

ZFD & ZBD Copeland Scroll Digital™ Compressor Range for Low and Medium Temperature Refrigeration

Copeland Scroll Digital ZBD and ZFD compressors provide stepless continuous capacity modulation in medium and low temperature refrigeration applications.

Based on the unique Copeland Compliant Scroll™ design, the Digital modulation operates on a simple mechanism. Capacity control is achieved by separating the scroll sets axially over a small period of time. It is a simple mechanical solution allowing precise temperature control and system efficiency.

Digital Scroll technology is a simple modulation solution that can easily and quickly be implemented into any existing system design as no other components are required.

Digital Scroll technology provides continuous, stepless modulation from 10% to 100% with no operating envelope restriction. As a result, system pressures and temperatures are tightly controlled. These compressors provide optimum performance for refrigeration units, refrigeration packs, process and agricultural units.

The Digital Scroll range consists of:

- ZBD models dedicated to medium temperature applications
- ZFD models with vapor injection for low temperature applications
- ZOD model designed for use in R744 (CO₂) - see page 68

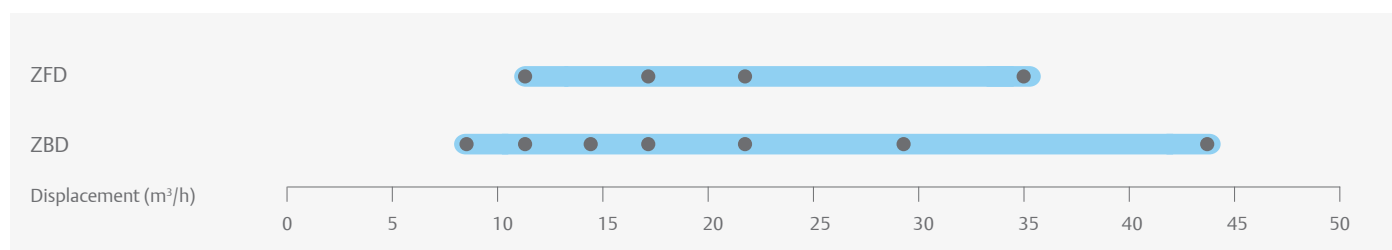


Copeland Scroll Digital for Low and Medium Temperature Refrigeration With and Without Sound Shell

CoreSense™ Diagnostics is now available as an option for the ZBD Scroll Summit series (ZBD76K5E and ZBD114K5E) as well as for ZFD41K5E.

These compressors are qualified for R407A/F/C, R448A/R449A and R404A for all digital models and R134a, R450A and R513 for ZBD only.

Digital Scroll Compressor Line-Up



Features and Benefits

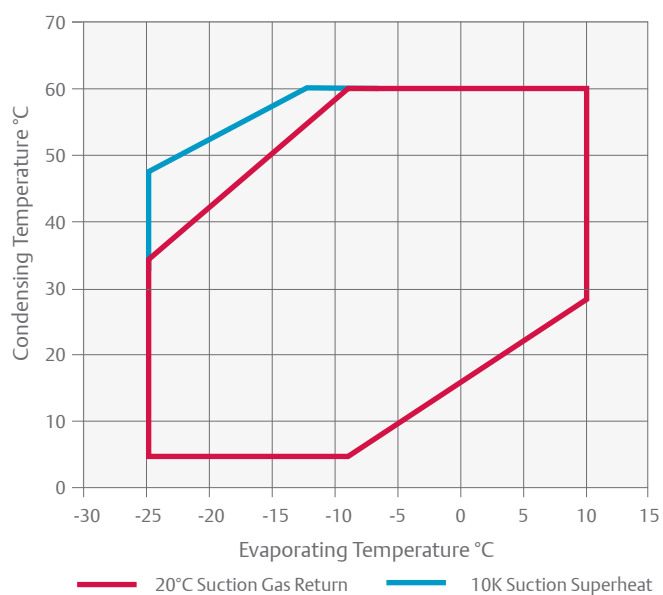
- Continuous modulation from 10% to 100% ensuring a perfect match of capacity and power to the desired load
- An economical and reliable alternative to variable speed drive
- Precise suction pressure control with associated energy savings
- Food quality is maintained by stable evaporating temperatures in the refrigerated areas
- Longer lasting refrigeration equipment due to fewer compressor cycling
- Quick and easy integration into refrigeration equipment, similar to any other scroll compressor
- Availability of optional sound shell on all models providing up to 10 dBA additional sound attenuation for silent operation
- Availability of Emerson's series of controllers that operate the Digital Scroll compressor
- Possibility of digital and liquid injection control via optional CoreSense technology

