



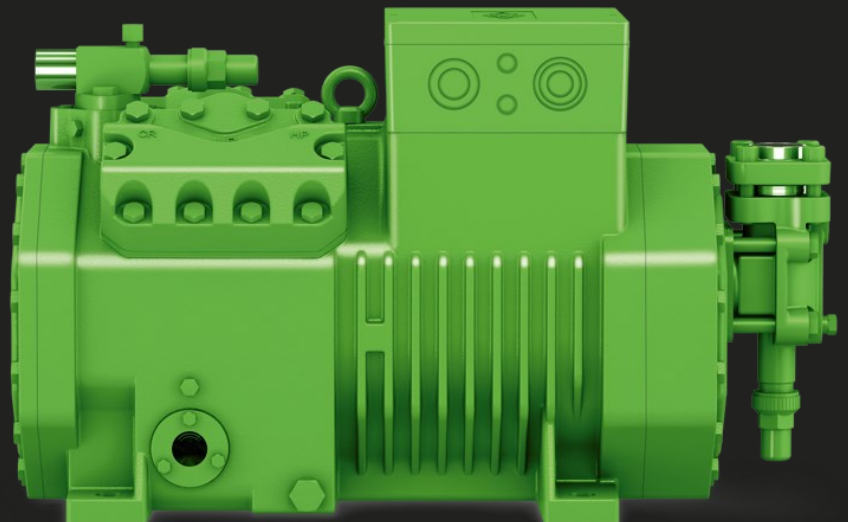
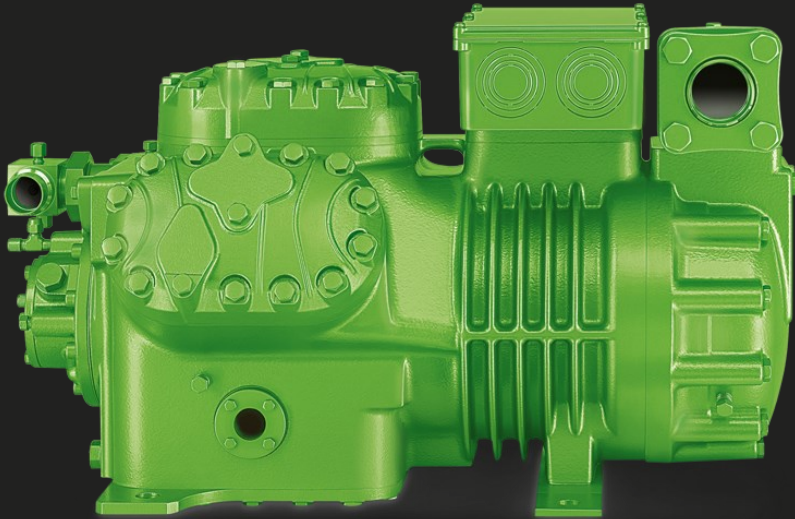
CARLYLE™ TO BITZER CONVERSION GUIDE

RECIPROCATING COMPRESSORS

FOR MODELS

06D (6 Cylinder) to CE4 Series Ecoline

06E (4 & 6 Cylinder) to BE Series Ecoline





ATTENTION:

ALL WORK ON COMPRESSOR AND REFRIGERATION SYSTEMS MUST BE CARRIED OUT BY TRAINED AND QUALIFIED REFRIGERATION TECHNICIANS.

THIS BOOK IS A GUIDELINE FOR ASSISTING AND SHOULD BE USED IN CONJUNCTION WITH OPERATING INSTRUCTIONS KB-100 OR KB-115.

FOLLOW ALL SAFETY GUIDELINES FOUND IN BITZER LITERATURE AND SAFETY INSTRUCTIONS ASSOCIATED WITH OTHER REFRIGERATION EQUIPMENT USED IN THIS GUIDE.

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SYMBOLS FOUND IN THIS BOOK:

!ATTENTION!

INSTRUCTIONS ON AVOIDING POSSIBLE DAMAGE TO EQUIPMENT

 **CAUTION!**

INSTRUCTIONS CONTAINING PROCEDURES THAT COULD POSSIBLY CREATE A MINOR HAZARD TO PERSONS.

 **WARNING!**

INSTRUCTIONS CONTAINING PROCEDURES THAT COULD POSSIBLY CREATE A SEVERE HAZARD TO PERSONS

 **DANGER!**

INSTRUCTIONS CONTAINING PROCEDURES THAT CREATE AN IMMEDIATE RISK OF SEVERE HAZARD TO PERSONS

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1.1 06D Cross Reference



Capacity Comparison -25/105/0/65											
Carlyle	CFH	R22	R404A	Bitzer	CFH	R22	Δ Cap	R404A	Δ Cap	Endbell	Conversion Kit ¹
06D(ϕ)x24	1440	22.6	25.2	4VE-7	1480	24.6	1.09	25.5	1.01	305236-01KIT	542020-01KIT
				4TE-9	1761	30.0	1.33	32.1	1.27		542020-01KIT
06D(ϕ)x25	1440	22.6	25.2	4VE-7	1480	24.6	1.09	25.5	1.01	305236-01KIT	542020-01KIT
				4TE-9	1761	30.0	1.33	32.1	1.27		542020-01KIT
06D(ϕ)x28	1680	27.0	33.1	4TE-9	1761	30.0	1.11	32.1	0.97	305236-01KIT	542020-01KIT
				4PE-12	2067	34.8	1.29	35.0	1.06		542020-01KIT
06D(ϕ)x37	2220	36.6	44.4	4PE-12	2067	34.8	0.85	35.0	0.72	--	542020-01KIT
				4NE-14	2397	40.5	0.99	43.6	0.89		542020-01KIT
06D(ϕ)x41	2460	41.1	48.9	4NE-14	2397	40.5	0.99	43.6	0.89	--	542020-01KIT

If ϕ = M, R, Z, Y = Low Temp application (SST < °15F)

¹With the conversion kit, this will be a direct drop in replacement.

Capacity Comparison 20/120/0/65											
Carlyle	CFH	R22	R404A	Bitzer	CFH	R22	Δ Cap	R404A	Δ Cap	Endbell	Conversion Kit ²
06D(ϕ)x24	1440	61.8	66.2	4VE-10	1480	77.2	1.25	74.6	1.13	--	542020-01KIT
06D(ϕ)x25	1440	61.8	66.2	4VE-10	1480	77.2	1.25	74.6	1.13	--	542020-01KIT
06D(ϕ)x28	1680	76.7	81.2	4VE-10	1480	77.2	1.01	74.6	0.97	--	542020-01KIT
				4TE-12	1761	93.5	1.22	90.7	1.18		542020-01KIT
06D(ϕ)x37	2220	106.6	112.7	4PE-15	2067	106.4	1.00	102.7	0.91	--	542020-01KIT
				4NE-20	2397	123.8	1.16	126.1	1.12		542020-01KIT
06D(ϕ)x41	2460	125.7	128.4	4NE-20	2397	123.8	0.98	126.1	0.98	--	542020-01KIT

Capacity Comparison 45/130/0/65											
Carlyle	CFH	R22	R404A	Bitzer	CFH	R22	Δ Cap	R404A	Δ Cap	Endbell	Conversion Kit ²
06D(ϕ)x24	1440	106	107	4VE-10	1480	124	1.17	113	1.05	--	542020-01KIT
06D(ϕ)x25	1440	106	107	4VE-10	1480	124	1.17	113	1.05	--	542020-01KIT
06D(ϕ)x28	1680	129	128	4VE-10	1480	124	0.96	113	0.88	--	542020-01KIT
				4TE-12	1761	150	1.16	137	1.06		542020-01KIT
06D(ϕ)x37	2220	175	174	4PE-15	2067	172	0.98	157	0.90	--	542020-01KIT
				4NE-20	2397	203	1.16	187	1.08		542020-01KIT

If ϕ = A-F, J, K, L, N, S, T, X, 2-9 = Medium/High Temp application (SST > 15°F)

²There is no direct drop in kit available for air conditioning applications because the suction valve of the Carlyle is at an angle. Re-piping will need to be done. Mounting rails and discharge connections are provided in the conversion kit.



Bitzer Compressor Selection

1. Select the equivalent **Bitzer** compressor, endbell and conversion kit as per table on page 4.

Carlyle Compressor: **06DR724**

Bitzer Replacement: **4VE-7**

Endbell: 305236-01KIT

Conversion Kit: 542020-01KIT

2. Select **compressor voltage** required and add the corresponding suffix it to the model number,
Bitzer replacement: **4VE-7-2NU**

- 230V/3/60Hz: “**-2NU**” (Standard)
- 380V/3/60Hz: “**-3PU**”
- 460V/3/60Hz: “**-2NU**” (Standard)
- 460V/3/60Hz - “**-4PU**” (Part Winding Start)
- 575V/3/60Hz: “**-5PU**”

3. If **unloading** is required, add the suffix to the model number.

Note: No unloading with Low Temp R22 applications.

Bitzer replacement: **4VE-7-2NU-1D**

- No unloader: “**-0D**”
- One unloader: “**-1D**”
- Two unloaders (only applicable to 6-cylinder models): “**-2D**”

1.2 06E Cross Reference



Capacity Comparison -25/105/0/65										
Carlyle	CFH	R22	R404A	Bitzer	CFH	R22	Δ Cap	R404A	Δ Cap	Mounting Rails ¹
06E(◇)x50	3000	44.6	59.3	4JE-15	2707	43.5	0.98	52.6	.089	542020-02KIT
				4HE-18	3139	50.4	1.13	63.1	1.06	542020-02KIT
06E(◇)x65	3900	56.4	72.4	4GE-23	3604	58.7	1.04	74.9	1.03	542020-02KIT
				6JE-25	4060	65.3	1.16	78.5	1.08	542020-02KIT
06E(◇)x75	4500	69.6	84.0	4FE-28	4339	70.1	1.01	89.7	1.07	542020-02KIT
				6HE-28	4709	75.7	1.09	93.0	1.11	542020-02KIT
06E(◇)x99	5940	87.0	108.7	6GE-34	5406	88.0	1.01	113.8	1.05	542020-02KIT
				6FE-44	6462	106.7	1.23	134.5	1.24	542020-02KIT

If ◇ = M, R, Z, Y = Low Temp application (SST < °15F)

¹There is no direct drop in kit available. Re-piping will need to be done. Mounting rails are available.

Capacity Comparison 20/120/0/65										
Carlyle	CFH	R22	R404A	Bitzer	CFH	R22	Δ Cap	R404A	Δ Cap	Mounting Rails ¹
06E(◇)x50	3000	133	138	4JE-22	2707	142	1.07	139	1.01	542020-02KIT
				4HE-25	3139	169	1.27	164	1.19	542020-02KIT
06E(◇)x65	3900	179	184	4GE-30	3604	196	1.09	188	1.02	542020-02KIT
				6JE-33	4060	213	1.19	206	1.11	542020-02KIT
06E(◇)x75	4500	197	216	6JE-33	4060	213	1.08	206	0.95	542020-02KIT
				4FE-35	4339	234	1.19	226	1.05	542020-02KIT
06E(◇)x99	5940	270	294	6GE-40	5406	291	1.08	274	0.93	542020-02KIT
				6FE-50	6462	351	1.30	334	1.14	542020-02KIT

Capacity Comparison 45/130/0/65										
Carlyle	CFH	R22	R404A	Bitzer	CFH	R22	Δ Cap	R404A	Δ Cap	Mounting Rails ¹
06E(◇)x50	3000	230	231	4JE-22	2707	229	1.00	207	0.90	542020-02KIT
				4HE-25	3139	270	1.17	241	1.05	542020-02KIT
06E(◇)x65	3900	303	294	4GE-30	3604	312	1.03	275	0.93	542020-02KIT
				6JE-33	4060	343	1.13	310	1.05	542020-02KIT
06E(◇)x75	4500	334	338	6JE-33	4060	343	1.03	310	0.92	542020-02KIT
				4FE-35	4339	372	1.11	324	0.96	542020-02KIT
06E(◇)x99	5940	441	398	6GE-40	5406	464	1.05	398	1.00	542020-02KIT
				6FE-50	6462	559	1.27	480	1.21	542020-02KIT

If ◇ = A-F, J, K, L, N, S, T, X, 2-9 = Medium/High Temp application (SST > 15°F)

¹There is no direct drop in kit available. Re-piping will need to be done. Mounting rails are available.



Bitzer Compressor Selection

1. **Select the equivalent Bitzer** compressor and mounting rails as per table on page 6.

