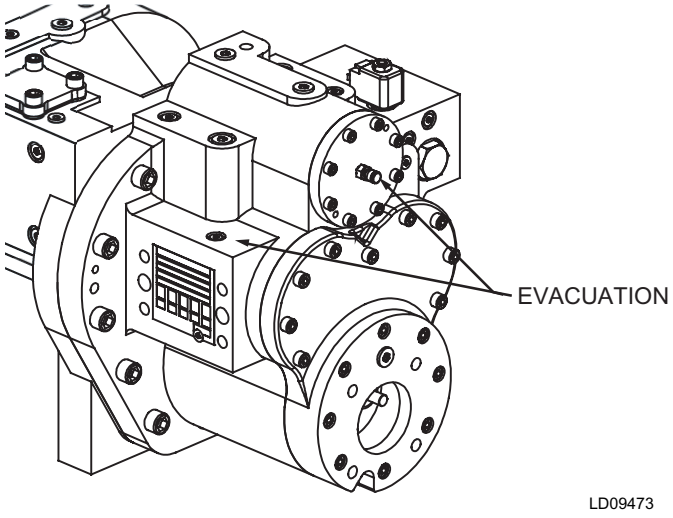

FIG. 22 - Evacuate At Both Ports

4. Remove the suction and discharge lines to allow sufficient workspace to separate the discharge housing from the rotor housing. If the lines cannot be moved, the compressor foot bolts or foot brackets can be removed and the compressor carefully slid a few inches to one side as needed after the suction, discharge, oil, and economizer (if equipped) lines are unbolted.

Be careful to collect any oil that may drain when the lines are removed.

5. Remove the suction strainer, stator screw and motor clamp. Tilt the screw and clamp subassembly upwards after it unthreads to allow them to all be removed at the same time to prevent dropping any parts inside the motor case. See Fig. 23.

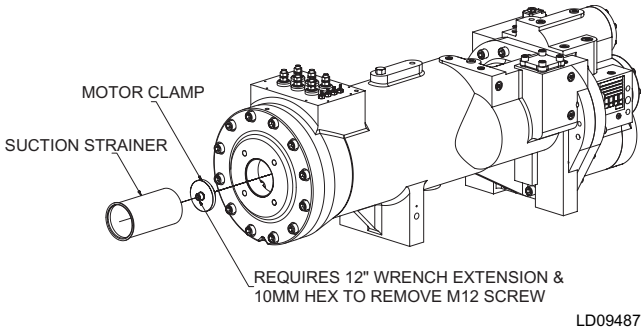

FIG. 23 - Remove Suction Strainer & Motor Clamp

6. Remove two M16 screws from the discharge housing as shown in Fig. 24. This requires a 14mm Hex.

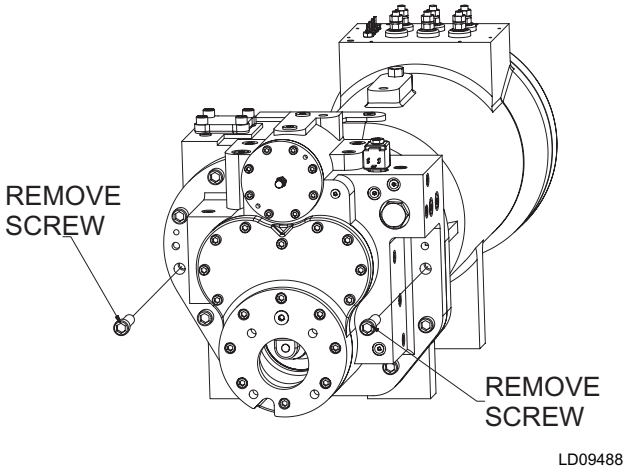

FIG. 24 - Remove Two Hex Screws from Housing

7. Screw in the two support rods (Table 2, Item 2) to full thread depth in place of the screws just removed at location "4" as shown in Fig. 25.
8. Insert the two jack screws (Table 2, Item 3) in the M10 tapped holes above the support rods at location "5" as shown in Fig. 25.
9. Remove the remaining M16 screws from the front and rear of the discharge housing mounting flange. See Figs. 25 & 26.

