

ZBD Digital Scroll and Control Solutions



Product Catalogue



Using advanced technologies to provide customers with best-in-class products

Emerson commercial & residential solutions is the world's leading provider of heating, ventilation, air conditioning and refrigeration solutions for residential, commercial and industrial applications, supporting the industry with advanced technology, technical support and training services.

Over the past 80 years, Emerson has introduced a number of pioneering technologies to the market. From the first semi-hermetic compressor from the 1940s, to fully hermetic compressors of the 1950s, the efficient Discus semi-hermetic compressors in the 1980s, the scroll compressors for air conditioning and heating in the 1990s, to today's latest Stream semi-hermetic and digital scroll compressors. Emerson has been on the forefront of technological innovation.

Not only that, but we also offer exceptional solutions for the air conditioning and refrigeration markets. Emerson is the leading solution provider for the air conditioning and refrigeration industry. The company's Copeland brand offers a wide range of solutions: from scroll and semi-hermetic compressors for both primary refrigerants to variable capacity outputs. Regulated compressors and compressors equipped with intelligent electronic control components. Emerson is leading the development of compressor technology to new heights.

Our mission

- Ensuring health and human comfort
- Protecting food quality and sustainability
- Advancing energy efficiency and environmental conservation
- Creating sustainable infrastructure

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Leading innovations in digital scroll technology

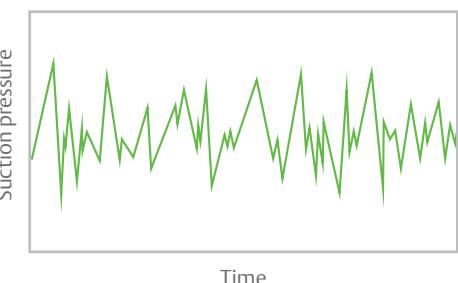
Emerson's scroll compression technology, introduced in 1987, revolutionized the compressor industry. In 2012, Emerson's 100 millionth scroll compressor rolled off the assembly line. It marked an important milestone for Emerson as a world leader in the development and application of scroll technology.

Energy-efficient refrigeration through digital modulation

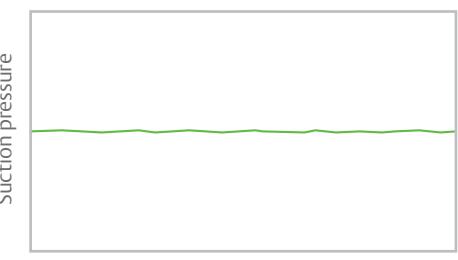
Today, Emerson is the world's largest manufacturer of refrigeration compressors, underscoring Emerson's thrust of ensuring food safety and protecting the environment. Leveraging on Emerson's vast global network and R&D resources, the company also continues to develop the ultimate in climate technology for various businesses. Emerson helps provide solutions to achieve high efficiency systems for cold storage warehouses, supermarkets, quick service restaurants, meat trading and processing facilities, seafood import and export establishments, agricultural depots and retail outlets - green technologies with less environmental impact.

With today's growing need to address energy efficiency and precise temperature control, Emerson provides ZBD compressors - digital scroll technology in a simplified, compact design yet very reliable. Precise capacity modulation control proves beneficial in a number of applications, including cold rooms that need accurate temperature control as well as multiple evaporator systems with varying cooling loads. The ZBD features continuous capacity modulation range of 10-100%. Compared to cycling compressors, the stepless capacity control of the ZBD enables for a smoother and a more accurate approach to load matching. Furthermore, the streamlined design of digital scroll technology requires less control boards than variable speed compressor technology which contributes to its high reliability and simplicity in operation.

Compressor modulation by cycling compressor on and off
Saw tooth profile of suction pressure for fixed speed compressors



Compressor modulation by digital scroll compressors
Smooth system suction pressure



Main features and advantages:

- 10-100% stepless capacity modulation, ensuring precise temperature control and reducing goods weight loss
- Less complicated compared to variable speed technologies
- More reliable compared to other modulation technologies due to elimination of oil return issues
- Proven scroll technology paired with mechanical unloading system provides greater reliability and efficiency