Carlyle Compressor: **06EA2993**

Bitzer Replacement: **6GE-40**

Mounting rails: 542020-02KIT

2. **Select compressor voltage** required and add the corresponding suffix it to the model number,

Bitzer replacement: 6GE-40-**2NU**

- 230V/3/60Hz: “-**2NU**” (Standard)
- 380V/3/60Hz: “-**3PU**”
- 460V/3/60Hz: “-**2NU**” (Standard)
- 460V/3/60Hz - “-**4PU**” (Part Winding Start)
- 575V/3/60Hz: “-**5PU**”

3. If **unloading** is required, add the suffix to the model number.

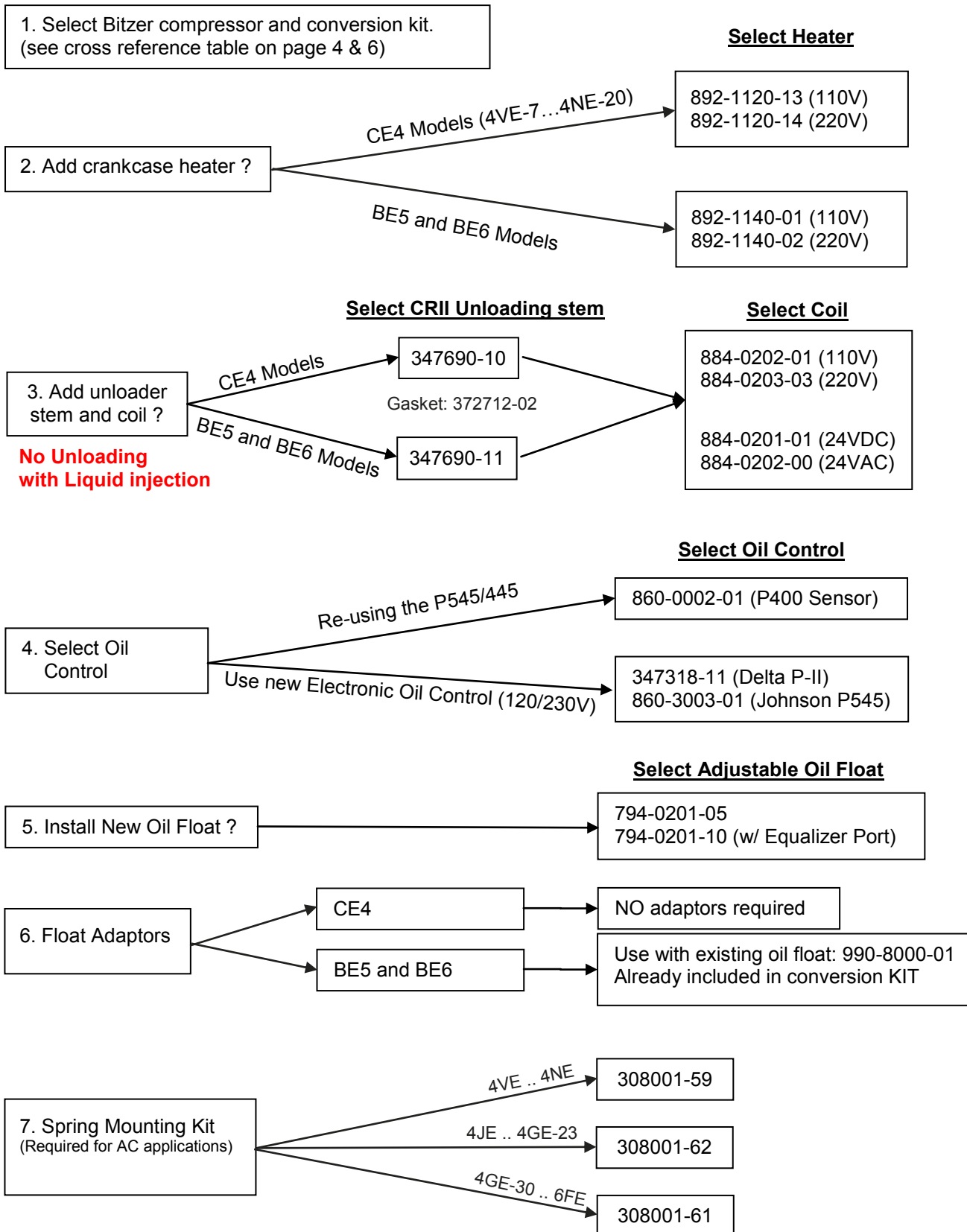
Note: No unloading with Low Temp R22 applications.

Bitzer replacement: 6GE-40-2NU-**1D**

- No unloader: “-**0D**”
- One unloader: “-**1D**”
- Two unloaders (only applicable to 6-cylinder models): “-**2D**”

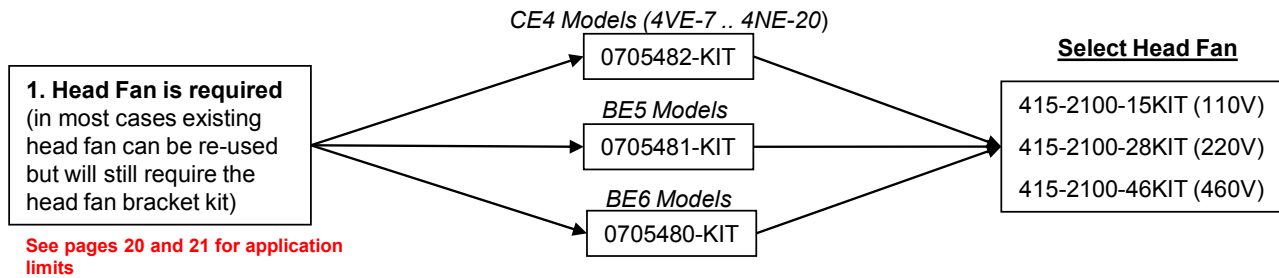


Selecting the Bitzer Compressor and Accessories



Additional Selections for Low Temp R22 Applications

Select Head Fan Bracket



2. Select a desuperheating method from the two options below (Valid for CE4, BE5 and BE6 models only):

A. CIC-System – Bitzer’s electronically controlled liquid injection system

347702-16 (4VE(S)-7 .. 4NE(S)-20)
347702-03 (4JE-15 / 4HE-18)
347702-04 (4GE-23)
347702-09 (6JE-25 / 6HE-28 / 6GE-34)
347702-10 (6FE-44)

- The standard CIC module is 220V. For a 115V module add “-115” to the end of the part number.
- All kits come with a 220V 50/60Hz coil.

B. Sporlan Y1037 Valve

Select appropriate size based on chart:

873-0407-13 (1/3 Ton, 240°F)
873-0109-05 (1/2 Ton, 240°F)
873-0109-11 (1 Ton, 240°F)
873-0109-15 (1-1/2 Ton, 240°F)
873-0109-12 (2 Ton, 240°F)
873-0109-03 (3 Ton, 240°F)
873-0109-04 (5 Ton, 240°F)

Temperature Responsive Expansion Valve - Y1037 - Sizing Chart (Tons)

SST (Evap Temp)	-10F		-20F		-30F	
	20F	40F	20F	40F	20F	40F
4VE(S)-7	1/3	1/3	1/2	1/2	1/2	1/2
4TE(S)-9	1/3	1/2	1/2	1/2	1/2	1/2
4PE(S)-12	1/3	1/2	1/2	1	1/2	1
4NE(S)-14	1/3	1/2	1/2	1	1/2	1
4JE-15	1/2	1/2	1/2	1	1	1
4HE-18	1/2	1	1	1	1	1
4GE-23	1/2	1	1	1	1	1 1/2
6JE-25	1/2	1	1	1 1/2	1 1/2	1 1/2
6HE-28	1/2	1	1	1 1/2	1 1/2	1 1/2
6GE-34	1	1 1/2	1 1/2	2	1 1/2	2
6FE-44	1 1/2	2	2	3	2	3

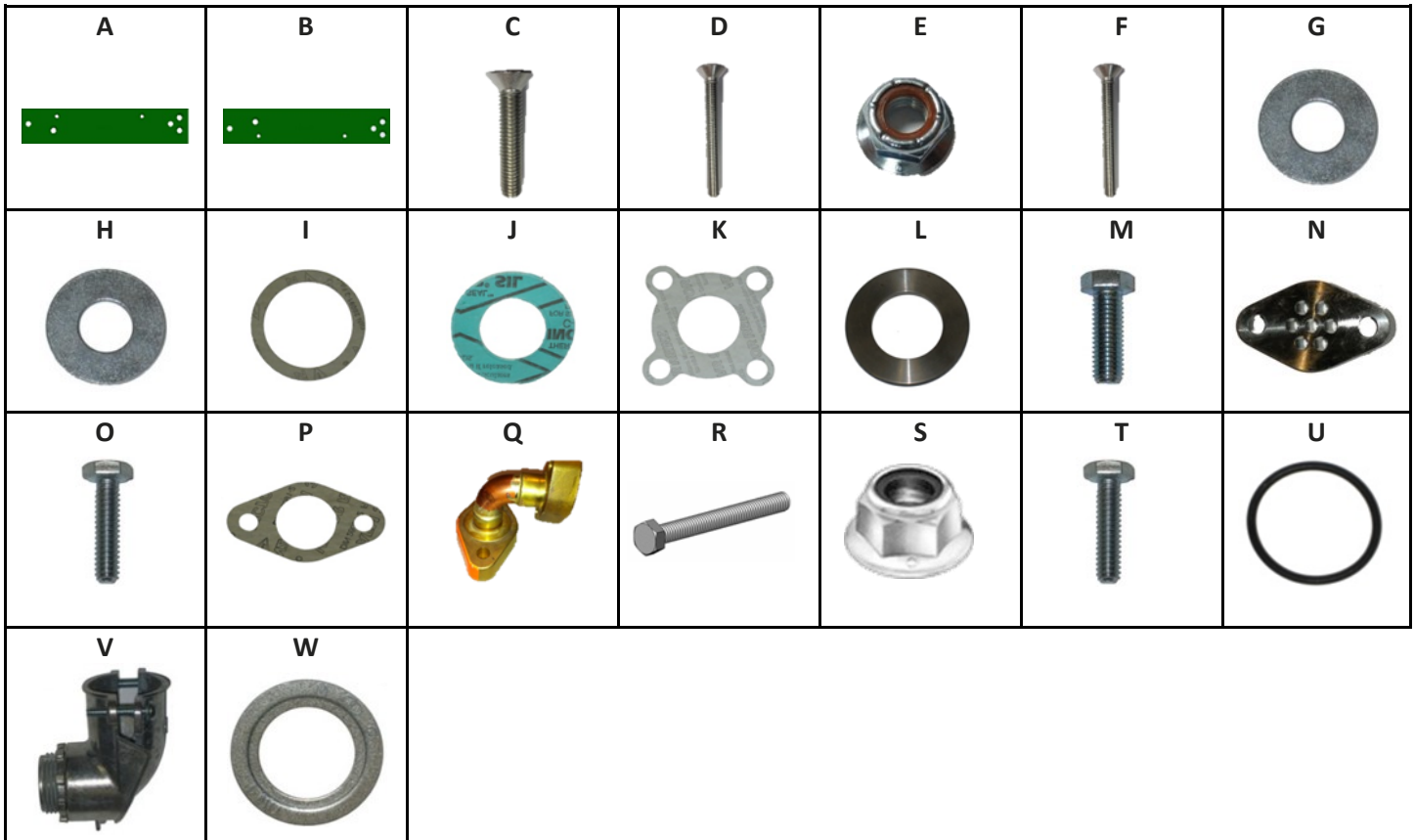
Saturated Condensing / Liquid Temp = 110°F

3. Optional Discharge Gas Temp Sensor: 347023-03 (not required with CIC-System)

Note: Oil Cooling is not needed!



Installation Instructions Replacing Copeland 06D with Bitzer CE4



PARTS NOT TO SCALE

BOM for Conversion Kit 542020-01KIT

ITEM	QTY	PART #	DESCRIPTION	ITEM	QTY	PART #	DESCRIPTION
<u>Mounting Parts</u>				<u>Discharge Valve Parts</u>			
A	1	542020-11	Mounting Rail Right	N	2	367015-21	Discharge Valve Baffle Spacer
B	1	542020-12	Mounting Rail Left	O	2	380056-03	HCC Screw M10 x 60mm
C	4	900-0008-31	SS FH Sckt Cap Screw 3/16"-16 x 2"	P	3	372704-01	Discharge Flange Gasket
D	4	900-0008-32	SS FH Sckt Cap Screw 3/16"-16 x 2.5"	Q	1	930-0007-01	Discharge Elbow w/Gasket
E	4	900-0008-34	Hex Flange Locknut 3/8"-16	R	2	380055-15	Hex Head Screw 5/16"-18 x 3"
F*	4	900-0008-33	SS FH Sckt Cap Screw 3/16"-16 x 3.5"	S	2	900-0008-35	Locknut 5/16"-18
G	16	901-0108-01	7/16" Flat Washer (Zinc)	T	2	380056-21	HHC Screw M10 x 50mm
H	8	901-0106-00	3/8" Flat Washer, USS/W 1"	<u>Oil Float Parts</u>			
<u>Suction Valve Parts</u>				U	1	372003-39	O-Ring (4VE..4NE sightglass)
I	2	372301-02	Suction Gasket (for Strainer)	<u>Electrical Parts</u>			
J	1	542010-13	Spacer Gasket (ID 37mm)	V	1	827-1100-02	1" 90° Conduit Elbow Fitting
K	1	542020-10	Gasket for Carlyle Valve	W	1	937-0611-00	1 1/4" x 1" Reducer Washer
L	1	930-1944-02	5mm Suction Spacer (CE4)				
M	4	900-0112-60	Hex Zinc Bolt M12 x 60				

* For use with Spring Mounting Kit

Tools Needed

1. 8 & 10mm Allen wrench (hex bit)
2. 17 mm open ended / box wrench
3. 10 mm open ended / box wrench
4. 7/16" open ended / box wrench
5. 9/16" open ended / box wrench
6. 3/4" open ended / box wrench
7. Refrigeration service valve wrench
8. Razor knife
9. Phillips head screwdriver
10. Flathead screwdriver
11. 10mm nutdriver
11. Large channel lock pliers (QTY 2)
12. Hammer
13. 10" adjustable wrench
14. Wire cutters & strippers
15. Multimeter
16. Adjustable Torque Wrench (recommended)
17. Power drill (optional)
18. Knockout set (optional)

It is also recommended to bring extra 1" conduit and fittings if possible. Depending on the system or control device changes, it may be necessary to lengthen a run of conduit and/or create a new conduit line from the control box to the compressor. A knockout set may make it easier to create a larger hole in the terminal box if necessary. Also, a power drill may help to reuse existing brackets by drilling out holes.

