

Copeland Scroll[®] K5 Refrigeration Compressor

January 2012



Copeland Scroll K5 Refrigeration Compressor Targets Key Customer Requirements

EFFICIENCY

SOUND **QUALITY** ^{SIZE} **RELIABILITY**
DELIVERY



Increasing
Customer Value
Was Top Priority



Advanced Technology For Greater Efficiency And Reliability

Efficient

- ① ② Optimized Scrolls & Motors For Annual Efficiency
- ③ VVR For Improved Low Condensing Performance

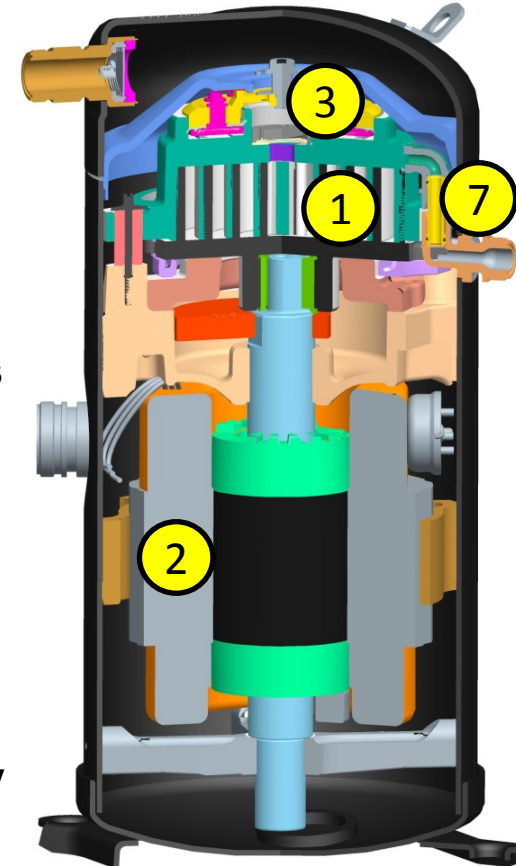
Reliable

- ④ Onboard CoreSense™ Diagnostics
- ⑤ Top Cap With Thermal Well → External Temperature Protection
- ⑥ Redesigned Gas Flow → Low Oil Circulation

Operational Improvements

- ⑦ Liquid & Vapor Injection Capability (1 SKU)

U.S. Manufacturing → Improved Lead Times

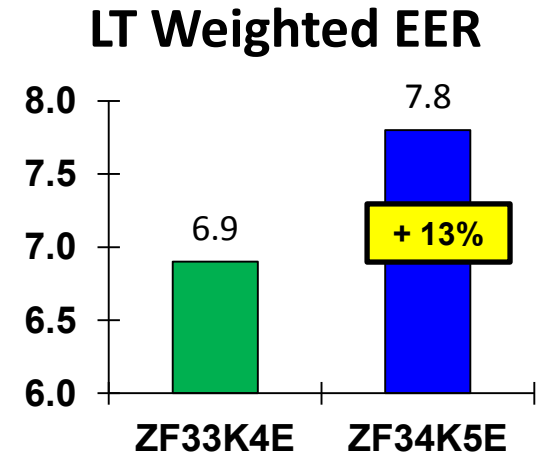
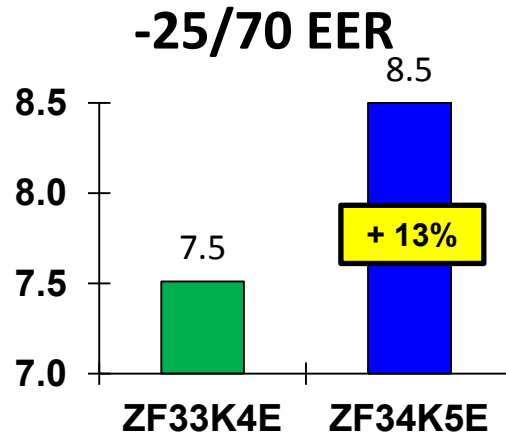
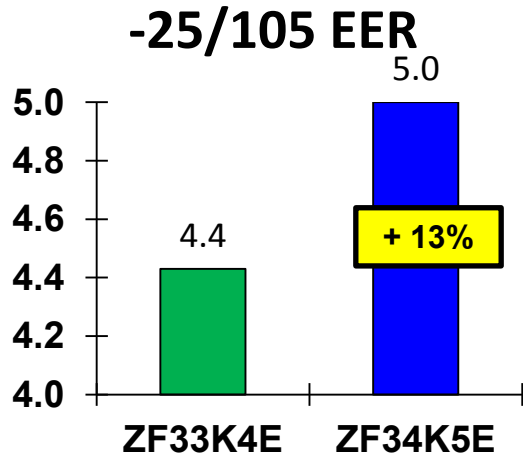