Digital Scroll Solution

Precise temperature control

- stepless capacity adjustment to meet year-round load changes

Safe operation

- adapts to multiple evaporator systems, effectively prevents floodback

Reduce operating costs

- energy efficient, best life cycle cost

Easy to use

- easy to design, easy operation and maintenance

High reliability

- proven controller for high reliability



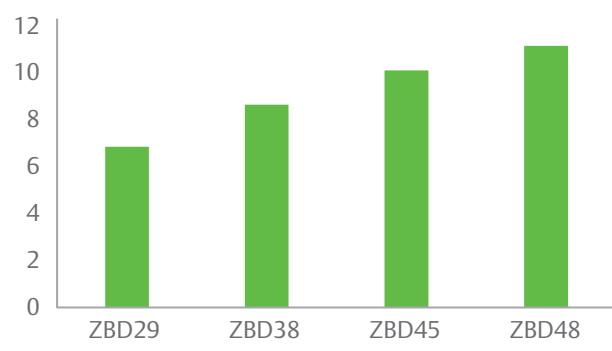
Digital controller

- Advanced digital unit controller
- Provides a variety of pressure and temperature protections, ensuring system security and stability.

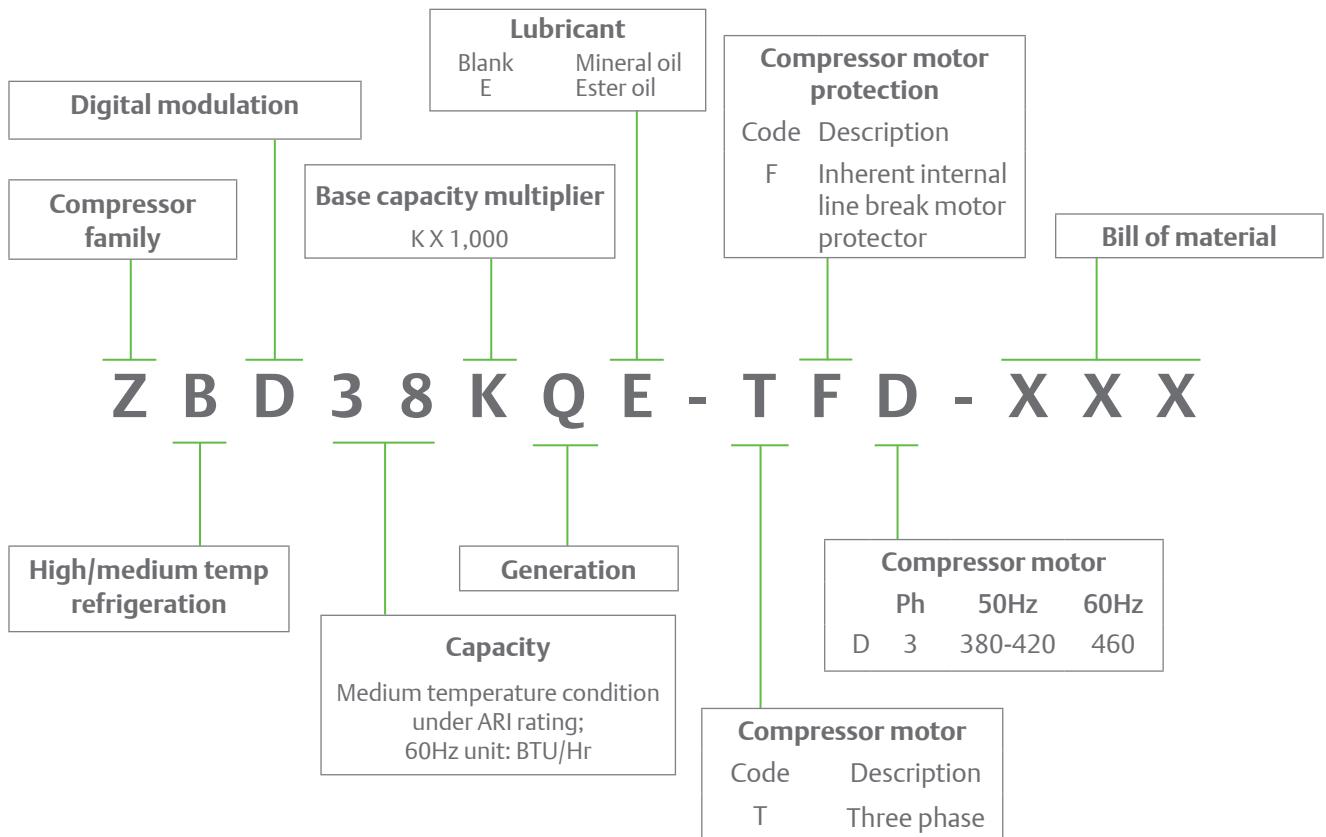
Fan speed controller

- Adjustable AC condenser fan speed

Cooling capacity, kW



Nomenclature

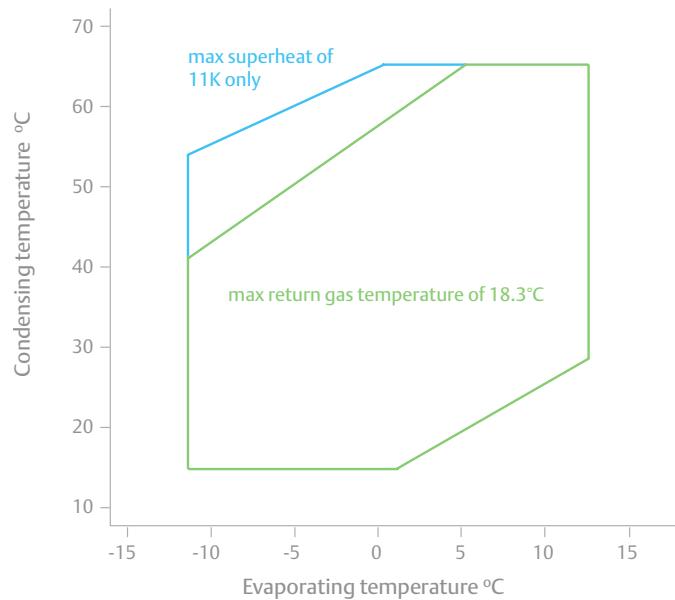


Bill of material

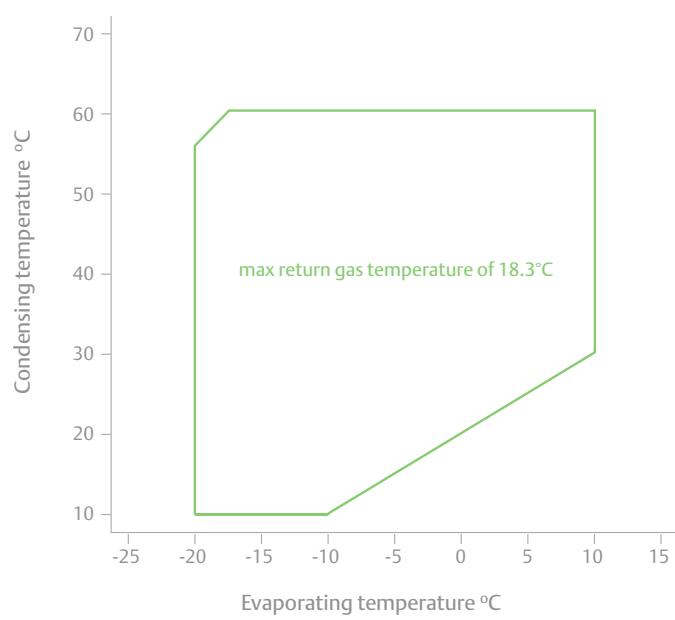
Configuration code	BOM-578
Digital scroll compressor	X1
Solenoid valve body and coil (220V 50/60 Hz)	X1
Digital Controller (XC35CX)	X1
Low pressure transducer	X1
Discharge temperature sensor	X1
Fan speed controller	Optional
Mid-coil temperature sensor	Optional