Please be aware that while this list should account for most of the tools that are needed, variations in the system could require additional tools. Most metric sizes can be swapped for the English equivalent without any issues. In some cases, using a socket may be preferable over a wrench.

Removing the Carlyle Compressor

1. Turn off control power and main power to the compressor. Check both the control circuit and the main power from the compressor breaker with a multimeter to ensure the power has been disconnected.

 **DANGER OF ELECTROCUTION!!!**

2. Disconnect and remove all wires from the compressor terminal box.

NOTE: Tag control wires for identification to the controls. (See the wiring appendix for wiring instructions for most conversions).

3. Close suction and discharge valves. If there is an additional valve in the discharge piping (downstream), close that valve instead of the compressor valve. Close oil supply line and any equalizing lines. Evacuate refrigerant from compressor using approved recovery methods.

 **WARNING! COMPRESSOR UNDER PRESSURE WITH CHEMICALS**

4. Disconnect the discharge valve or piping from the head of the compressor. This pipe will interfere with the BITZER compressor and will eventually need to be pushed or cut out of the way.
5. Disconnect the suction valve.
6. Remove all components that are attached to or obstructing the removal of the compressor such as head fans, oil failure, high and low pressure controls.
7. Remove the compressor.
8. Remove all fittings that will be required for installation of the BITZER compressor using 7/16" and 9/16" wrenches. See pages 23 for a list of ports on the compressor.



9. Remove oil float by tilting the compressor away from the oil sight glass.

Install a Carlyle sight glass if possible (do not remove the sightglass from float) to prevent oil from draining out. If the sight glass is not available, drain oil prior to removing oil float.

Figure 2.1

Installing the Bitzer CE4 Compressor

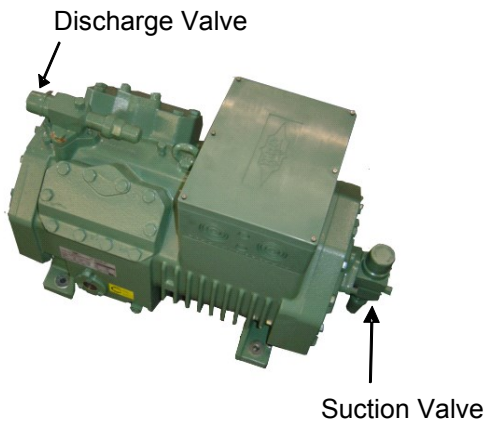


Figure 2.2



⚠ WARNING! Compressor is under pressure.

1. Relieve pressure from compressor by opening the service valves ports.

!ATTENTION! Wherever possible, minimize time compressor is open to ambient.

2. Remove the discharge and suction valves. (17 mm and 8 mm hex bit).

IMPORANT: Do not knock-out electrical holes in the compressor terminal box at this time. Leave terminal box cover in place. Refer to electrical connection section of manual.

3. When either an oil float regulator or Trax oil is required, install prior to putting compressor in place only if frame and piping allow it.

If the compressor is not free of oil, tilt compressor away from sight glass (prop up with a 4X4). Remove sight glass and install the oil float using Bitzer sightglass bolts, 10mm wrench and a new o-ring (U).



Figure 2.3



4. Install all the required fittings removed from the old compressor. See pages 23 for Bitzer fitting locations.

5. Suction Valve Adapter Configuration:

4 Bolt Bitzer to 4 Bolt Carlyle

5a. The BITZER compressor must have an endbell with a 4 bolt suction valve well. The 4PE-15 and 4NE-20 have this standard. All other CE4 compressors have an endbell that uses a 2 bolt suction valve. This endbell can be replaced by obtaining the kit 305236-01-KIT. This kit includes the endbell, gasket and bolts. Torque the bolts in two step (50% and 100%) to 80 Nm (60 ft-lb). Please be sure to return the original endbell for credit using the original packaging and label provided.

5b. Replace both gaskets (I) above and below suction strainer using a small amount of oil.

Note: If any exposed hardware is not zinc or painted, apply a small amount of grease to top of bolts to prevent rust.

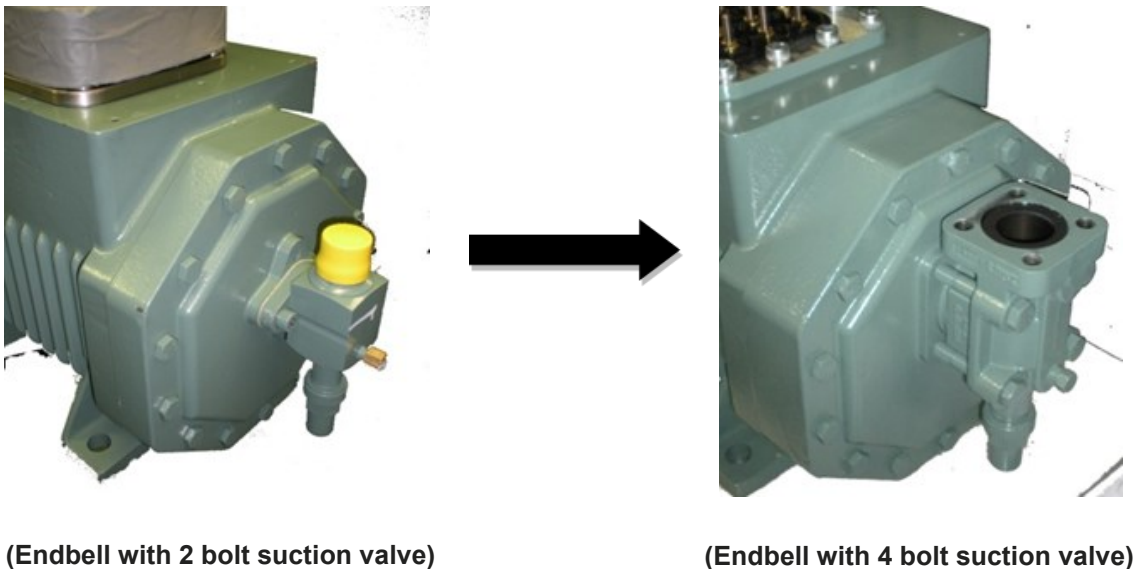


Figure 2.5

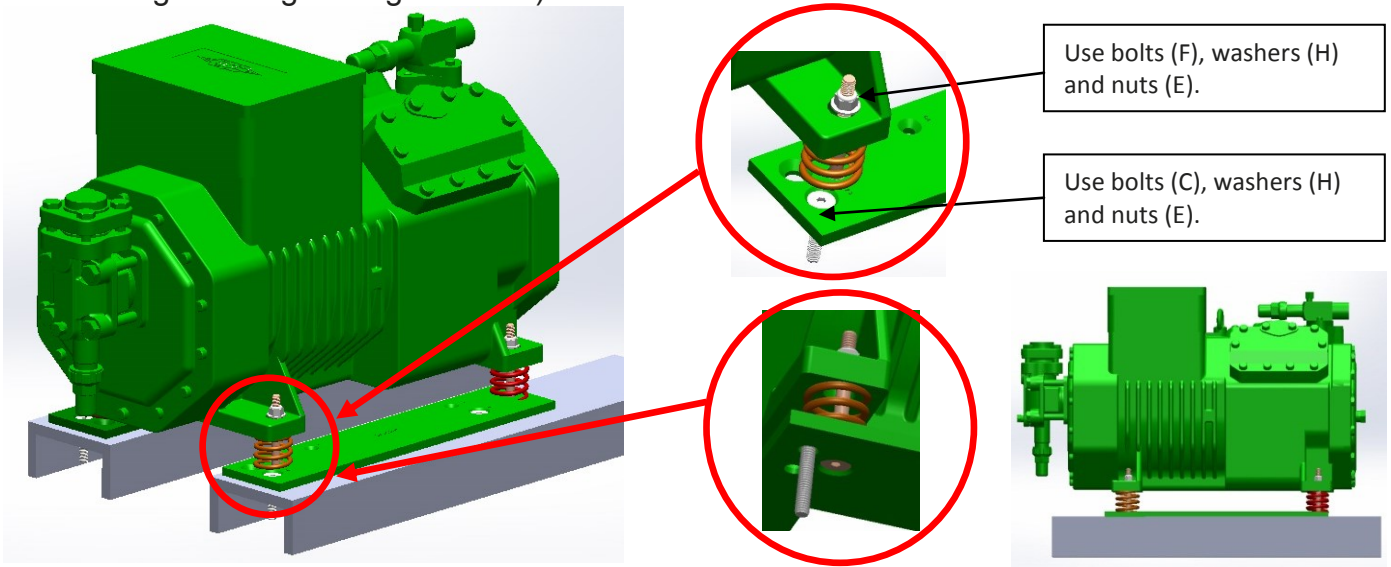
Mounting the BITZER Compressor

⚠ CAUTION! Compressor is extremely heavy.

Place the compressor bolts into the countersunk holes before laying the rail down to mount to original holes.

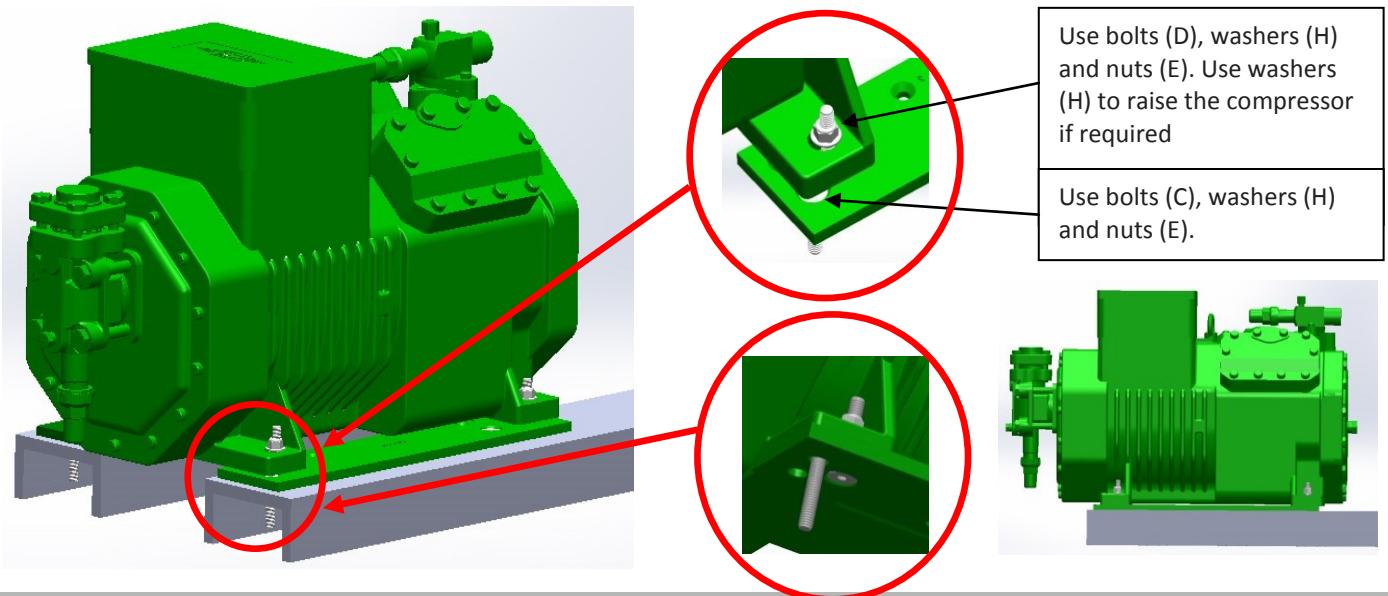
a. A/C Applications – mounting the compressor on springs.