Maximum Allowable Pressure (PS)

- Digital ZBD:
Low Side PS 22.6 bar(g) / High Side PS 32 bar(g)
- Digital ZFD:
Low Side PS 22.6 bar(g) / High Side PS 32 bar(g)

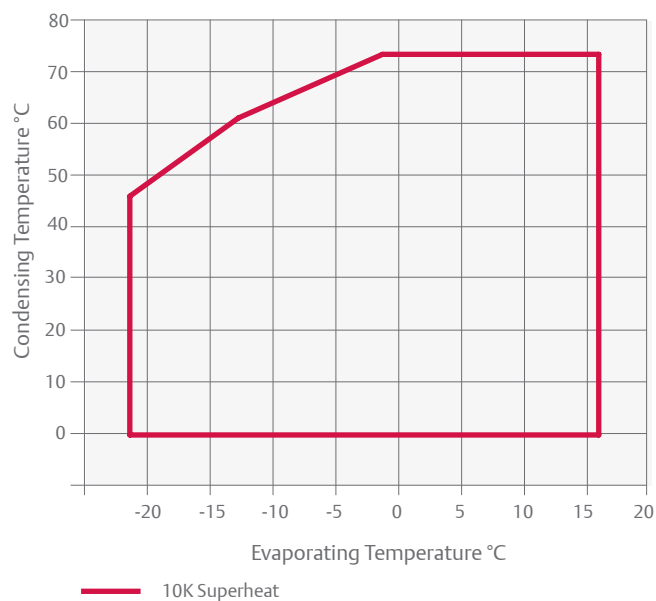
Operating Envelope R448A/R449A

For ZBD Digital Models



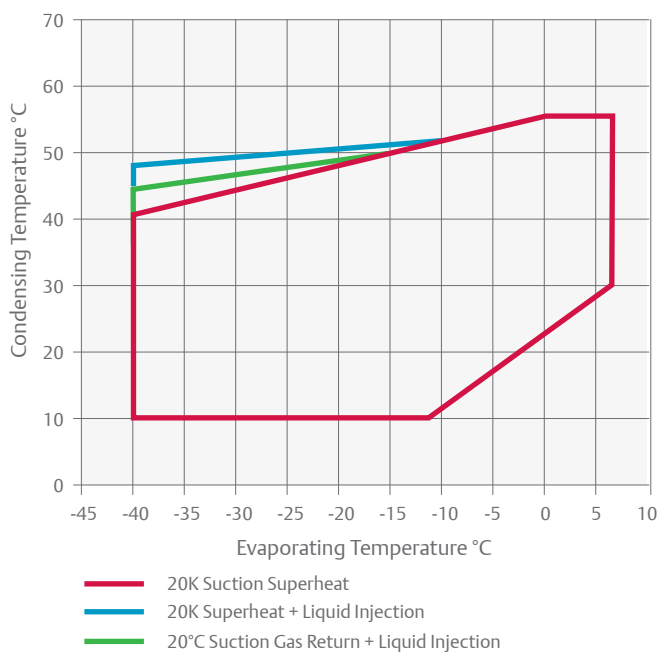
Operating Envelope R134a

For ZBD Digital Models



Operating Envelope R448A/R449A

For ZFD Digital Models



For individual model details please refer to Select software.