Operating envelopes

R22



R404A



Performance data

Q=Capacity (kW) P=Power input (kW) 3-Phase

R22 50 Hz

Compressor	Condensing temperature °C	Evaporating temperature °C						
		-12	-10	-5	0	5	10	12.5
ZBD29kQ	Q	15	7.90	8.53	10.30	12.40		
		20	7.58	8.19	9.89	11.90	14.20	
		30	6.99	7.55	9.11	10.90	13.00	15.45
		40	6.37	6.89	8.32	9.98	11.90	14.10
		50	5.60	6.09	7.45	8.96	10.70	13.80
		55		5.62	6.91	8.41	10.05	11.95
		60			6.34	7.75	9.38	11.20
		65				7.07	8.62	10.35
ZBD38kQ	P	15	1.46	1.48	1.52	1.57		
		20	1.62	1.64	1.68	1.74	1.80	
		30	1.98	2.01	2.06	2.11	2.17	2.24
		40	2.44	2.46	2.52	2.57	2.62	2.67
		50	3.05	3.08	3.14	3.18	3.21	3.24
		55		3.46	3.52	3.56	3.58	3.60
		60			3.96	3.99	4.01	4.01
		65				4.49	4.50	4.49
ZBD45kQ	Q	15	8.72	9.20	10.60	12.30		
		20	9.12	9.69	11.30	13.25	15.50	
		30	8.86	9.55	11.45	13.60	16.10	18.95
		40	7.95	8.64	10.50	12.70	15.15	17.95
		50	7.20	7.79	9.48	11.35	13.50	16.00
		55		7.71	9.12	10.80	12.75	14.95
		60			9.10	10.45	12.15	14.05
		65				10.50	11.80	13.35
ZBD45kQ	P	15	2.24	2.35	2.65	3.00		
		20	2.21	2.28	2.48	2.70	2.97	
		30	2.55	2.58	2.65	2.72	2.81	2.92
		40	3.14	3.17	3.23	3.27	3.29	3.32
		50	3.65	3.73	3.90	4.01	4.09	4.15
		55		3.90	4.16	4.36	4.51	4.62
		60			4.32	4.63	4.88	5.08
		65			12.50	4.79	5.17	5.48

Notes: Suction return temperature 18.3°C

Suction superheat 11.0K

Liquid subcooling 0.0K

Performance data

Q=Capacity (kW) P=Power input (kW) 3-Phase

R22 50 Hz

Compressor	Condensing temperature °C	Evaporating temperature °C						
		-12	-10	-5	0	5	10	12.5
ZBD48kQ	15	11.55	12.20	14.05	16.30			
	20	12.10	12.85	15.05	17.60	20.60		
	30	11.80	12.75	15.25	18.15	21.40	25.20	27.30
	40	10.65	11.60	14.10	17.00	20.30	24.00	26.00
	50	9.79	10.60	12.85	15.35	18.25	21.60	23.40
	55	-	10.55	12.45	14.70	17.30	20.30	22.00
	60	-	-	12.50	14.35	16.60	19.15	20.60
	65	-	-	-	14.45	16.20	18.30	19.50
P	15	2.96	3.11	3.51	3.97			
	20	2.92	3.01	3.28	3.58	3.93	-	-
	30	3.35	3.39	3.49	3.59	3.71	3.86	3.96
	40	4.11	4.16	4.24	4.29	4.33	4.37	4.40
	50	4.76	4.87	5.10	5.25	5.37	5.45	5.48
	55		5.07	5.43	5.70	5.90	6.06	6.13
	60			5.62	6.04	6.38	6.65	6.77
	65				6.23	6.74	7.17	7.35