Mount the rails on top of the original compressor holes. Install the springs and compressor. (Note: Compressor bolts will need to be held in place with pliers or an appropriate tool to keep from rotating when tightening the nuts.)



b. Parallel Applications - do NOT mount the compressor on springs

Mount the rails on top of the original holes. Note: If required use 8 washers (G), placed between the compressor and the rails (2 at each leg), to raise the compressor to meet the suction and discharge valve location. (Note: Compressor bolts will need to be held in place with pliers or an appropriate tool to keep from rotating when tightening the nuts.)



Connecting the BITZER CE4 Compressor

1. Suction Valve installation

Place one large round gasket (J) in the adapter hole. Insert the metal spacer (L).

Place the four bolts provided (M) through the suction valve and gasket (K) so that the gasket is held in place.

Using a 3/4" wrench, tighten the suction valve evenly to the end bell (approx. 65 ft-lb).



2a. Discharge Valve Option1

(Does NOT require pump down. Requires vibration eliminators on discharge line and installing discharge elbow to mount to existing Carlyle valve.)

Use parts (N) – (T) to install the elbow (Q). Torque the elbow to the compressor body to 60 lbf-ft (80 Nm). Connect the elbow to the Carlyle discharge valve using bolts (R) and (S).



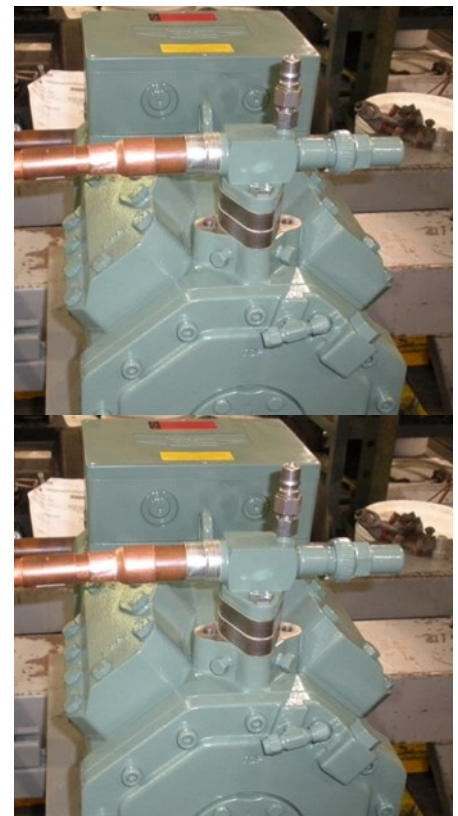
2a. Discharge Valve Option2

(Requires pump down of discharge manifold and brazing of existing pipe to new valve.)

Install spacers (N) to raise the discharge valve of the BITZER compressor: Determine proper orientation of the valve so that the piping will be pointing in the direction of the existing piping. Use three gaskets (P) with two spacers (N) placed between the compressor body and valve. Apply a small amount of oil to the gaskets. Install the two longer bolts (O) provided and torque to 40 ft-lb. (8mm hex bit).

The Carlyle discharge valve (or adapter that mounts to the head) must be removed if not already. The remaining pipe that is hanging should be in line with the BITZER valve.

You may need to provide a coupling or reducer and then sweat to the existing pipe to the BITZER valve. (In some cases it may be necessary step up or down from 7/8" OD to 1-1/8" OD copper tubing).

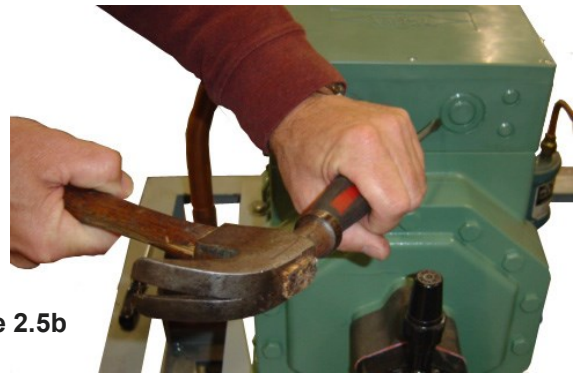
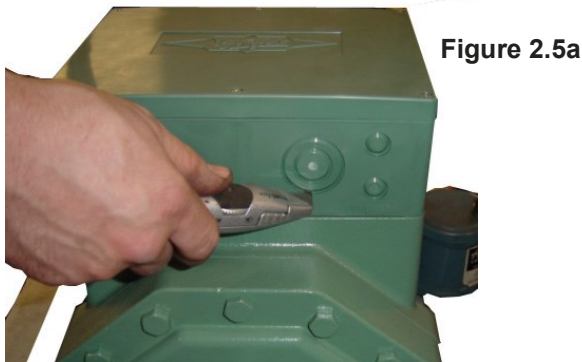


3. Oil Line

After mounting, the oil float should be in the same location compared to when it was attached to the Carlyle. Reattach the oil and equalization pipes.

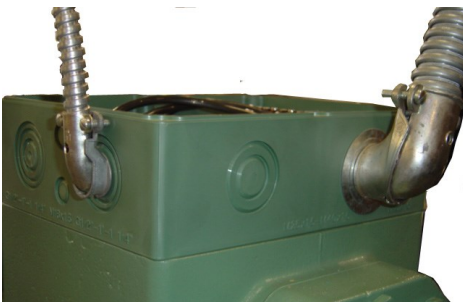


4. Connect all remaining lines and controls to the compressor. Check for leaks at all connection points.



IMPORTANT : DO NOT REMOVE TERMINAL BOX COVER UNTIL ALL HOLES ARE KNOCKED OUT.

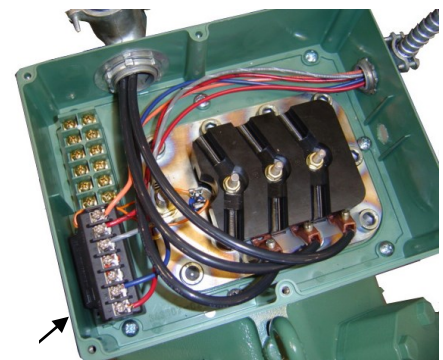
- Use a razor to scribe around the electrical knock-outs that will be used for connecting electrical flex (See Figure 2.5a). Using a hammer and screw driver, tap around the scribed area to carefully knock out the hole. (See Figure 2.5b)



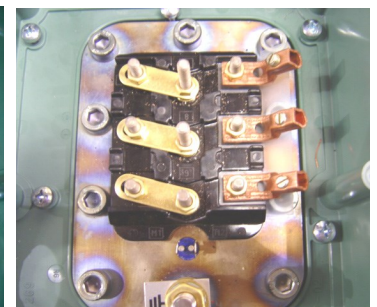
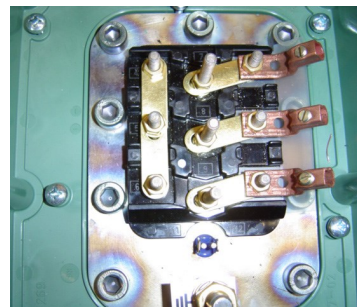
- Remove the terminal box cover. Connect all electrical flex to the terminal box. A 1" X 90° connector (D) has been provided to assist if necessary with the installation.

If the hole is oversized for the connector, use the reducer washers (E) with the 1" connector.

- Remove the (3) 10 mm nuts holding down the plastic terminal cover (10mm nutdriver). Remove cover and install the jumper bars to correspond to your system voltage (See Figures 2.16a and 2.16b). Install the wire lugs (I) on the terminals marked L1, L2, & L3. Replace the terminal cover. Refer to label inside of terminal box for more detail and other voltages.



- Connect the three phase wires to the terminal lugs and tighten with a flathead screwdriver. Connect the two thermistor wires to spade connectors on the compressor terminal plate.
- Please see wiring appendix for further instructions.



Mechanical or Electronic Oil Protection (For pump models only. Does not apply to S models)

1. If the Copeland compressor has a mechanical oil safety control, this control can be used with a Bitzer compressor with an oil pump.
2. When using the Johnson electronic control P545-NCB25 the electronic sensor is connected as shown in Figure 2.19. If reusing the Sentronic ask for the P400 oil lube sensor PN 860-0002-01 and connect the Sentronic harness to the P400. For older versions of the Sentronic, use the new harness and wire directly into the Sentronic.

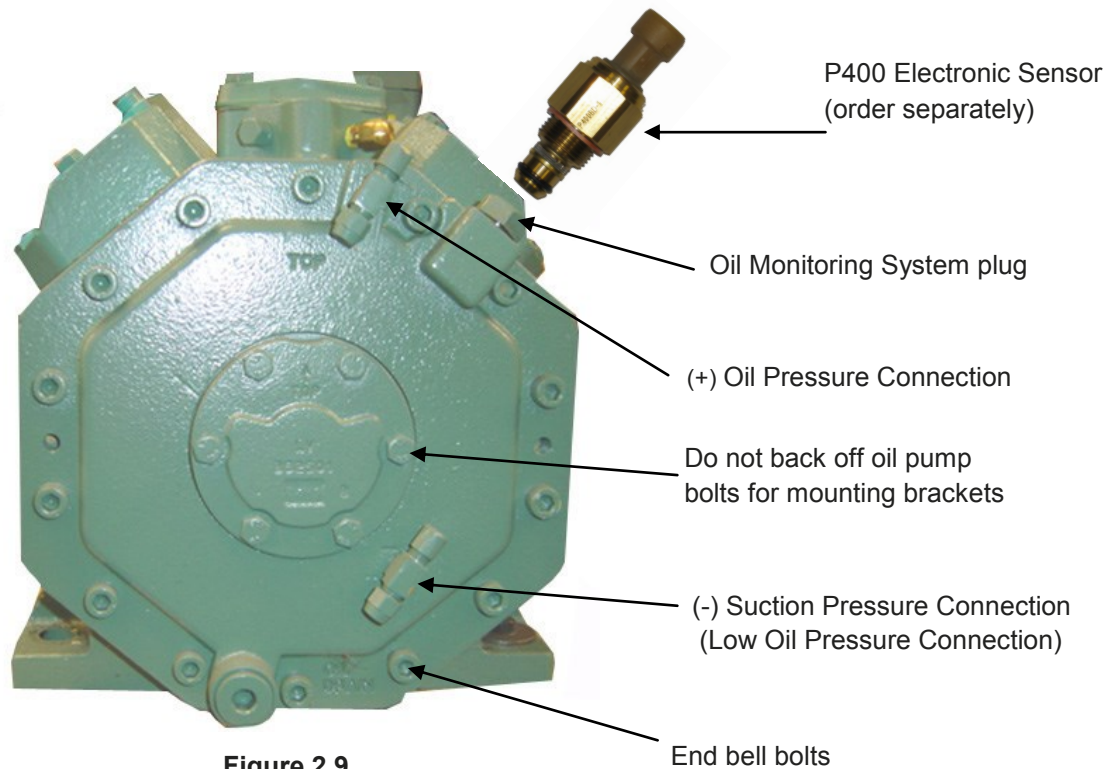


Figure 2.9

3. Mechanical oil safety control connects to the (+)(-) fittings shown in Figure 2.19.
4. High pressure oil is connected to the ¼" SAE marked "+" and the suction is connected to the fitting marked "-".
5. Extension bolts (V) and nuts (W) have been included in the kit to help mount the oil safety controls. Remove a bolt from a cylinder head and replace with an extension bolt. (Torque to 60ft lb). Drill out hole on old mounting bracket and tighten to extension bolt using the M10 nut (W) provided. (Preferred method over using end bell bolts – Do not use oil pump bolts)
6. Refer to the wiring appendix for diagrams for the electrical connections.

Installing Head Cooling Fans (when required)

1. See the below charts for application limits and when head fans are recommended for R22 and R404A. No unloading/capacity regulation with Low Temp R22 applications.

Motor 1 is a high temp motor.