Technical Overview

Models	Nominal hp	Displacement (m ³ /h)	Rotolock Suction (inch)	Rotolock Discharge (inch)	Oil Quantity (l)	Length/Width/Height (mm)	Net weight (kg)	Motor Version/Code		Maximum Operating Current (A)		Locked Rotor Current (A)		Sound Pressure @1 m - db(A)***	
								1 Ph*	3 Ph**	1 Ph*	3 Ph**	1 Ph*	3 Ph**		
Medium Temperature															
ZBD21KCE	3.0	8.3	1 1/4	1	1.2	243/243/432	30	PFJ	TFD	16	6	97	40	62	
ZBD29KCE	4.0	11.4	1 1/4	1	1.4	245/243/463	32		TFD		7		48	58	
ZBD38KCE	5.0	14.4	1 1/4	1	1.9	246/250/481	38		TFD		11		64	67	
ZBD45KCE	6.0	17.1	1 1/4	1	1.9	241/246/481	39		TFD		12		74	61	
ZBD57KCE	7.5	21.4	1 1/4	1 1/4	1.9	246/257/481	43		TFD		15		102	68	
ZBD76K5E	10.0	28.8	1 3/4	1 1/4	3.4	299/280/534	61		TFD		24		118	66	
ZBD114K5E	15.0	43.3	1 3/4	1 1/4	3.4	299/280/552	68		TFD		33		174	71	
Low Temperature															
ZFD13KVE EVI	4.0	11.7	1 1/4	1	1.9	246/250/481	38		TFD		9		64	65	
ZFD18KVE EVI	6.0	17.1	1 1/4	1	1.9	300/299/481	43		TFD		13		74	67	
ZFD25KVE EVI	7.5	21.4	1 1/4	1 1/4	1.9	246/250/481	43		TFD		16		102	70	
ZFD41K5E	10.0	35.3	1 3/4	1 1/4	3.4	310/280/534	66		TFD		20		118	73	
ZFD41K5E EVI	13.0	35.3	1 3/4	1 1/4	3.4	310/280/534	66		TFD		20		118	72	

* 1ph: 230V/ 50Hz

** 3 Ph: 380-420V/ 50Hz

** @ 1m: sound pressure level at 1m distance from the compressor, free field condition

For capacity data of ZFD54K5E please refer to select software.

Condensing Temperature 40°C															
R407A	Cooling Capacity (kW)							R407A	Power Input (kW)						
	Evaporating Temperature (°C)								Evaporating Temperature (°C)						
Model	-35	-30	-25	-20	-15	-10	-5	Model	-35	-30	-25	-20	-15	-10	-5
Medium Temperature															
ZBD21KCE				3.4*	4.3	5.2	6.3	ZBD21KCE				1.8*	1.9	1.9	2.0
ZBD29KCE				4.2*	5.5	6.8	8.4	ZBD29KCE				2.6*	2.6	2.6	2.6
ZBD38KCE				5.5*	7.3	9.1	11.2	ZBD38KCE				3.4*	3.4	3.4	3.5
ZBD45KCE				6.1*	8.1	10.1	12.5	ZBD45KCE				3.8*	3.8	3.8	3.9
ZBD57KCE				8.4*	11.1	13.8	17.0	ZBD57KCE				5.2*	5.2	5.3	5.3
ZBD76K5E			8.2*	11.3	14.5	18.4	22.8	ZBD76K5E			7.5*	7.1	7.1	7.3	7.5
ZBD114K5E			10.8*	15.6	20.5	26.3	32.8	ZBD114K5E			10.3*	10.2	10.2	10.3	10.5
Low Temperature with Enhanced Vapor Injection															
ZFD13KVE EVI	3.1	4.1	5.2	6.4	7.7	9.2	10.9	ZFD13KVE EVI	2.7	2.8	2.8	2.9	2.9	3.0	3.1
ZFD18KVE EVI	4.9	6.0	7.3	8.8	10.8	13.3	16.4	ZFD18KVE EVI	3.4	3.5	3.6	3.7	3.9	4.1	4.4
ZFD25KVE EVI	6.1	7.7	9.4	11.4	13.5	15.8	18.2	ZFD25KVE EVI	4.3	4.4	4.6	4.8	5.0	5.3	5.5
ZFD41K5E	7.3	9.3	11.8	14.6				ZFD41K5E	6.2	6.7	7.2	7.5			
ZFD41K5E EVI	10.1	12.6	15.5	18.7	22.1	25.8	23.7	ZFD41K5E EVI	6.7	6.9	7.2	7.4	7.6	7.8	8.0