Notes: Suction return temperature 18.3°C

Suction superheat 11.0K

Liquid subcooling 0.0K

Performance data

Q=Capacity (kW) P=Power input (kW) 3-Phase

R404A 50 Hz

Compressor	Condensing temperature °C	Evaporating temperature °C						
		-20	-15	-10	-5	0	5	10
ZBD29KQE	Q	10	7.13	8.67	10.45			
		20	6.49	7.90	9.54	11.45	13.65	
		30	5.80	7.06	8.53	10.20	12.15	14.40
		40	5.04	6.14	7.40	8.86	10.55	12.50
		50	4.21	5.11	6.15	7.36	8.76	10.40
		60		3.97	4.77	5.70	6.80	8.10
	P	10	1.39	1.36	1.35			
		20	1.83	1.85	1.86	1.87	1.91	
		30	2.19	2.25	2.29	2.32	2.35	2.42
		40	2.63	2.72	2.78	2.82	2.86	2.91
		50	3.28	3.41	3.50	3.55	3.58	3.61
		60		4.47	4.57	4.63	4.66	4.69
ZBD38KQE	Q	10	9.18	11.00	13.10			
		20	8.14	9.82	11.85	14.15	16.75	
		30	7.19	8.75	10.55	12.65	15.05	17.70
		40	6.28	7.64	9.23	11.05	13.15	15.50
		50	5.33	6.46	7.77	9.29	11.05	13.05
		60		6.15	6.14	7.30	8.66	10.25
	P	10	1.84	1.88	1.90			
		20	2.37	2.46	2.53	2.58	2.60	
		30	2.85	2.97	3.09	3.18	3.25	3.30
		40	3.37	3.52	3.67	3.79	3.90	3.99
		50	4.01	4.18	4.35	4.50	4.64	4.75
		60		5.03	5.21	5.38	5.53	5.67
ZBD45KQE	Q	10	10.90	13.05	15.60			
		20	9.69	11.70	14.05	16.80	19.90	
		30	8.56	10.40	12.55	15.05	17.85	21.10
		40	7.47	9.09	10.95	13.15	15.65	18.45
		50	6.35	7.69	9.24	11.05	13.15	15.50
		60		6.12	7.30	8.68	10.30	12.15
	P	10		2.25	2.27			
		20	2.20	2.93	3.01	3.07	3.10	
		30	2.82	3.55	3.68	3.79	3.88	3.93
		40	3.40	4.20	4.37	4.52	4.65	4.76
		50	4.02	4.99	5.18	5.37	5.53	5.67
		60	4.78	6.01	6.22	6.42	6.61	6.77
ZBD48KQE	Q	10		14.70	17.50			
		20	12.30	13.15	15.85	18.90	22.40	
		30	9.63	11.70	14.15	16.90	20.10	23.70
		40	8.40	10.25	12.35	14.80	17.60	20.80
		50	7.14	8.65	10.40	12.45	14.75	17.45
		60		6.89	8.21	9.77	11.60	13.70
	P	10	2.42	2.47	2.50			
		20	3.10	3.22	3.31	3.38	3.41	
		30	3.73	3.90	4.04	4.17	4.26	4.32
		40	4.41	4.61	4.80	4.97	5.11	5.23
		50	5.25	5.48	5.69	5.89	6.07	6.23
		60		6.60	6.83	7.05	7.25	7.43

Notes: Suction return temperature 18.3°C
Liquid subcooling 0.0K

Performance data

Q=Capacity (kW) P=Power input (kW) 3-Phase

R22 60 Hz

Compressor	Condensing temperature °C	Evaporating temperature °C						
		-12	-10	-5	0	5	10	12.5
ZBD29kQ	Q	15	9.49	10.25	12.35	14.85		
		20	9.11	9.84	11.90	14.25	17.00	
		30	8.40	9.07	10.95	13.10	15.60	18.50
		40	7.66	8.27	9.98	11.95	14.25	16.90
		50	6.75	7.32	8.94	10.75	12.80	16.55
		55		6.79	8.30	10.10	12.05	14.35
		60			7.65	9.31	11.25	13.40
		65				8.52	10.35	12.45
ZBD38kQ	P	15	1.76	1.77	1.82	1.89		
		20	1.95	1.97	2.02	2.09	2.17	
		30	2.38	2.41	2.47	2.54	2.61	2.74
		40	2.93	2.96	3.03	3.09	3.15	3.21
		50	3.67	3.70	3.77	3.82	3.86	3.90
		55		4.16	4.23	4.28	4.31	4.33
		60			4.76	4.80	4.82	4.82
		65				5.40	5.41	5.40
ZBD45kQ	Q	15	10.45	11.05	12.70	14.75		
		20	10.95	11.65	13.60	15.90	18.65	
		30	10.65	11.45	13.75	16.35	19.35	22.80
		40	9.56	10.40	12.65	15.25	18.20	21.60
		50	8.67	9.39	11.40	13.70	16.30	19.30
		55		9.29	11.00	13.05	15.40	18.10
		60			11.00	12.65	14.65	17.00
		65				12.70	14.25	16.15
ZBD45kQ	P	15	2.68	2.81	3.17	3.58		
		20	2.65	2.74	2.97	3.24	3.55	
		30	3.06	3.09	3.18	3.27	3.38	3.52
		40	3.76	3.80	3.88	3.93	3.96	4.00
		50	4.38	4.48	4.68	4.82	4.92	5.00
		55		4.68	5.00	5.24	5.42	5.57
		60			5.20	5.57	5.87	6.12
		65				5.77	6.22	6.61