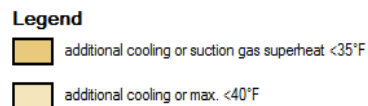
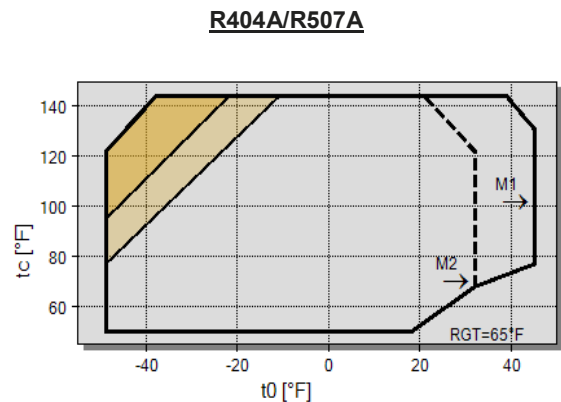
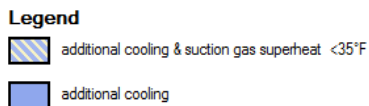
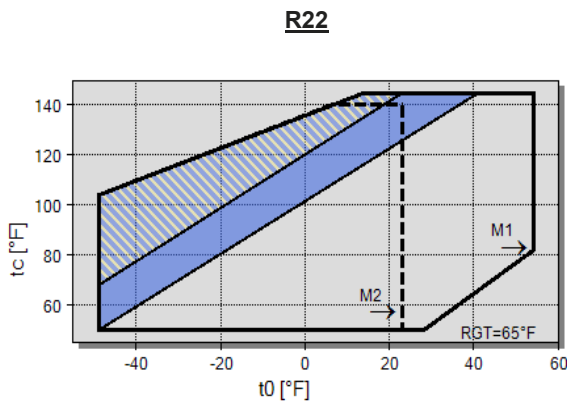


Figure 2.10- Cub 2 Head Fan

2. If the Carlyle compressor has a Cub 2 head cooling fan mounted on the compressor, this fan can also be used with a new bracket as illustrated in Figure 2.10. **Requires Bracket # 0705482 with adapter plate provided with the previous bracket.**
3. Wiring the fan will stay the same as previous compressor.

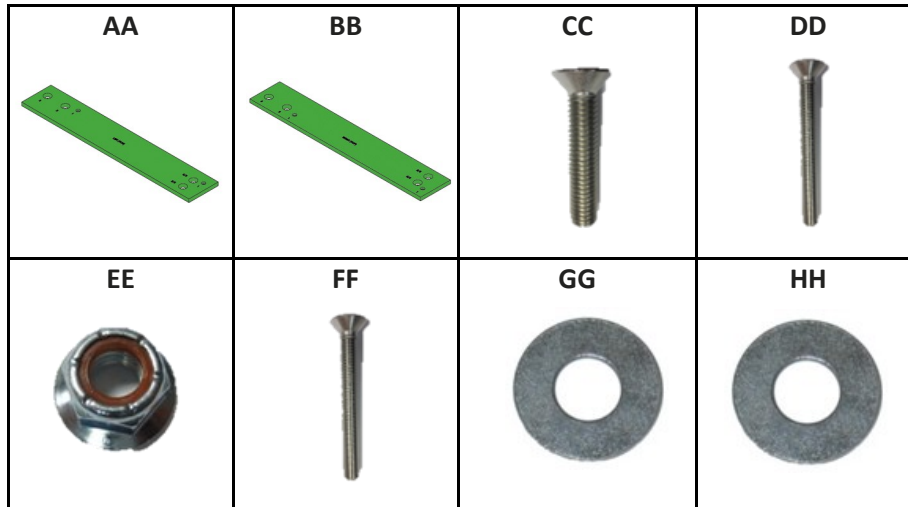
Capacity Control

100%



BOM for Mounting Rail Kits for 06E to Bitzer Conversion

There is no direct drop in kit available. Re-piping will need to be done.



PARTS NOT TO SCALE

BOM for Conversion Kit 542020-02KIT			
<u>ITEM</u>	<u>QTY</u>	<u>PART #</u>	<u>DESCRIPTION</u>
<u>Mounting Parts</u>			
AA	1	542020-13	Mounting Rail Left
BB	2	542020-14	Mounting Rail Right
CC	4	900-0008-31	SS FH Sckt Cap Screw 3/16"-16 x 2"
DD	4	900-0008-32	SS FH Sckt Cap Screw 3/16"-16 x 2.5"
EE	4	900-0008-34	Hex Flange Locknut 3/8"-16
FF	4	900-0008-33	SS FH Sckt Cap Screw 3/16"-16 x 3.5"
GG	16	901-0108-01	7/16" Flat Washer (Zinc)
HH	8	901-0106-00	3/8" Flat Washer, USS/W 1"



Installing Head Cooling Fans (when required)

1. See the below charts for application limits and when head fans are recommended for R22 and R404A (Note the capacity regulation). Motor 1 is a high temp motor.
2. Install head fan bracket on the 4 inner head bolts per figure 3.1. Mount the existing fan to the bracket (**Part #: 0705480**) using the 3 screws provided with the existing fan.
3. Wiring the fan will stay the same as the previous compressor.

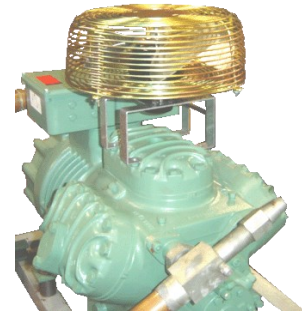
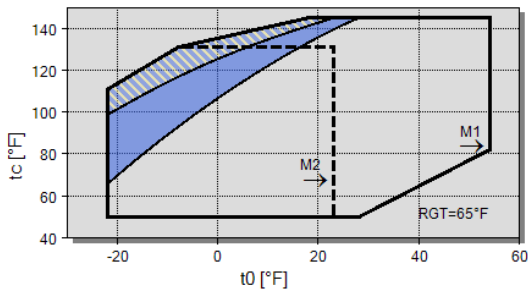


Figure 3.1

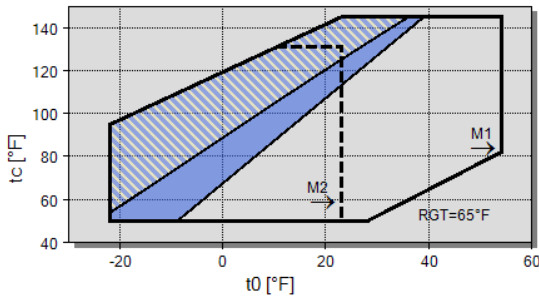
BE5

R22

100%



50%

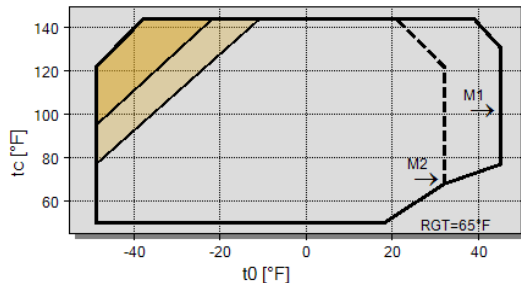


Legend

- additional cooling & suction gas superheat <20°F
- additional cooling

BE5/BE6

R404A/R507A



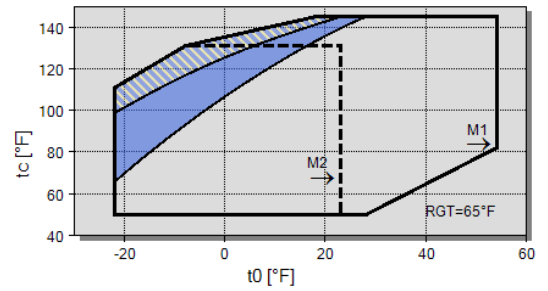
Legend

- additional cooling or suction gas superheat <35°F
- additional cooling or max. <40°F

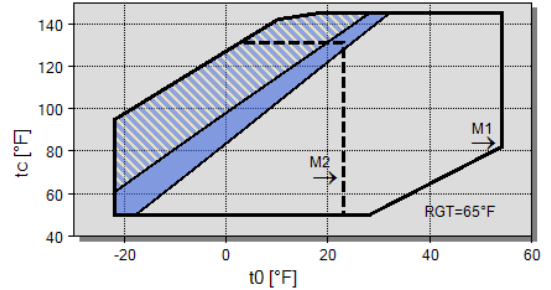
BE6

R22

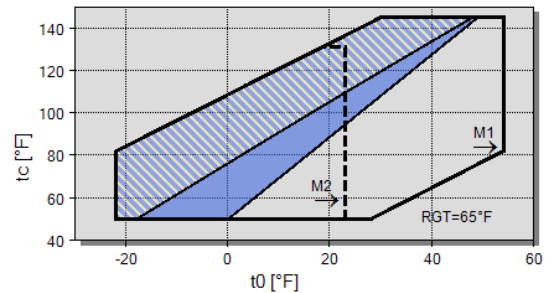
100%



66%



33%



Legend

- additional cooling & suction gas superheat <20°F
- additional cooling

Mechanical or Electronic Oil Protection

BE5 and BE6 Compressors

1. If the Carlyle compressor has a mechanical oil safety control, this control can be used with a Bitzer compressor with an oil pump.
2. When using the Johnson electronic control P545-NCB25 the electronic sensor is connected as shown in Figure 3.2.

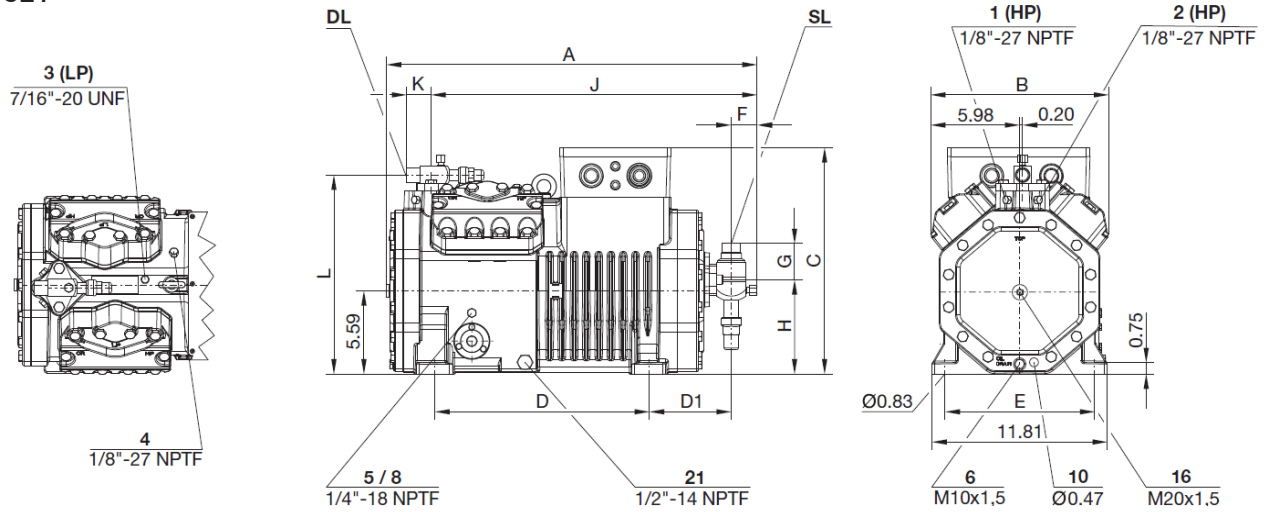


Figure 3.2

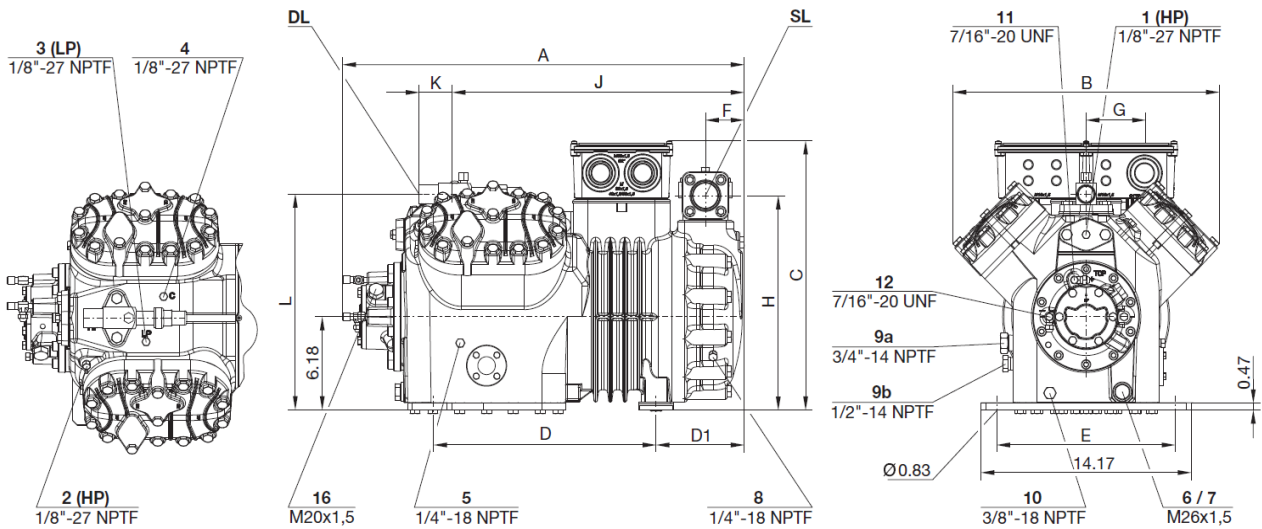
3. Mechanical oil safety control connects to the (+)(-) fittings shown in figure 4.15.
4. High pressure oil is connected to the 1/4"SAE marked "+" and the suction is connected to the fitting marked "-".
5. Refer to the wiring appendix for diagrams for the electrical connections.