Designed to Maximize Efficiency & Reliability

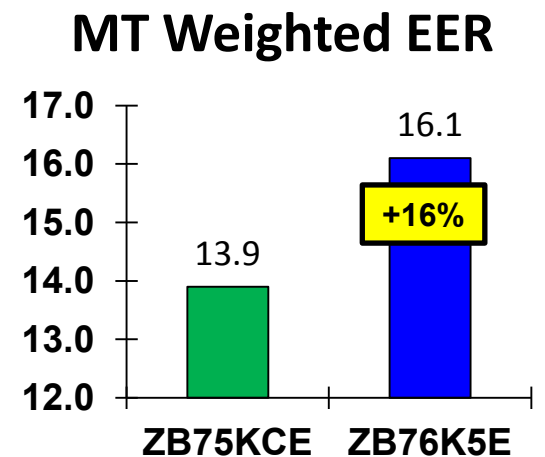
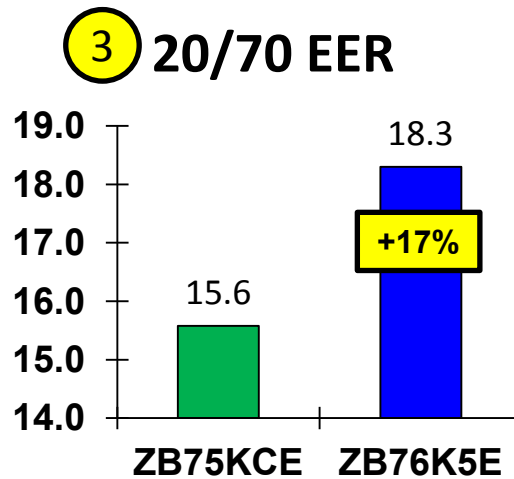
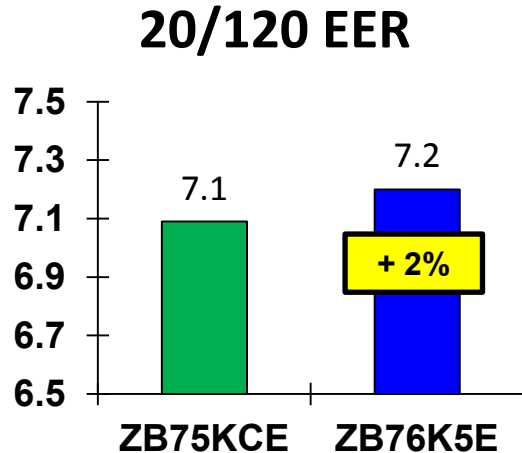