Conditions: Suction Gas Return 20°C / Subcooling 0K

*Conditions: Suction Superheat 10K, Subcooling 0K

Preliminary Data

Condensing Temperature 40°C															
R407F	Cooling Capacity (kW)							R407F	Power Input (kW)						
	Evaporating Temperature (°C)								Evaporating Temperature (°C)						
Model	-35	-30	-25	-20	-15	-10	-5	Model	-35	-30	-25	-20	-15	-10	-5
Medium Temperature															
ZBD21KCE						5.1	6.3	ZBD21KCE						2.0	2.0
ZBD29KCE					5.8*	7.3	8.9	ZBD29KCE					2.9*	2.9	2.9
ZBD38KCE				5.7*	7.1*	8.9	10.8	ZBD38KCE				3.0*	3.3*	3.5	3.6
ZBD45KCE				6.4*	8.4*	10.8	13.2	ZBD45KCE				3.7*	3.9*	4.1	4.3
ZBD57KCE				8.5*	10.8*	13.8	17.0	ZBD57KCE				5.2*	5.2*	5.3	5.3
ZBD76K5E				11.5*	15.2	19.3	23.9	ZBD76K5E				7.5*	7.4	7.6	7.9
ZBD114K5E				15.8*	21.5	27.6	34.4	ZBD114K5E				10.7*	10.7	10.8	11.0
Low Temperature with Enhanced Vapor Injection															
ZFD13KVE EVI	3.3	4.3	5.4	6.7	8.1	9.7	11.4	ZFD13KVE EVI	2.8	2.9	3.0	3.0	3.1	3.1	3.2
ZFD18KVE EVI	4.9	6.1	7.6	9.3	11.3	13.5	16.0	ZFD18KVE EVI	3.8	4.0	4.1	4.2	4.4	4.5	4.7
ZFD25KVE EVI	6.4	8.0	9.9	11.9	14.2	16.6	19.1	ZFD25KVE EVI	4.5	4.7	4.9	5.1	5.3	5.5	5.8
ZFD41K5E	7.3	9.3	11.8	14.6				ZFD41K5E	6.2	6.7	7.2	7.5			
ZFD41K5E EVI	23.5	29.8	37.2	45.9				ZFD41K5E KVE	6.4	6.6	6.8	7.1			

Conditions: Suction Gas Return 20°C / Subcooling 0K

*Conditions: Suction Superheat 10K, Subcooling 0K

Preliminary Data

Condensing Temperature 40°C															
R448A/ R449A	Cooling Capacity (kW)							R448A/ R449A	Power Input (kW)						
	Evaporating Temperature (°C)								Evaporating Temperature (°C)						
Model	-35	-30	-25	-20	-15	-10	-5	Model	-35	-30	-25	-20	-15	-10	-5
Medium temperature															
ZBD21KCE			2.5*	3.3	4.2	5.2	6.4	ZBD21KCE			2.0*	2.0	2.0	2.0	2.0
ZBD38KCE			3.9*	5.7	7.2	8.9	10.9	ZBD38KCE			3.4*	3.4	3.4	3.4	3.4
ZBD45KCE			4.5*	6.6	8.4	10.5	12.8	ZBD45KCE			3.9*	3.9	3.9	3.9	3.9
ZBD57KCE			6.0*	8.7	11.0	13.6	16.5	ZBD57KCE			4.3*	4.5	4.7	4.9	5.1
ZBD76K5E					15.1	18.8	23.0	ZBD76K5E					6.9	6.9	7.0
ZBD114K5E					21.8	27.7	34.2	ZBD114K5E					10.7	10.8	10.9
Low Temperature with Enhanced Vapor Injection															
ZFD13KVE EVI	3.3	4.2	5.2	6.3	7.6	9.0	10.6	ZFD13KVE EVI	2.3	2.3	2.4	2.5	2.7	2.8	2.8
ZFD18KVE EVI	4.8	6.0	7.4	9.0	10.8	12.9	15.2	ZFD18KVE EVI	3.4	3.6	3.8	4.0	4.3	4.5	4.7
ZFD25KVE EVI	6.2	7.7	9.5	11.4	13.5	15.7	18.1	ZFD25KVE EVI	3.9	4.2	4.5	4.8	5.1	5.3	5.5
ZFD41K5E	7.4	9.4	11.8	14.6	17.9	21.7	26.2	ZFD41K5E	5.4	5.8	6.2	6.8	7.4	8.1	8.9
ZFD41K5E EVI	9.9	12.5	15.6	19.0	22.8	27.9	31.9	ZFD41K5E EVI	6.8	7.3	7.8	8.4	9.0	9.7	10.4