NEW ECOLINE Dimensions and Port Locations

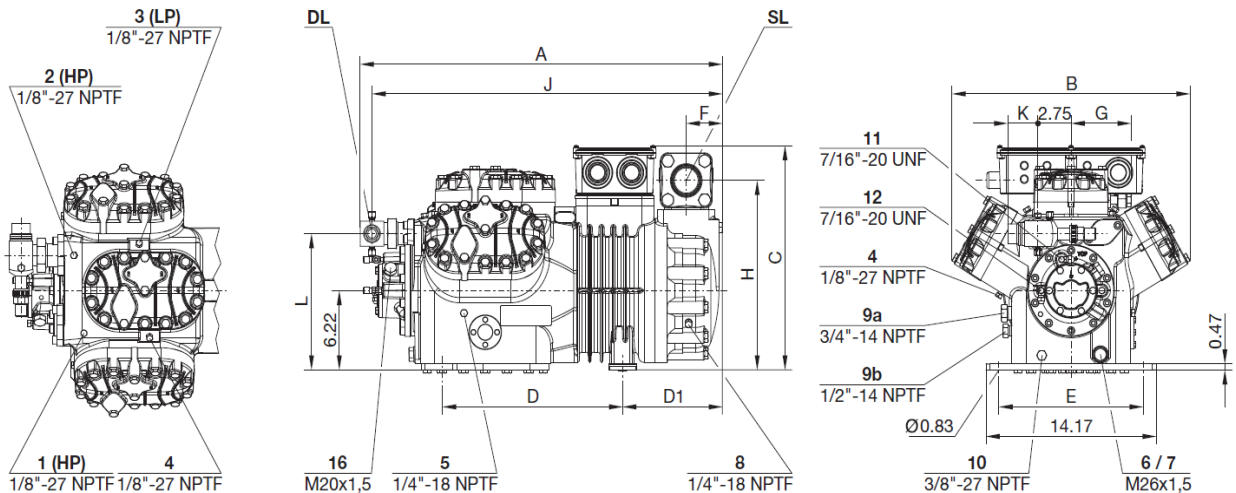
CE4



BE5



BE6





NEW ECOLINE Dimensions

Compressor	A	B	C	D	D1	E	F	G	H	J	K	L				
4VE(S)-7	24.92	11.93	15.16	14.45	5.51	10.08	1.73	2.20	6.34	21.97	2.21	13.46				
4VE(S)-10								21.93								
4TE(S)-9								25.91		22.91						
4TE(S)-12										21.93						
4PE(S)-12								24.92		6.38			1.89	4.33	6.81	22.91
4PE(S)-15								25.91		5.51			1.73	2.52	6.34	21.93
4NE(S)-14								24.92		6.38			1.89	4.33	6.81	22.91
4NE(S)-20								25.91								
4JE-15	27.09	17.95	18.50	15.00	5.94	12.01	2.60	4.33	14.21	19.72	2.21	14.25				
4JE-22										21.61						
4HE-18										20.43						
4HE-25										29.02			7.87	3.43	2.99	21.61
4GE-23										27.80			6.65			
4GE-30										29.02			7.87	3.43	29.13	
4FE-28																30.35
4FE-30																
6JE-25	30.16	19.80	18.50	15.00	8.31	12.01	2.99	5.00	14.84	29.13	2.52	10.67				
6JE-33	31.38									30.35						
6HE-28	30.16									8.31			2.99	29.13		
6HE-35	31.38									9.53			3.43	30.35		
6GE-34	30.16									8.31			2.99	29.13		
6GE-44	31.10									9.53			3.43	30.35		
6FE-44															28.71	
6FE-50																
6FE-50																

Port Locations

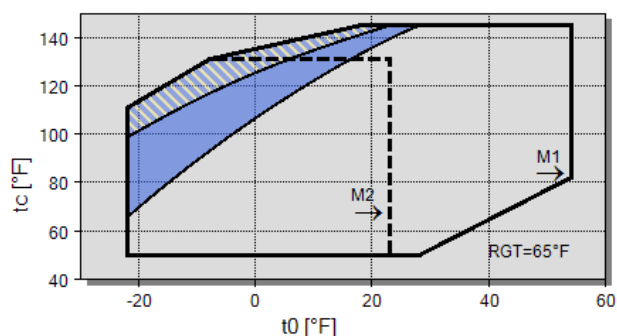
1	High pressure connection (HP)	9a	Gas equalization (parallel operation)
2	Discharge gas temp sensor (HP) or LI sensor	9b	Oil equalization (parallel operation)
3	Low pressure connection (LP)	10	Crankcase heater
4	Liquid Injection spray nozzle (LP)	11	High pressure oil connection (7/16" - 20 UNF)
5	Oil fill plug	12	Low pressure oil connection (7/16" - 20 UNF)
6	Oil drain (magnetic screw)	16	Connection for oil monitoring (M20 Thread)
7	Oil filter	21	Connection for oil service valve
8	Oil return (oil separator)		



R22 LOW TEMP APPLICATIONS

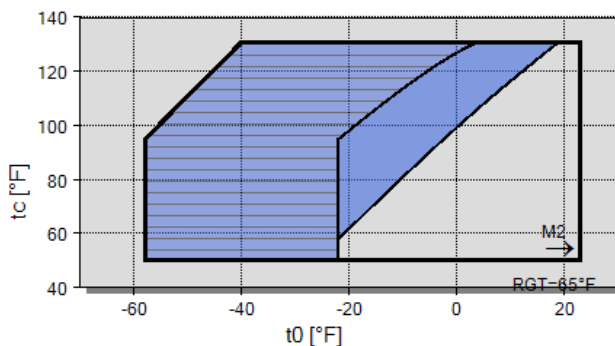
The use of R22 as a low temp application can place a high demand on the compressor and lubricant. Discharge gas temperatures can reach very high values not sustainable by the compressor. It is necessary to cool the return gas to ensure the performance of the compressor will prevail. Regardless of how this is achieved, a discharge hi-temp safety device should be used as a secondary preventive measure for protecting the compressor.

The yellow and green areas below indicate the application limits that require additional cooling (note head fan, superheat settings, and liquid injection areas). For other applications, use the BITZER software (free download from www.BITZERUS.com).



Legend

- additional cooling & suction gas superheat <35°F
- additional cooling



Legend

- additional cooling & CIC
- additional cooling

Motor 1 refers to High Temp compressors versus Motor 2 which indicates the Low temp versions.

Three options for de-superheating are available:

1. Using the CIC-System

The Bitzer CIC system is a reliable electronically controlled refrigerant injection device for limiting the temperature of 4 and 6 cylinder single stage reciprocating compressors operating in low temperature systems with R22. Please refer KT-130 for detailed information and installation instructions).

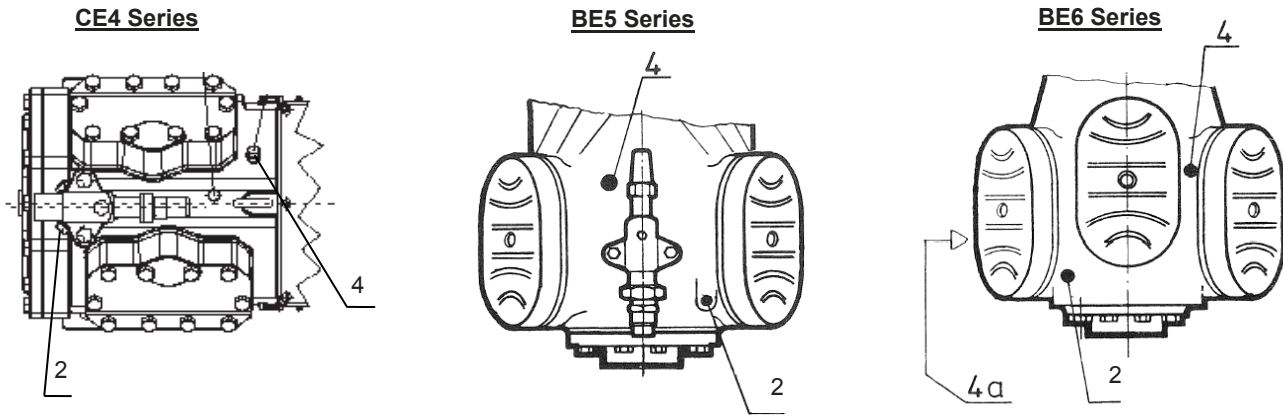
2. Using a Temperature Responsive Expansion Valve

The Sporlan TREV (Y1037) valves are available from various refrigeration wholesalers and have a variety of set points. Valves suitable for BITZER compressors are also available directly through BITZER US. These valves regulate the discharge gas temperature to 240°F. Most valves have 3/8" SAE connections and the bulb sensor is 5 feet long. The only exception is the 1/3 ton valve which has 3/8 sweat connection and a 30 inch long sensor. See the chart on page 10 for valve sizes and part numbers.

BITZER recommends injecting into the low pressure port of the compressor after the motor. These ports are shown in the figure below as port 4. For 6 cylinder compressors, install a manifold to the high pressure (bottom) side of the left head so that it has two injection ports (4 and 4a).

Be sure to install the TREV bulb 4-8 inches away from the discharge valve and properly insulate it to prevent influence from the ambient and head fan air.

It is also recommended to install a solenoid valve before the Y-1037 to ensure the liquid feed is off when the compressor is off.



Installing a Discharge Temperature Sensor

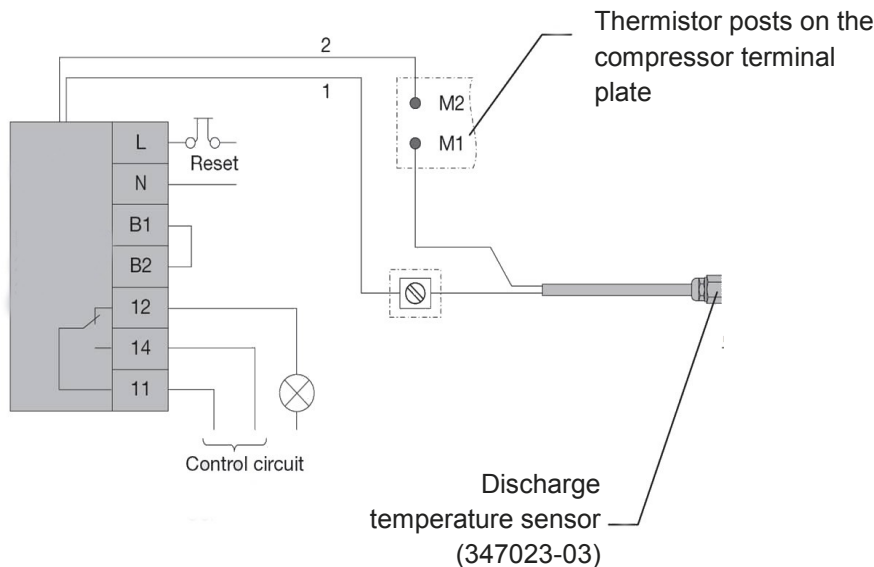
As an additional step to protect compressors from damage, the use of a discharge temperature sensor as a secondary backup safety is recommended. This safety has proved especially useful when using R22 in low temp applications, even when an injection device is in place to cool the return gas.

BITZER offers a discharge temperature sensor (part # 347023-03) that will open the SE-B INT module at 140°C / 284°F.

To Use:

Apply Teflon tape sealant to the threads of the sensor and install into port 2 (see figure above). The sensor must not be installed further downstream (e.g. discharge piping) due to the ability of the gas to lose heat quickly. This would allow the temperature in the head to reach unsafe temperatures.

Wire the sensor according to this diagram:

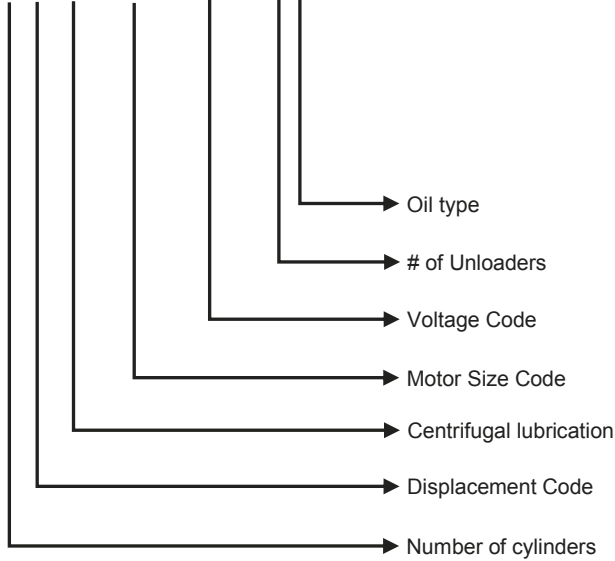




Nomenclature (Current vs Previous)

BITZER

4NES - 14 - 2NU - 1Y



Note: The suffix (e.g. "-1Y") is used for ordering and shipping purposes but is not displayed on the data tag (nameplate) of the compressor.