High Efficiency Performance ARI & Low Condensing

Low Temp



Medium Temp

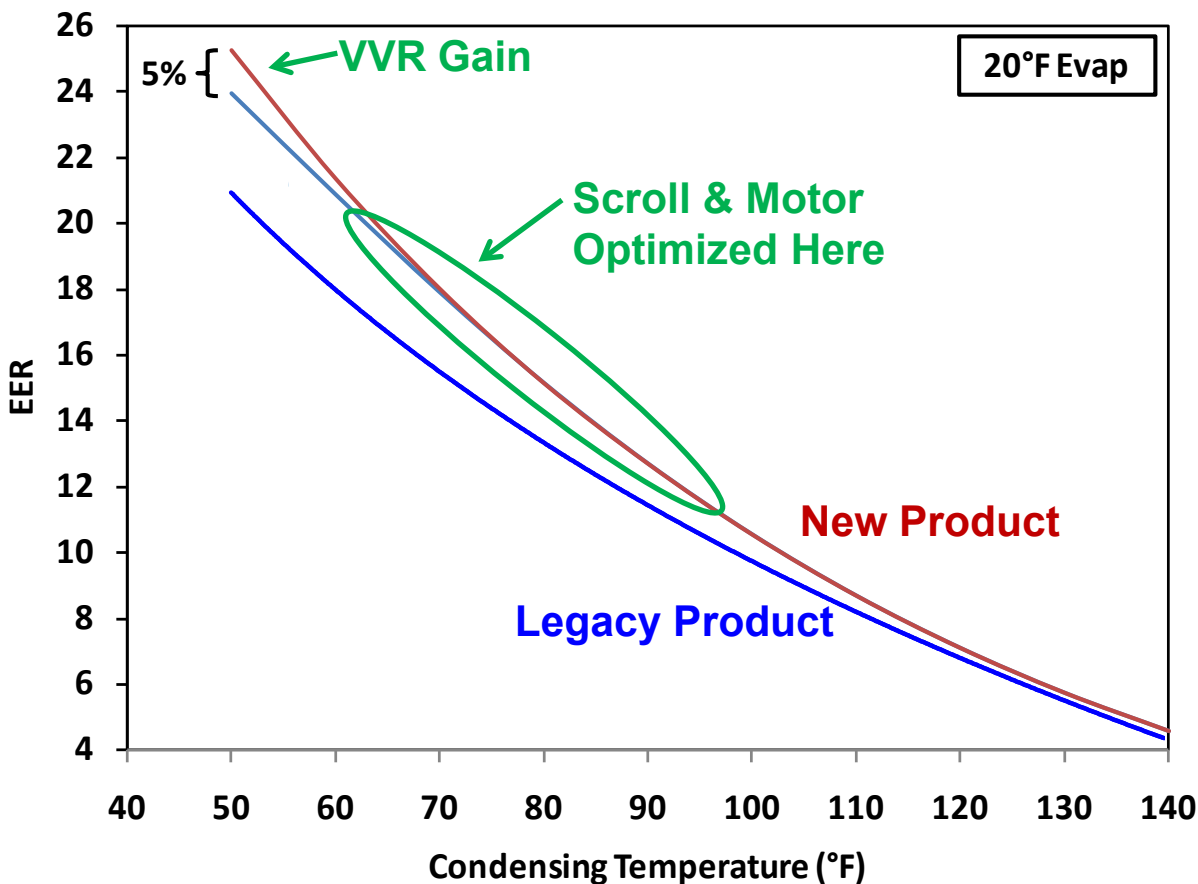


LT Weighted EER = $0.8 * (-25/70 \text{ EER}) + 0.2 * (-25/105 \text{ EER})$
MT Weighted EER = $0.8 * (20/70 \text{ EER}) + 0.2 * (20/120 \text{ EER})$