Notes: Suction return temperature 18.3°C

Suction superheat 11.0K

Liquid subcooling 0.0K

Performance data

Q=Capacity (kW) P=Power input (kW) 3-Phase

R22 60 Hz

Compressor	Condensing temperature °C	Evaporating temperature °C						
		-12	-10	-5	0	5	10	12.5
ZBD48kQ	15	13.85	14.60	16.85	19.55			
	20	14.45	15.40	17.95	21.00	20.60		
	30	14.05	15.15	18.15	21.60	21.40	30.10	27.30
	40	12.55	13.65	16.70	20.10	20.30	28.50	26.00
	50	11.30	12.30	14.90	18.00	18.25	25.40	23.40
	55	-	12.10	14.40	17.15	17.30	23.80	22.00
	60	-	-	14.35	16.55	16.60	22.30	20.60
	65	-	-	-	16.60	16.20	21.20	19.50
P	15	3.69	3.88	4.39	4.96			
	20	3.64	3.77	4.10	4.47	4.92	-	-
	30	4.20	4.25	4.38	4.50	4.65	4.85	4.97
	40	5.19	5.24	5.35	5.41	5.47	5.52	5.55
	50	6.04	6.18	6.46	6.66	6.81	6.91	6.96
	55		6.46	6.90	7.24	7.51	7.71	7.79
	60			7.17	7.70	8.13	8.48	8.63
	65				7.97	8.62	9.16	9.40

Notes:
 Suction return temperature 18.3°C
 Suction superheat 11.0K
 Liquid subcooling 0.0K

Performance data

Q=Capacity (kW) P=Power input (kW) 3-Phase

R404A 60 Hz

Compressor	Condensing temperature °C	Evaporating temperature °C						
		-20	-15	-10	-5	0	5	10
ZBD29KQE	Q	10	8.57	10.45	12.60			
		20	7.76	9.46	11.45	13.70	16.35	
		30	6.98	8.51	10.25	12.30	14.60	14.40
		40	6.13	7.47	8.99	10.75	12.75	12.50
		50	5.10	6.24	7.51	8.97	10.65	10.40
		60		4.71	5.72	6.87	8.19	8.10
	P	10	1.66	1.63	1.61			
		20	2.18	2.21	2.22	2.25	2.30	
		30	2.63	2.70	2.75	2.79	2.84	2.92
		40	3.17	3.29	3.36	3.41	3.45	3.50
		50	3.96	4.12	4.21	4.27	4.29	4.31
		60	11.15	5.36	5.47	5.53	5.52	5.50
ZBD38KQE	Q	10		13.35	15.95			
		20	9.91	12.00	14.40	17.20	20.40	
		30	8.75	10.65	12.85	15.40	18.30	21.60
		40	7.63	9.30	11.25	13.45	16.00	18.90
		50	6.49	7.86	9.46	11.30	13.45	15.85
		60	2.22	6.27	7.47	8.89	10.55	12.45
	P	10		2.27	2.30			
		20	2.85	2.96	3.05	3.11	3.14	
		30	3.43	3.59	3.72	3.83	3.92	3.98
		40	4.06	4.25	4.42	4.57	4.71	4.81
		50	4.83	5.04	5.24	5.43	5.59	5.73
		60	13.30	6.07	6.28	6.49	6.67	6.84
ZBD45KQE	Q	10		45.90	18.95			
		20	11.80	14.25	17.10	20.40	24.20	
		30	10.40	12.65	15.30	18.30	21.70	25.60
		40	9.08	11.05	13.35	16.00	19.00	22.40
		50	7.71	9.35	11.25	13.45	16.00	18.85
		60	2.66	7.45	8.88	10.55	12.55	14.80
	P	10		2.74	2.75			
		20	3.41	3.54	3.64	3.72	3.75	
		30	4.11	4.29	4.45	4.59	4.69	4.75
		40	4.86	5.08	5.29	5.47	5.63	5.75
		50	5.78	3.03	6.27	6.49	6.69	6.86
		60	14.75	7.26	7.52	7.76	7.99	8.19
ZBD48KQE	Q	10		17.65	21.00			
		20	13.10	15.80	19.00	22.70	22.40	
		30	11.55	14.05	16.95	20.30	20.10	28.50
		40	10.10	12.25	14.80	17.75	17.60	24.90
		50	8.57	10.40	12.50	14.95	14.75	20.90
		60	2.92	8.27	9.86	11.75	11.60	16.45
	P	10		2.99	3.02			
		20	3.75	3.89	4.01	4.09	4.13	
		30	4.52	4.72	4.89	5.04	5.16	5.23
		40	5.34	5.59	5.81	6.02	6.19	6.33
		50	6.36	6.63	6.90	7.14	7.35	7.54
		60		7.99	8.27	8.53	8.78	9.00