CARLYLE

06DR 3 37 0 D A 36 7 A - (RP)**

- Compressor Type:**
- 06DA = Compressor — A/C Duty No Unloading
 - 06DB = Compressor — A/C Duty 1-Step Elec. } Hot Gas Bypass Unloading
 - 06DC = Compressor — A/C Duty 2-Step Elec. }
 - 06DD = Compressor — A/C Duty 1-Step Press. } Suction Cut-Off Unloading
 - 06DE = Compressor — A/C Duty 2-Step Press. }
 - 06DF = Compressor — A/C Duty 1-Step Elec. }
 - 06DG = Compressor — A/C Duty 2-Step Elec. }
 - 06DH = Compressor — A/C Duty 1-Step Press. }
 - 06DJ = Compressor — A/C Duty 2-Step Press. }
 - 06DM = Compressor Refrig. Duty Medium Temperature
 - 06DR = Compressor Refrig. Duty Low Temperature
 - 06DM = Service Compressor — Replacement for new 06DA, DM without Unloading
 - 06DS = Service Compressor — Replacement for new 06DF, G, H and J with suction cut-off unloading. Compressor has 1-stage suction cut-off unloading
 - 06DX = Service Compressor — Replacement for new 06DB, C, D, and E with hot gas (bypass) unloading. Compressor has 1-stage of bypass unloading

Motor Size — (Does Not Signify Horsepower)

- Model = 0, Package = 1 or 9, A = Shipped Without Oil
- Suction Cut-Off Unloading Designation for 06DR, DM Compressors:
 - 0 = All Models Except as Noted
 - 5 = No Oil
 - 7 = 1 Unloader, Suction Cutoff, Oil-less (DR, DM Only)
 - 8 = 2 Unloaders
- Electrical Characteristics (XL Start Only, Unless Noted):

High Efficiency Models	Standard Efficiency Models
31 = 575-3-60	01 = 575-3-60
32 = 208/230-3-60	04 = 200-3-60
33 = 208/230-1-60	05 = 230-3-60
34 = 220-3-50	06 = 400/460-3-50/60
36 = 400/460-3-50/60	08 = 220-3-50
	12 = 208/230-3-60
	13 = 380-3-60
	14 = 200-3-60 (PW)
	15 = 230-3-60 (PW)
	18 = 220-3-50 (PW)
- Electrical Variables:
 - A = With Internal Thermostat and External Overloads
 - C = With Internal Thermostat and Without External Overloads
- Suction Service Valve — Variables:
 - Location, Orientation and Mounting Bolts
- Compressor Identification Key:
 - 0 = New Compressor
 - 2 = New Compressor
 - 3 = New Compressor
 - 6 = Service Compressor, Remanufactured
 - 7 = Service Compressor, New Manufactured
 - 8 = New Compressor, Special
 - 9 = Service Compressor, Special
- Displacement (CFM at 1750 rpm)

**Refrigeration Partner - Only authorized CCRP members have access to these compressor models.

06EB 3 99 3 0 A - (RP)**

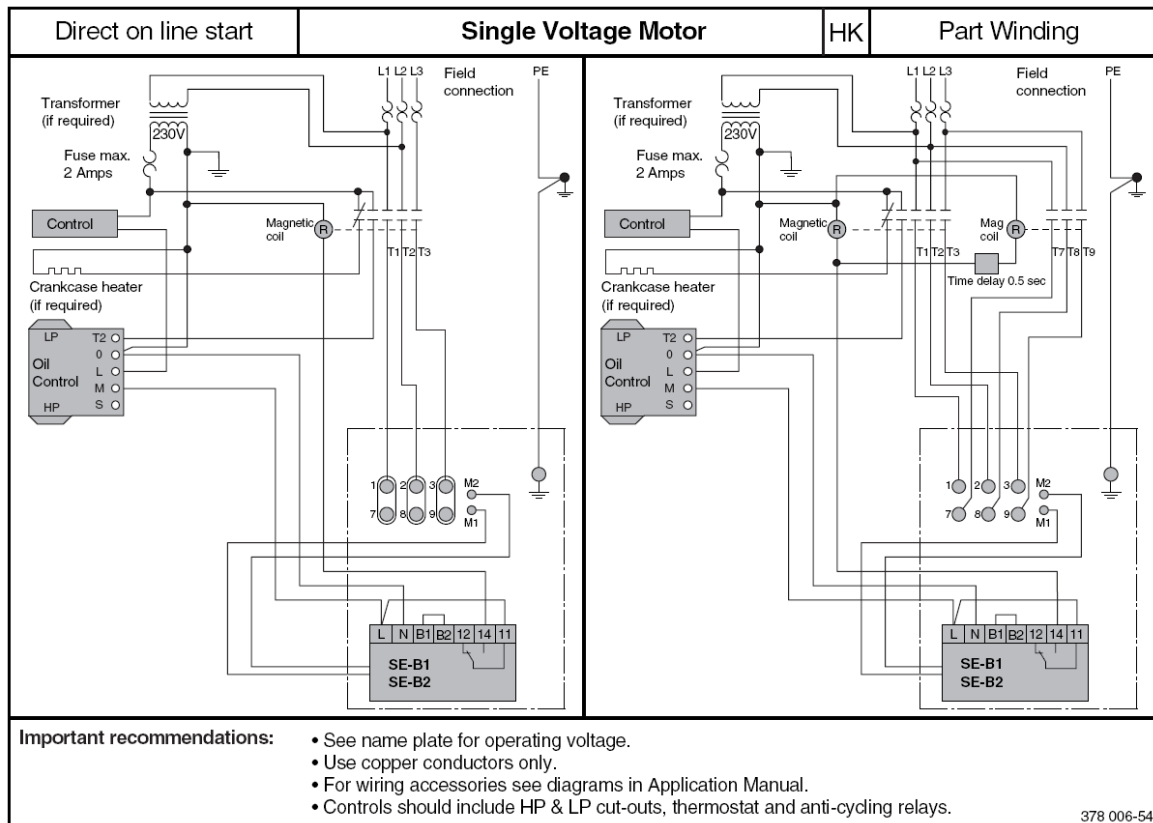
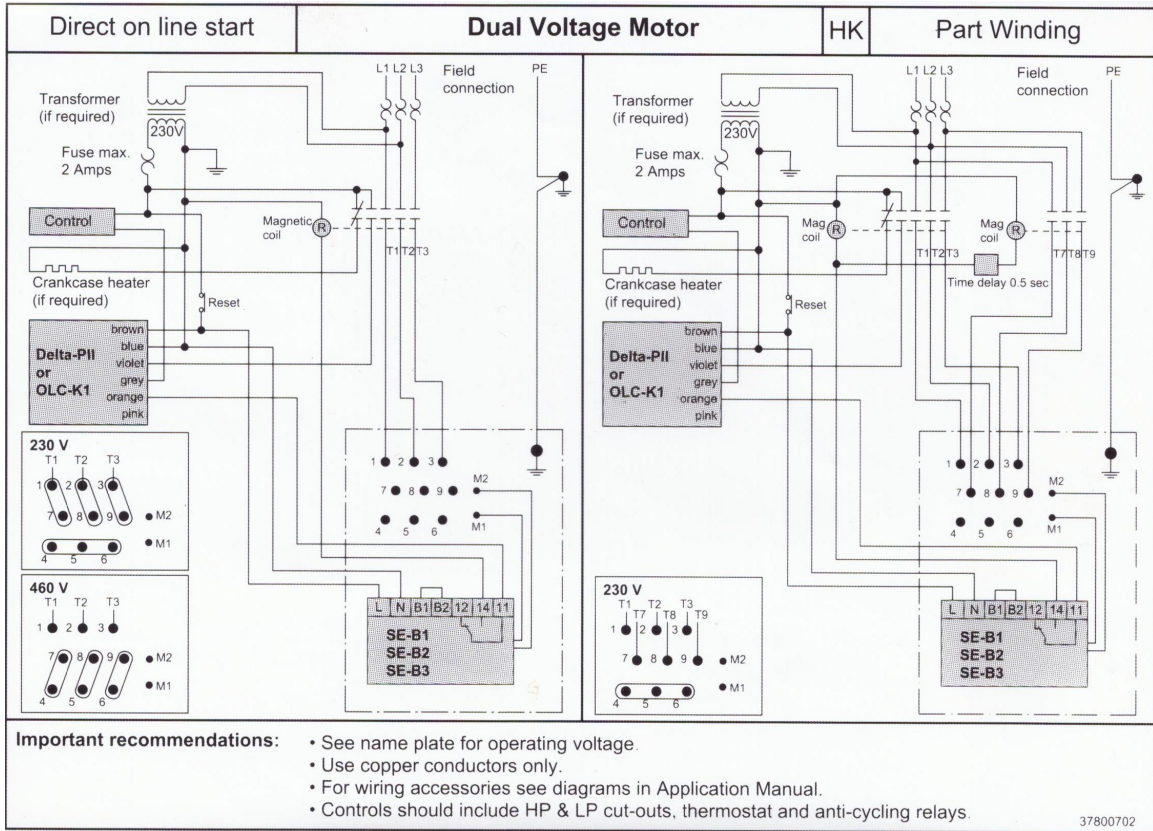
- Compressor Type:**
- STD* REV†
 - 06EA 06EF Compressor — A/C Duty No Unloading
 - 06EB 06EJ Compressor — A/C Duty 1-Step Elec. } Hot Gas Bypass Unloading
 - 06EC 06EK Compressor — A/C Duty 2-Step Elec. }
 - 06ED 06EL Compressor — A/C Duty 1-Step Press. } Suction Cut-Off Unloading
 - 06EE 06EN Compressor — A/C Duty 2-Step Press. }
 - 06E2 06E6 Compressor — A/C Duty 1-Step Elec. }
 - 06E3 06E7 Compressor — A/C Duty 2-Step Elec. }
 - 06E4 06E8 Compressor — A/C Duty 1-Step Press. }
 - 06E5 06E9 Compressor — A/C Duty 2-Step Press. }
 - 06EM Compressor — Refrig. Duty Med Temp.
 - 06ER Compressor — Refrig. Duty Low Temp.
 - 06ET Service Compressor A/C Duty. Replaces 06E2,3,4,5, 6,7,8, and 9. Compressor has 1 stage of suction cut-off unloading.
 - 06EX Serv. Compressor A/C Duty Replaces 06EA,B,C,D,E, F,J,K,L, and N. Compressor has 1 stage of Bypass unloading.
 - 06EY Service Compressor Refrig. Duty Replaces 06ER
 - 06EZ Service Compressor Refrig. Duty Replaces 06EM

Motor Size (Does Not Signify Horsepower)

- Model = 0, Package = 1 or 9, A = Shipped Without Oil
- Design Variable:
 - New Compressors:
 - 0 = OEM Model
 - 1 = Carrier A/C Model
 - 2 = Old Design Refrigeration Valve Plates
 - 6 = Carrier A/C Model
 - 8 = OEM with DGT and Oil Charge
 - 9 = Cemak Model
 - Service Compressors:
 - 2 = New Manufactured (A/C)
 - 4 = Remanufactured (Low Temp.)
 - 6 = Remanufactured (A/C)
 - 7 = Remanufactured (Med Temp.)
- Electrical Characteristics (XL and PW Start, Unless Noted)
 - 0 = 208/230-3-60
 - 1 = 575-3-60
 - 3 = 208/230/460-3-50/60 (480v XL Only)
 - 4 = 200-3-60
 - 5 = 230-3-60
 - 6 = 400/460-3-50/60
 - 8 = 230-3-50
 - 9 = 220/380-3-60
- Displacement (CFM at 1750 rpm)

- 0,1,2 = Models With Oil
- 3,4,5 = Models Without Oil
- 7 = 1 Unloader, Suction Cutoff, Oil-less (ER, EM Only)
- 8 = Special Order

Wiring Diagram Located in Terminal Box



Wiring Diagram Appendix



DANGER OF ELECTROCUTION!!!
ALL WORK TO BE PERFORMED BY A TRAINED PROFESSIONAL

!!!ATTENTION!!!