3

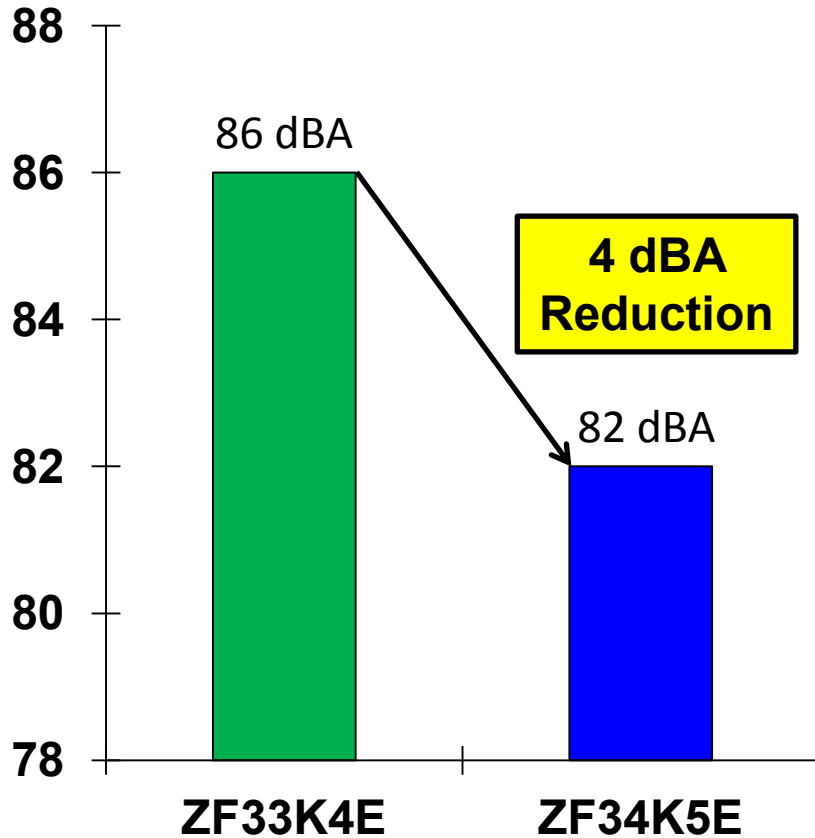
Variable Volume Ratio Adjustable Porting Improves Annual Efficiency

- Adjusts Scroll Compression Ratio To Reduce Over Compression
- 5% Efficiency Improvement At Low Condensing Temperatures