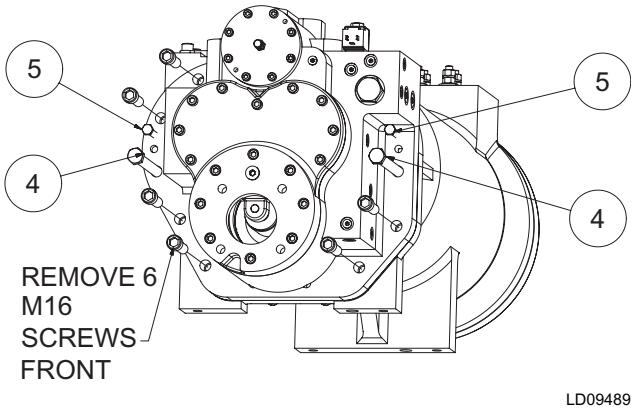

FIG. 25 - Insert Rods (4, 5) and Remove Screws

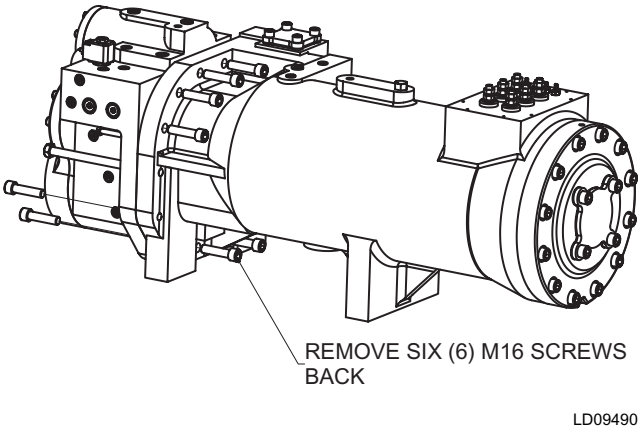

FIG. 26 - Remove Remaining Screws from Housing

10. Separate the discharge housing from the rotor housing by turning the jackscrews (Location "5" in Fig. 25). The rotors will become visible as the cases are separated as shown in the two drawings in Fig. 27. Be aware the compressor will drain oil when the housings are separated.

Assure the support rods are in place before separating the housings.

11. Pull the discharge housinge away from rotor case until it reaches the support rod stop as shown in the bottom drawing in Fig. 27.

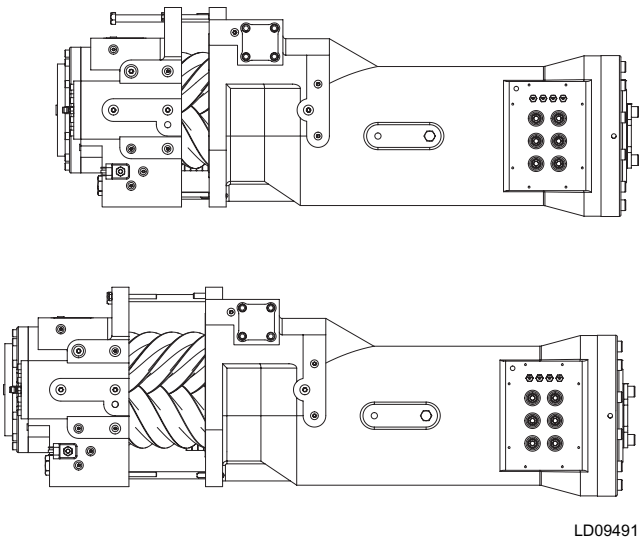

FIG. 27 - Pull Discharge Housing from Rotor Case

12. Remove the spring and piston as shown in Fig. 28. Be sure that all pieces of the spring are removed and the piston bore is clean.

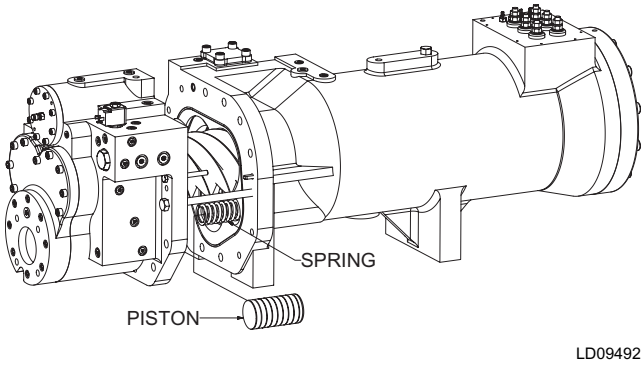

FIG. 28 - Remove Spring and Piston from Housing

13. Install the new piston (Table 2, Item 6) into the discharge housing, as shown in Fig. 29. Be sure the open end of the piston is facing the motor end of the compressor as shown.

