ZFD & ZBD Copeland Scroll Digital™ Range for Medium and Low 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 condensing units, refrigeration packs, process and agricultural units.

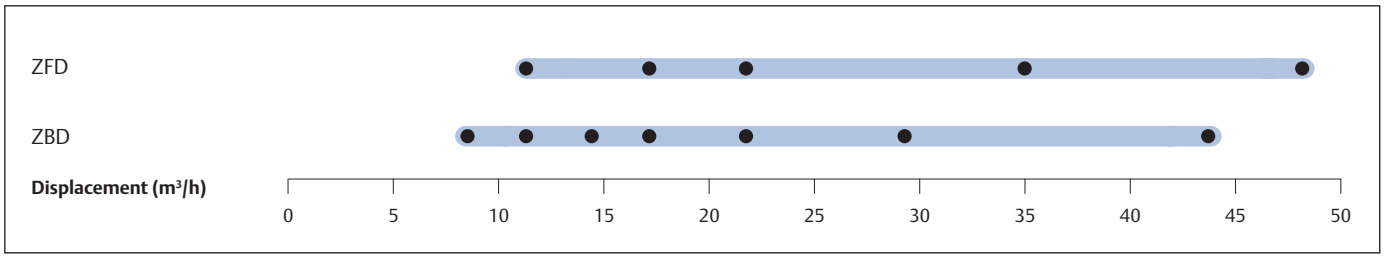
The Digital Scroll range consists of:
- ZBD models dedicated to medium temperature applications
- ZFD models with vapor injection for low temperatureapplications
- ZOD model designed for use in R744 (CO_2) - see page 60

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 and ZFD54K5E Summit Digital.

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 an additional 10dBA sound attenuation for silent operation
- Availability of Emerson's series of controllers that operate the Digital Scroll compressor

Maximum Allowable Pressure (PS)

- Digital ZBD:
  Low Side PS 22.6 bar(g) / High Side PS 32 bar(g)
- Digital ZFD:
  Low Side PS 19 bar(g) / High Side PS 28 bar(g)