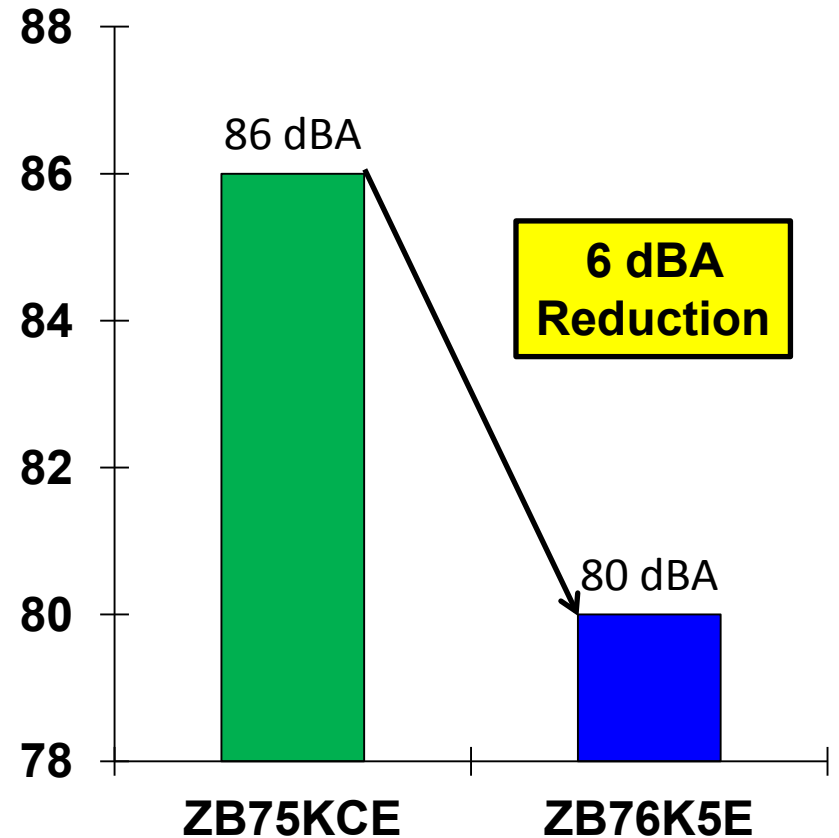


Quiet Operation Sound Reduced Design

Low Temperature



Medium Temperature



4

Copeland Scroll® K5 with CoreSense™ Technology Onboard



EMERSON
Climate Technologies

COPELAND SCROLL™

CoreSense Diagnostics

<ul style="list-style-type: none"> ● Module Power ⚙️ Alert ● Demand, No Current ⚙️ Trip (Auto Reset) ● Lockout (Manual Reset) ● 	<p>⚙️ Alert Codes</p> <table border="0"> <tr> <td>1 High Discharge Temperature</td> <td>7 Reverse Phase</td> </tr> <tr> <td>2 Excessive System Limit Trips</td> <td>8 Welded Contactor</td> </tr> <tr> <td>3 Excessive Demand Cycling</td> <td>9 Low Module Voltage</td> </tr> <tr> <td>4 Locked Rotor</td> <td>10 Module Communications Error</td> </tr> <tr> <td>5 Open Circuit</td> <td>11 Discharge Temperature Sensor Error</td> </tr> <tr> <td>6 Missing Phase</td> <td>12 Current Transducer Error</td> </tr> </table> <p>Disconnect power before servicing – additional information on inside cover</p>	1 High Discharge Temperature	7 Reverse Phase	2 Excessive System Limit Trips	8 Welded Contactor	3 Excessive Demand Cycling	9 Low Module Voltage	4 Locked Rotor	10 Module Communications Error	5 Open Circuit	11 Discharge Temperature Sensor Error	6 Missing Phase	12 Current Transducer Error
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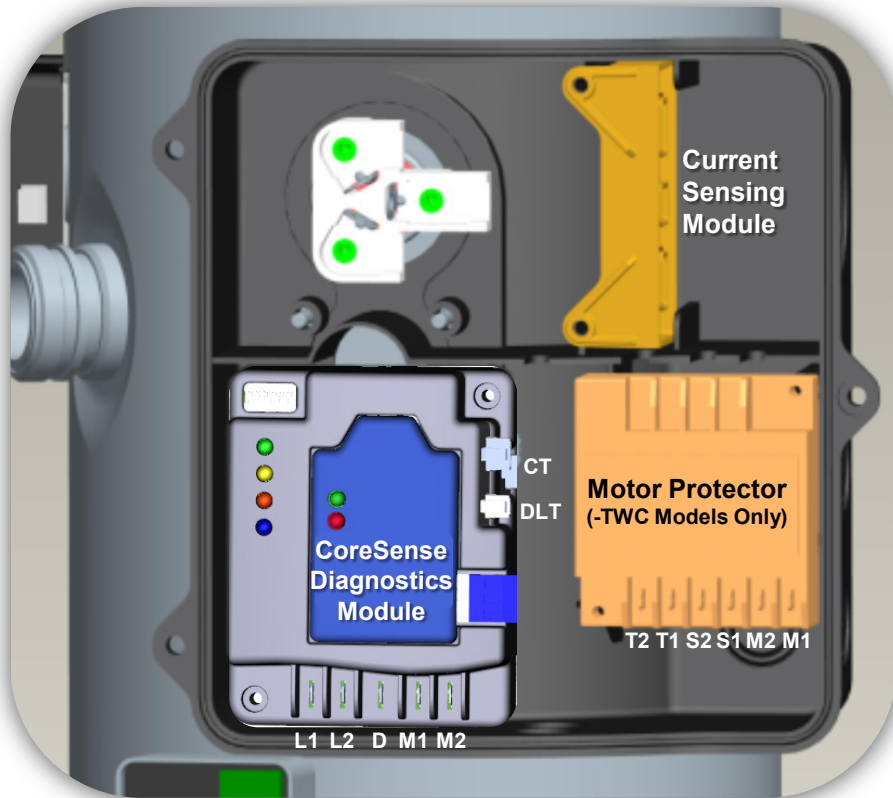
For more product information. Scan here ▶  or visit www.EmersonClimate.com/manual

- Continuing Commitment To Bring Added Value Via CoreSense Technology
- All Copeland Scroll K5 Compressors Will Include CoreSense Onboard