Conditions: Suction Gas Return 20°C / Subcooling 0K

*Conditions: Suction Superheat 10K, Subcooling 0K

Preliminary Data

Condensing Temperature 40°C															
R404A	Cooling Capacity (kW)							R404A	Power Input (kW)						
	Evaporating Temperature (°C)								Evaporating Temperature (°C)						
Model	-35	-30	-25	-20	-15	-10	-5	Model	-35	-30	-25	-20	-15	-10	-5
Medium Temperature															
ZBD21KCE			3.0	3.7	4.5	5.5	6.6	ZBD21KCE			1.9	1.9	2.0	2.1	2.1
ZBD29KCE			4.1	5.1	6.2	7.4	8.9	ZBD29KCE			2.5	2.6	2.7	2.8	2.8
ZBD38KCE			5.2	6.3	7.7	9.3	11.1	ZBD38KCE			3.1	3.2	3.4	3.5	3.6
ZBD45KCE			6.1	7.5	9.2	11.2	13.4	ZBD45KCE			3.7	3.8	4.0	4.2	4.4
ZBD57KCE			7.9	9.7	11.9	14.3	17.1	ZBD57KCE			4.7	4.9	5.2	5.4	5.5
ZBD76K5E			10.6	13.3	16.4	20.0	23.9	ZBD76K5E			7.5	7.5	7.6	7.7	7.8
ZBD114K5E			14.2	18.6	23.4	28.7	34.7	ZBD114K5E			11.3	11.3	11.3	11.4	11.4
Low Temperature with Enhanced Vapor Injection															
ZFD13KVE EVI	4.0	4.9	6.0	7.2	8.5	10.0	11.7	ZFD13KVE EVI	2.9	3.0	3.1	3.2	3.3	3.4	3.5
ZFD18KVE EVI	6.1	7.3	8.7	10.4	12.3	14.4	16.9	ZFD18KVE EVI	4.0	4.3	4.5	4.6	4.8	5.0	5.1
ZFD25KVE EVI	7.7	9.3	11.2	13.2	15.3	17.5	19.7	ZFD25KVE EVI	4.8	5.1	5.4	5.7	6.0	6.3	6.6
ZFD41K5E EVI	12.5	15.0	18.1	21.5	25.4	29.5	33.9	ZFD41K5E EVI	7.9	8.4	8.8	9.3	9.7	10.1	10.6
ZFD41K5E	8.6	10.6	13.0	15.7	18.9	22.6	27.0	ZFD41K5E	6.3	6.7	7.1	7.5	7.9	8.4	8.8

Conditions: Suction Gas Return 20°C / Subcooling 0K

Preliminary Data

Capacity Data

Condensing Temperature 40°C																	
R134a		Cooling Capacity (kW)						R134a		Power Input (kW)							
		Evaporating Temperature (°C)								Evaporating Temperature (°C)							
Model		-35	-30	-25	-20	-15	-10	-5	Model		-35	-30	-25	-20	-15	-10	-5
Medium Temperature																	
ZBD21KCE					2.0*	2.7	3.3	4.0	ZBD21KCE					1.2*	1.3	1.4	1.4
ZBD29KCE					2.5*	3.3	4.2	5.2	ZBD29KCE					1.7*	1.7	1.7	1.7
ZBD38KCE					3.2*	4.4	5.5	6.8	ZBD38KCE					1.9*	2.1	2.2	2.3
ZBD45KCE					3.8*	5.1	6.4	7.9	ZBD45KCE					2.3*	2.4	2.5	2.6
ZBD57KCE					4.7*	6.4	8.1	10.1	ZBD57KCE					3.4*	3.4	3.4	3.5
ZBD76K5E*					6.2	7.9	10.0	12.6	ZBD76K5E					5.3	5.3	5.4	5.4
ZBD114K5E*					8.1	11.1	14.6	18.7	ZBD114K5E					7.4	7.4	7.4	7.5

Conditions: Suction Gas Return 20°C / Subcooling 0K

* Conditions: Suction Superheat 10K, Subcooling 0K

Preliminary Data