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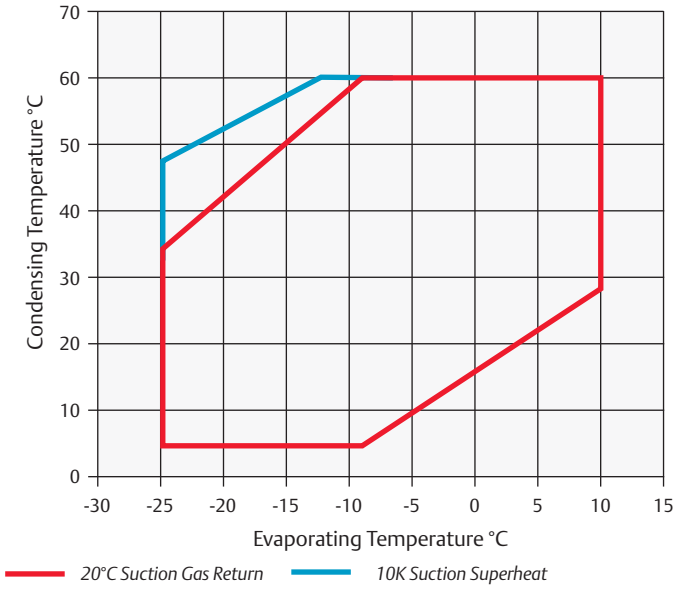
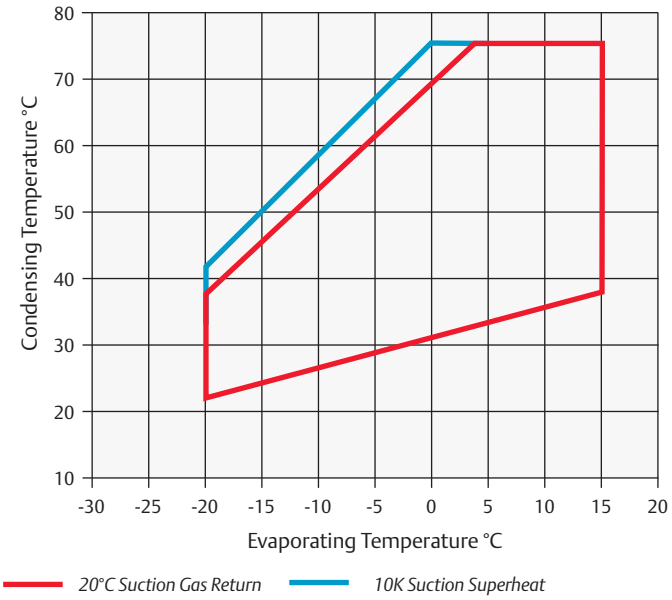
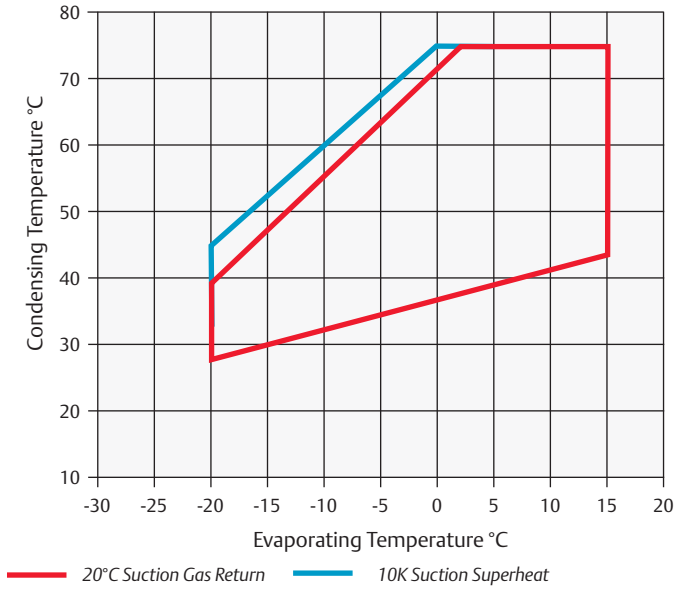
Operating Envelope R448A/R449A - For ZBD Digital Models



Operating Envelope R513A - For ZBD Digital Models

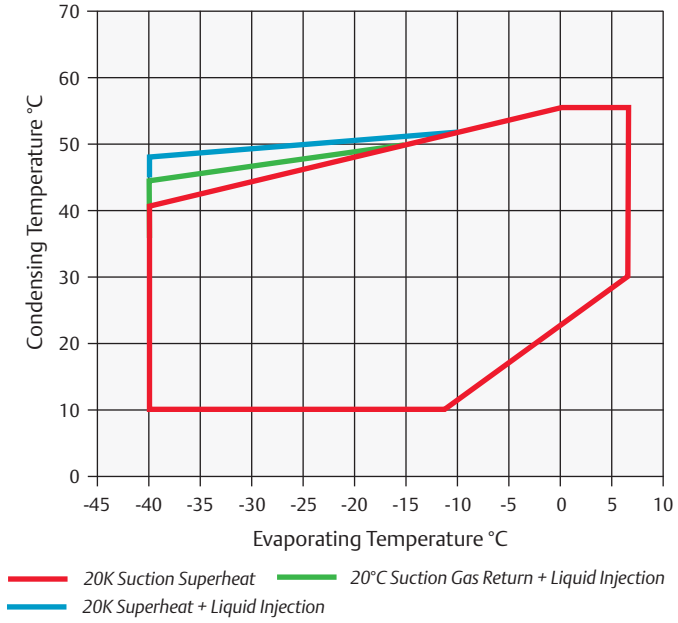


Operating Envelope R450A - For ZBD Digital Models



For individual model details please refer to Select software.