**CoreSense Diagnostics Deliver
Advanced Monitoring, Protection & Communication Capabilities**

CoreSense Diagnostics For Copeland Scroll K5

- **Factory Installed Onboard Compressor Electronics**
 - Send Early Warning Signs Of System Issues
 - Protect Compressor To Prevent Costly Failures
 - Improve Speed & Accuracy Of System Troubleshooting



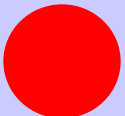



Features

- Current Sensing Diagnostics
- Discharge Temperature Protection
- Motor Protection
- Compressor Asset Information
- LED Visual Indication Of Alerts
- Modbus Communication
- Remote Reset

CoreSense *Diagnostics*

Alarm Codes

<u>LED</u>	<u>SOLID</u>	<u>FLASHING</u>
	Normal	ALERTS
	Demand , No Current	TRIP (Auto Reset)
	-	LOCK OUT (Manual Reset)
		FUTURE (EXV Injection Control)

<u>Code</u>	<u>Description</u>	<u>Lock-out Enabled</u>
1	High Discharge Temperature	Yes
2	Excessive System Limit Trips	No
3	Excessive Demand Cycling	No
4	Locked Rotor	Yes
5	Open Circuit	No
6	Missing Phase	Yes
7	Reverse Phase	Yes
8	Welded Contactor	No
9	Low Module Voltage	No
10	Module Communications Error	No
11	Discharge Temperature Sensor Error	No
12	Current Transducer Error	No

CoreSense Diagnostics Smartphone Resources

- **QR Code Reader:** Scan The Compressor QR Code To Launch Mobile Troubleshooting



- **Mobile App:** Download HVACR Fault Finder On Your Smartphone



Copeland Scroll K5 Refrigeration Compressor



Program Summary

- Improved Efficiency And Sound
- Enhanced Reliability via CoreSense® Diagnostics
 - Improved Delivery Lead Times
- Manufactured In US & Europe
- Low Oil Circulation Rate

Scope

- Covers 7–15 HP Medium And Low Temp Models
- 5 MT Displacements & 3 LT Displacements
- Will Be Approved For R404A, R22, R407A/C, R134a

Copeland Scroll K5 Refrigeration Compressor

Today's Technology



Advanced Technology



Copeland Scroll K5 Refrigeration Compressor

Model Cross Reference To Current Models (Specter)

Medium Temperature

Current Models:
ZB**KC & ZS**K4



New Models:
ZB**K5



K5 Refrigeration Scroll
ZB**K5

Low Temperature

Current Models:
ZF**K4 & ZF**KV



New Models:
ZF**K5




Quest
ZF**K4/KV

K5 Refrigeration Scroll
ZF**K5: One Model Capable Of Liquid & EVI

With CoreSense

Without CoreSense

Additional Resources Available by Registering for Online Product Information at www.EmersonClimate.com



Application Engineering
BULLETIN

Copeland

AE-1383

Introduction
The Copeland Scroll® refrigeration compressor product offering has developed the next generation Large Refrigeration scroll for the 8 to 17 hp size range. The scope of this bulletin will cover the application parameters unique to the ZB7K5E and ZF7K5E refrigeration scrolls and the CoreSense™ electronics specific to these models.

ZF7K5E Low Temperature Large Refrigeration Scrolls
The low temperature models are provided with an injection port that can be used for either liquid or vapor injection.

Table 1 at the end of this bulletin will help identify discharge temperature protection variations possible for various the ZF7K5E scrolls in a refrigeration

Application Engineering Bulletin AE-1383

Approved Refrigerants

Application	Model Number	Horsepower	Approved Refrigerants
Low Temperature	ZF34K5E	10	R-404A, R-507, R-407A/C, R-22
	ZF41K5E	13	
	ZF49K5E	17	
Medium	ZB58K5E	8	R-404A, R-507
	ZB66K5E	9	
	ZB74K5E	10	

A solenoid valve with a minimum 0.109 inch orifice must be provided in the injection circuit that opens whenever the compressor is operative or cooling is required during pumpdown. The solenoid must be closed when the compressor is cycled off to stop the liquid injection and prevent short cycling on pump down controlled system due to the retained heat in the top cap and bulb mass.