WIRING SCHEMATICS ARE DIFFERENT FOR EVERY SYSTEM. THESE DRAWINGS ARE PROVIDED ONLY FOR REFERENCE AND MAY NOT BE USED LITERALLY. CONSULT SYSTEM MANUFACTURER OR OTHER QUALIFIED SYSTEM ENGINEER IF UNSURE OF REWIRING

Installing the BITZER INT (motor protection device: "SE-B")

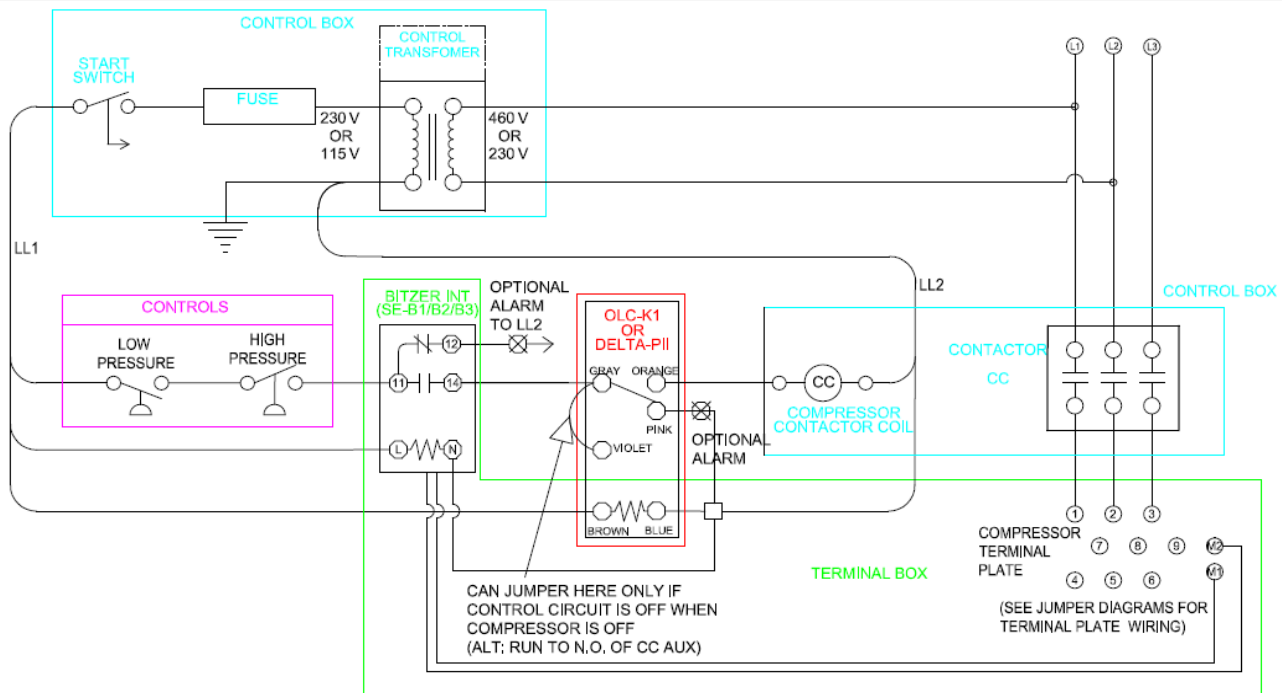
General directions (may not be applicable depending system):

1. Use 11 and 14 of the BITZER INT so it is in series with the rest of the control circuit that energizes the contactor coil.
2. Verify that there is proper power wired to L and N on the INT.
3. Make sure the orange wires of the INT are connected to thermistors on the terminal plate.
4. If possible, maintain separate power to L from 11 so the BITZER INT cannot be reset accidentally or be an electronic controller. Disconnect power at L or N for 5 seconds to reset.

Installing the BITZER OLC-K1 or Delta PII

General directions:

1. Wire the GRAY and ORANGE wires of the oil control so it is in series with the rest of the control circuit that energizes the contactor coil.
2. Verify that there is proper power wired to BROWN and BLUE.
3. Wire the PINK to install an alarm.
4. The VIOLET wire is used as a run proof to tell the oil control when the compressor has started. Wire the VIOLET to the NO auxiliary contacts of the compressor contactor. As an option, VIOLET can be jumpered to GRAY (control circuit) only if the control circuit is powered when the compressor is on.

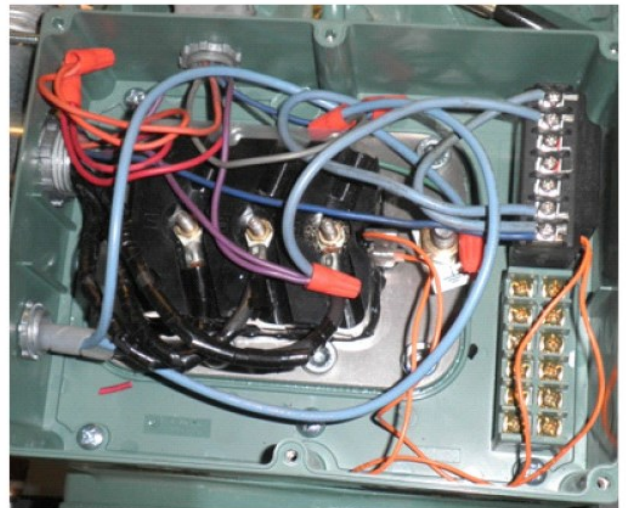
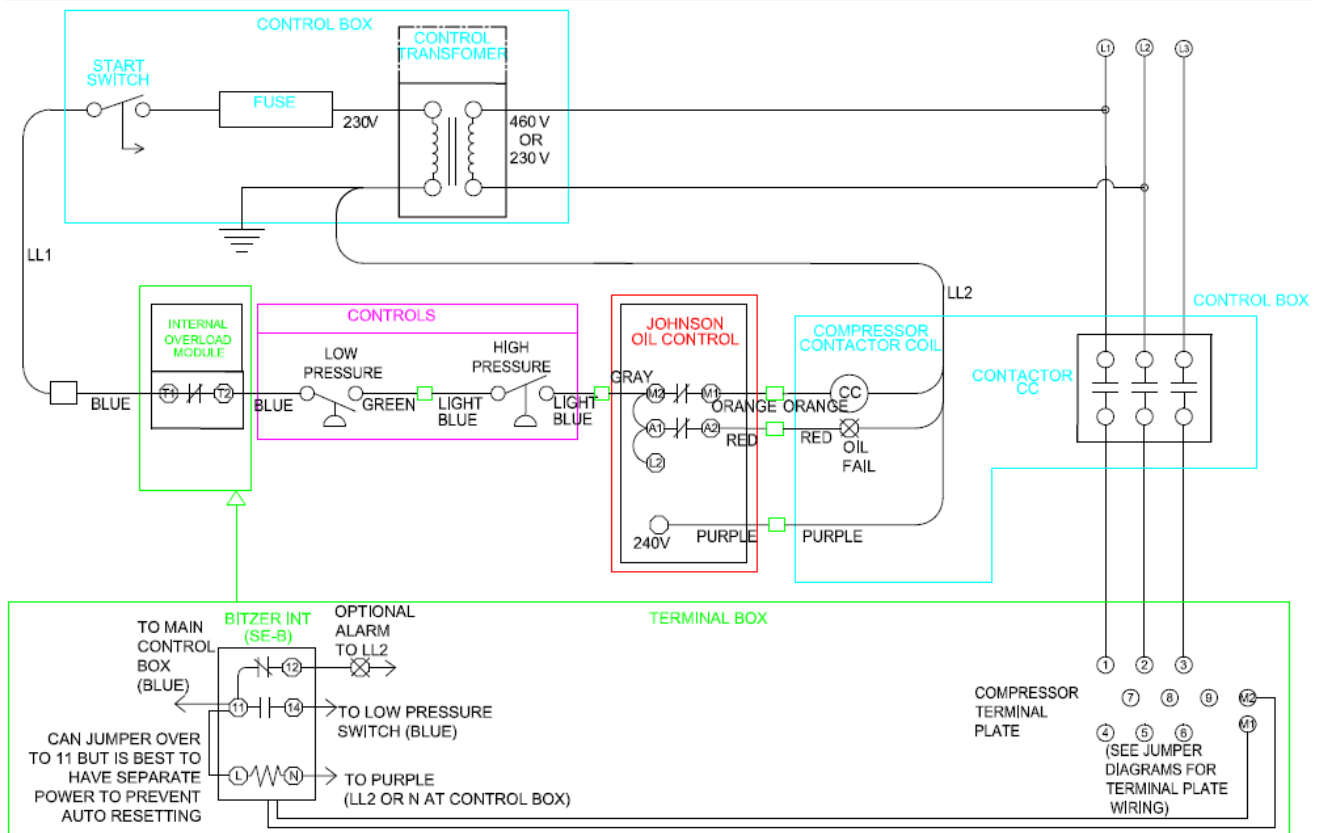


***THERMOSTAT CONTROL, LIQUID LINE SOLENOIDS, UNLOADERS AND OTHER POSSIBLE COMPONENTS ARE NOT SHOWN.

Reusing Johnson P545 Oil Control

General directions (may not be applicable depending system):

1. In this example, there are 7 wires coming from the control box to the terminal box: 3 main power wires, BLUE and ORANGE (Control Circuit), RED (Alarm) and PURPLE (LL2).
2. There are 7 Wires coming from the control device: GREEN and BLUE (LP Switch), ORANGE and GRAY (Oil Switch Control), RED (Alarm) PURPLE (Power/LL2 to Oil Control), and two LIGHT BLUE (HP Switch).
3. Reconnect the ORANGE and RED wires
4. Reconnect the PURPLE wires and connect them to N on the Bitzer INT.
5. Connect the BLUE wire from the control box to 11 on the Bitzer INT.
6. Jumper 11 and L or run separate power to L (Bitzer INT must receive continuous power).
7. Connect the BLUE wire for the oil and HP switch to 14 on the Bitzer INT.
8. Reconnect one LIGHT BLUE wire to the GRAY wire and the other LIGHT BLUE wire to the GREEN wire.





Observation	Possible Cause	Trouble Shooting Steps
Compressor is not running	Loss of power	Check voltage between phases before and after breaker, contactor and at the terminal box. Check voltage between the contactor coil.
	Overload protection (INT) tripped	Check resistance between M1 and M2. If resistance is lower than 1000 ohms, reset the INT. If the resistance is greater, check motor windings, supply voltage and ensure connections are tight.
	Burnt motor	Check windings. Check continuity and resistance between windings. All windings should have the same resistance of about 1 ohm and should show continuity. Also check continuity and resistance between each pin and ground. Resistance should be at least 50 Megohms (non-continuous).
	Other protections tripped	Check continuity for all control circuit devices (e.g. low/high pressure switches, phase loss, oil failure, etc)
Compressor is noisy	Broken reeds	Check suction and discharge pressure. Turn off the compressor and look for the pressures to equalize. If the pressures equalize almost immediately, change valve plate.
	Wet suction	Check superheat on the suction side of the compressor (superheat should be at least 20° F). Adjust TXV to the appropriate superheat.
	Broken rod	Check for heavy vibrations. Replace compressor.
Compressor leaking	Gaskets / o-rings	Tighten bolts according to the torque chart. If the problem is not solved then change the gasket or o-ring. Inspect mating surfaces when changing gaskets. Only use BITZER gaskets / o-rings.
	Oil adapter / sight glass	Replace the oil adapter.
Oil pump	Low pressure differential	Minimum pressure differential is 9psi. Check oil level at the sightglass. Reverse the rotation by changing two phases of the power supply, look for improvement. If no improvement, change oil pump.
	No pressure differential	Open oil pump. If the oil pump bearing is worn, change the complete oil pump.
	Oil level low	Add oil and check for leaks.
Flooded start	Crankcase heater	May not be operating or installed. Crankcase heater remains on when compressor is off.
	Piping	Piping is allowing liquid to enter the compressor when the compressor is off. Change piping and/or install check valve.
	Migration	Ensure proper crankcase heating. If the compressor is outdoors, use housing or machining room.
Flood back	Suction line frozen	Check superheat at evaporator. Adjust TXV.
	Liquid coming back	Clean evaporator coil.



Observation	Possible Cause	Trouble Shooting Steps
Compressor is running hot	High discharge	Ensure condenser is operating and clean.
	Suction temp high	Check return gas temperature.
	Compression ratio is too high	Check set points and application limits.
Oil failure trips	No oil at sightglass	Check for leaks and check piping. Possibility of improper traps. Possibility of liquid refrigerant in the crankcase. Too much oil in the system.
Oil failure trips	Oil at normal level	
Oil failure trips	Oil sightglass full	

10.0 Start up data sheet



Bitzer model number _____ Date _____
 Serial Number _____ Location _____
 Compressor/equipment bought from _____ Tech name _____
 Phone _____

Refrigerant		Compressor installed in	Parallel system
Set points			Condensing unit (remote)
Suction pressure			Chiller (self contained)
Discharge pressure			

Defrost		System description
Quantity		
Duration (mins)		
Type (air, electric or gas)		

DATA	Voltage between phases	/ /	Comments
Date	Amps per phase	/ /	
Time			
Suction pressure	psi Oil level at sightglass	/8	
Discharge pressure	psi Oil color		
Suction temp	F Any foam?	YES/NO	
Discharge temp	F Oil pump (pressure dif)	psi	
Compressor superheat	F Condenser clean?	YES/NO	
Evaporator superheat	F Fans running?	YES/NO	
Liquid temp	F Using subcooler	YES/NO	
Any noise?	YES/NO Other protections		
	Low pressure switch		
	High pressure switch		
	Phase loss		
	Oil failure		



Notes

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