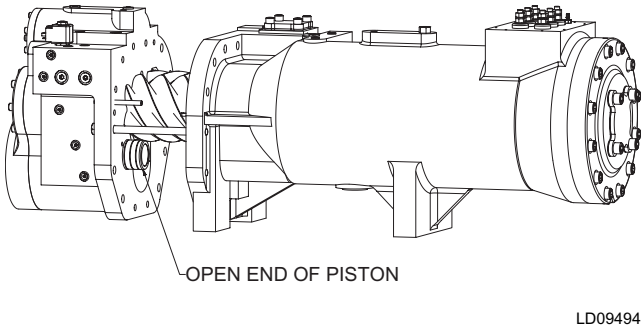

FIG. 29 - Install New Piston in Discharge Housing

14. Install the new spring (Table 2, Item 5) into the rotor housing as shown in Fig. 30.
15. Install a new O-ring (Table 2, Item 1) as shown in Fig. 30. O-ring lubrication is recommended. The O-ring should be coated with a light coating of YORK "L" oil**.**

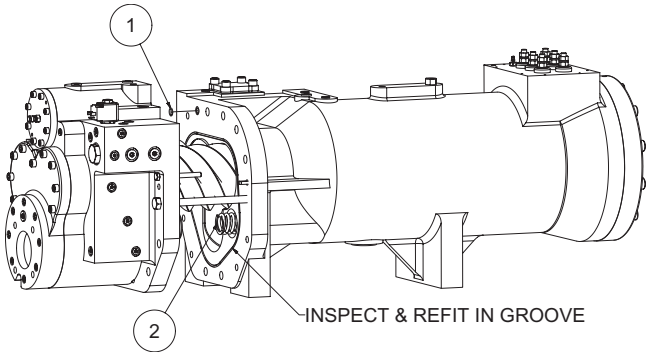

FIG. 30 - Install New O-Ring in Groove

16. Inspect the large O-ring (Fig. 30), which seals the rotor/discharge cases. If the O-ring is in good condition, reinsert the O-ring prior to putting the discharge case back in place. The use of O-ring lubrication is recommended. The O-ring should be coated with a light coating of YORK "L" oil**.** If the O-ring is not reusable, which is typical, replace it using Item 4, Table 2.

Replacing the large o-ring is tricky. The O-ring must be carefully stretched over the discharge housing. Carefully remove one support rod a short distance and slip the O-ring between the rod and the rotor case. The discharge housing will rest on the rotors. Replace the support rod and repeat the procedure for the other side. Be sure to lightly lubricate the O-ring with YORK "L" oil before placing the new O-ring into the groove.

17. Carefully slide the discharge housing toward the rotor housing until it contacts rotor housing.
18. Insert all M16 discharge housing mounting bolts (12 total).
19. Remove the support rods and jack screws.
20. Replace the two (2) M16 mounting bolts.
21. Torque all M16 mounting bolts to 144 foot-pounds.
22. Replace the motor clamp and screw and torque the screw to 85 ft.-lbs**.**

As the bolt is tightened, the rotor will turn. It is recommended that an electric impact is used to tighten the bolt. Set the impact for the proper torque and tighten the bolt 3 times with the impact.

23. Replace the suction strainer.
24. If the compressor has been moved, place it back in it's original position and bolt it back into place with either the foot bolts or the foot brackets.
25. Replace the suction line, discharge line, and if equipped, the economizer line. Rebraze any lines that have been cut.
26. Evacuate the compressor or low side of the system to 500 microns.
27. Replace the refrigerant recovered from the compressor or compressor/low side of the system.
28. Leak check the compressor and any piping that has been modified.
29. Open the compressor valves to the system.
30. Verify the compressor loads and unloads by running the compressor to 75 steps and removing the signal from the capacity control solenoid as described in the troubleshooting section for loading/unloading problems.

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