The following components are not required, but they are recommended for liquid injection.

- Sight Glass - A sight glass can be installed before the DTC valve to allow for visual inspection for the presence of liquid refrigerant.

ZF25K5E-TF5
HFC, R-404A, 60Hz, 3-Phase, 200/230 V
Low Temp, Economized
Production Status: Available for sale to all U.S. customers. Please check with your local Emerson Climate Technologies Representative for international availability.



Accessories

Part Number	Description
019-0095-00	Crankcase Heater, 240V, 70W, 2" Lead Length
019-0095-01	Crankcase Heater, 480V, 70W, 2" Lead Length
019-0095-02	Crankcase Heater, 575V, 70W, 2" Lead Length
019-0095-03	Crankcase Heater, 240V, 70W, 32" Lead Length
019-0095-04	Crankcase Heater - 240V, 70W, 48" Lead Length
019-0095-05	Crankcase Heater - 480V, 70W, 48" Lead Length

Accessories List

095-C P2M7X	Pressure Control
495-3803-00	Oil Control Reference Drawing
905-0738-00	Sound Blanket for ZF13K-ZF16K, ZS30K-ZS34K, ZB30K-ZB40K
527-0116-00	Spacer Mounting Assembly, CRANP/YS, 6 Same Scroll, 9/26/04, 04
527-0157-00	High Diameter Mount Kit
969-0009-00	Adapter & Seal Kit
969-0157-00	Oil Level Control
969-0540-00	Discharge Line Thermostat, 1/2", 12" Lead
969-0548-00	Discharge Line Thermostat, 1/2", 36" Lead (W/Alarm Lead Wire)
969-1000-00	Scroll Demand Cooling Kit - 240 Volt (Required for R407A)
969-1000-51	Scroll Demand Cooling Kit - 240 Volt (Required for R407A)
969-5100-42	Suction & Discharge Valve Kit, includes orifice suction and discharge service valves and seals, 7/9" Suction Valve, 1/2" Discharge Valve, 1" Suction Valve Seal, 3/8" Discharge Valve Seal
969-7022-02	Discharge Line Thermostat, 1/2", 36" Lead (W/Connected)
969-7022-03	Discharge Line Thermostat with 36" connector

Follow Ester Oil. Approved for use with specific Copeland Hermetic & Semi Hermetic models. Consult specific model only. nomenclature for oil standards in the model number.

RATING CONDITIONS
65 °F Return Gas
Actual Subcooling
35 °F Ambient Air Over
60 Hz Operation

LOW TEMPERATURE

ZF25K5E-TF5
HFC-404A
COP ELAND SCROLL®
TF5 200/230-3-60

W/HC ECONOMIZER



Superheating Temperature °F (Std Dew Pt Pressure, PkG)