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)	Rotalock Suction (inch)	Rotalock 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 ¼	1	1.2	243/243/432	30.2	PFJ	TFD	16.5	6.7	97.0	40.0	62.0
ZBD29KCE	4.0	11.4	1 ¼	1	1.4	245/243/463	32.7		TFD		7.9		48.0	58.0
ZBD38KCE	5.0	14.4	1 ¼	1	1.9	246/250/481	38.1		TFD		11.3		64.0	67.0
ZBD45KCE	6.0	17.1	1 ¼	1	1.9	241/246/481	39.9		TFD		12.3		74.0	61.0
ZBD57KCE		21.4	1 ¼	1 ¼	1.9	246/257/481	43.1		TFD		15.9		102.0	68.0
ZBD76K5E	10	28.8	1.75	1.25	3.37	299/280/534	61.2	TFD	24	118	66			
ZBD114K5E	15	43.3	1.75	1.25	3.37	299/280/552	68.9	TFD	33.3	174	71			
Low Temperature														
ZFD13KVE EVI	4.0	11.7	1 ¼	1	1.9	246/250/481	38.6		TFD		9.0		64.0	65.0
ZFD18KVE EVI	6.0	17.1	1 ¼	1	1.9	300/299/481	43.1		TFD		13.8		74.0	67.0
ZFD25KVE EVI	7.5	21.4	1 ¼	1 ¼	1.9	246/250/481	43.1		TFD		16.0		102.0	70.0
ZFD41K5E	10	35.3	1 ¾	1 ¼	3.4	363/312/534	66.2		TFD		20.4		118	73.0

* 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.

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Capacity Data

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			
ZFD54K5E	on request							ZFD54K5E	on request						

Suction Gas Return 20°C / Subcooling 0K
*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 KVE	23.5	29.8	37.2	45.9				ZFD41K5E KVE	6.4	6.6	6.8	7.1			
ZFD54K5E	on request							ZFD54K5E	on request						

Suction Gas Return 20°C / Subcooling 0K
*Suction Superheat 10K, Subcooling 0K
Preliminary data

Capacity 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	on request							ZBD76K5E	on request								
ZBD114K5E	on request							ZBD114K5E	on request								
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		

Suction Gas Return 20°C / Subcooling 0K
*Suction Superheat 10K, Subcooling 0K
Preliminary data

For capacity data of ZFD41K5E and ZFD54K5E please refer to Select software.

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		
ZFD54K5E EVI	on request							ZFD54K5E EVI	on request								

Suction Gas Return 20°C / Subcooling 0K
Preliminary data

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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	on request								ZBD76K5E	on request						
ZBD114K5E	on request								ZBD114K5E	on request						

Suction Gas Return 20°C / Subcooling 0K
*Suction Superheat 10K, Subcooling 0K
Preliminary data

Condensing Temperature 40°C															
R450A	Cooling Capacity (kW)								R450A	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				1.6*	2.3	2.9	3.6		ZBD21KCE				1.0*	1.1	1.1	1.1
ZBD38KCE				2.7*	3.8	4.8	5.9		ZBD38KCE				1.7*	1.8	1.8	1.9
ZBD45KCE				3.2*	4.5	5.7	7.2		ZBD45KCE				2.0*	2.1	2.2	2.3
ZBD57KCE				4.0*	5.5	7.0	8.7		ZBD57KCE				2.6*	2.7	2.8	2.9
ZBD76K5E	on request								ZBD76K5E	on request						
ZBD114K5E	on request								ZBD114K5E	on request						

Suction Gas Return 20°C / Subcooling 0K
*Suction Superheat 10K, Subcooling 0K
Preliminary data

Condensing Temperature 40°C															
R513A	Cooling Capacity (kW)								R513A	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				1.9*	2.6*	3.3*	4.2		ZBD21KCE				1.2*	1.2*	1.3*	1.3
ZBD38KCE				3.3*	4.3*	5.4*	7.0		ZBD38KCE				2.0*	2.1*	2.2*	2.2
ZBD45KCE				4.0*	5.5	6.9	8.5		ZBD45KCE				2.4*	2.5	2.6	2.7
ZBD57KCE				5.0*	6.4*	8.1*	10.6		ZBD57KCE				3.0*	3.2*	3.3*	3.4
ZBD76K5E	on request								ZBD76K5E	on request						
ZBD114K5E	on request								ZBD114K5E	on request						

Suction Gas Return 20°C / Subcooling 0K
*Suction Superheat 10K, Subcooling 0K
Preliminary data