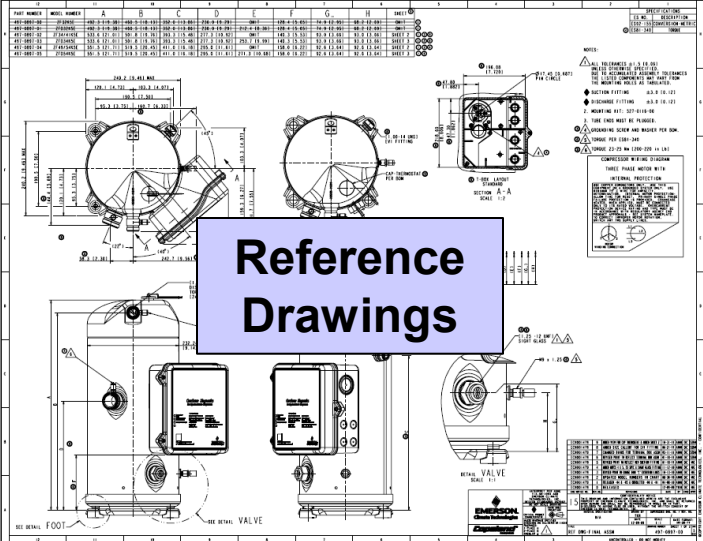
	-40(-45)	-30(-1)	-20(16)	-10(20)	0(24)	5(28)	10(33)
14(402) P							5000
A							10150
M							1735
E							5
L							66.5
13(354) P			3320	3600	4020	4420	4840
A			7630	7900	8280	8600	8920
M			206	217	225	232	238
E			417	421	424	427	430
L							250
12(310) P							
A							
M							
E							
L							
11(271) P							
A							
M							
E							
L							
10(252) P							
A							
M							
E							
L							
10(235) P	28200	29300	32700	36400	40400	46200	54100
A	4980	5260	5610	5940	6360	6710	6980
M	15.5	16.1	16.65	17.2	17.7	18.2	18.7
E	292	334	380	42	489	552	621
L	6.3	6.6	6.9	6.3	6.8	7.3	7.7
M	8.8	14.4	19.8	24.8	29.8	34.2	38.6
A	13.8	14.25	14.6	14.95	15.3	15.65	15.95
M	296	337	395	457	495	559	626
E	6.5	7	7.5	8.1	8.7	9.4	10.1
L	9.6	5.7	10.5	15.1	19.6	23.9	27.9
80(174) C	27200	30600	34900	38200	42500	47100	52100
A	13.8	14.25	14.6	14.95	15.3	15.65	15.95
M	296	337	395	457	495	559	626
E	6.5	7	7.5	8.1	8.7	9.4	10.1
L	9.6	5.7	10.5	15.1	19.6	23.9	27.9
70(145) C	27700	31200	34600	38000	42400	47100	52200
A	13.8	14.25	14.6	14.95	15.3	15.65	15.95
M	296	339	398	459	497	561	631
E	7.2	7.5	8.4	9.1	9.8	10.7	11.5
L	-2.7	2.1	6.8	11	15.1	19.1	23
40(86) C	28900	32400	35900	40400	45000	50000	55400
A	13.8	14.25	14.6	14.95	15.3	15.65	15.95
M	296	347	393	444	500	563	632
E	9.6	10.4	11.5	12.7	13.9	15.2	16.6
L	-8.7	-3	0.4	3.8	7	10.4	13.2

Performance Information & Coefficients

Normal Performance Values (65 °F based on 72 hours run-in). Subject to change without notice. Current @ 230 V

C: Capacity (Btu/hr), P: Power (Watts), A: Current (Amps), M: Mass Flow (lb/hr), E: EER (Btu/W-hr), L: Liquid Temp (°F)

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Auto-Registered Compressor Performance Printed 01/10/2010



ZB68K5E-TFD
HFC, R-404A, 60Hz, 3-Phase, 460 V
Medium Temperature
Production Status: Preliminary data only - Contact your Emerson Climate

Performance

Evap (°F) Cond (°F)	20 / 120	-6 / 130
RSL (°F) Log (°F)	65 / 120	65 / 130

Capacity (Btu/hr): 58800, 86900

Power (Watts): 82, 122

Current (Amps): 12, 17

EER (Btu/W-hr): 7.2, 7.2

Mass Flow (lb/hr): 72, 72

Sound Power (dBA): 82, 82

Vibration (mil/peak): 3.0, 3.0

Record Date: 20, 20

Electrical Information

Number of Cylinders: 0.00

Bore Size (in.): 0.00

Stroke (in.): 0.00

Mounting Length (in.): 7.50

Mounting Width (in.): 7.50

Mounting Height (in.): 20.13

1/4 Rotabolt

1/4 Rotabolt

106

110

126

Electrical

LRA High:	95.0	MCC (Amps):	25.0	UL File No.:	
LRA Half Winding:		RPM:	0	UL File Date:	
LRA Low:		Max Operating Current:	15.4		
RLA (MCC)/s-use for contactor selection:	17.0				
RLA (MCC)/s-use for breaker & wire size:	16				

*Low and High refer to the low and high nominal voltage ranges for which the motor is approved.