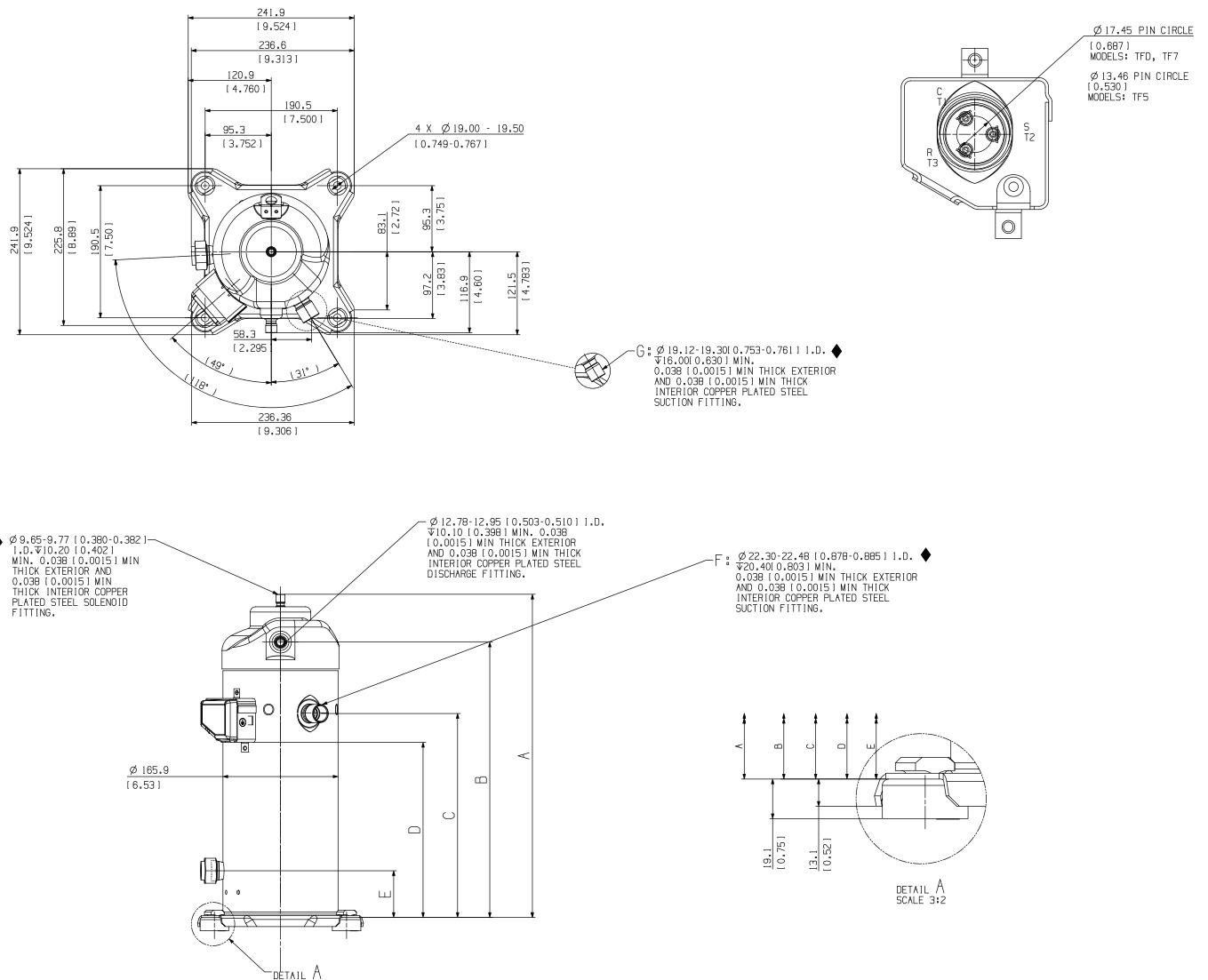
Notes: Suction return temperature 18.3°C
Liquid subcooling 0.0K

Technical data

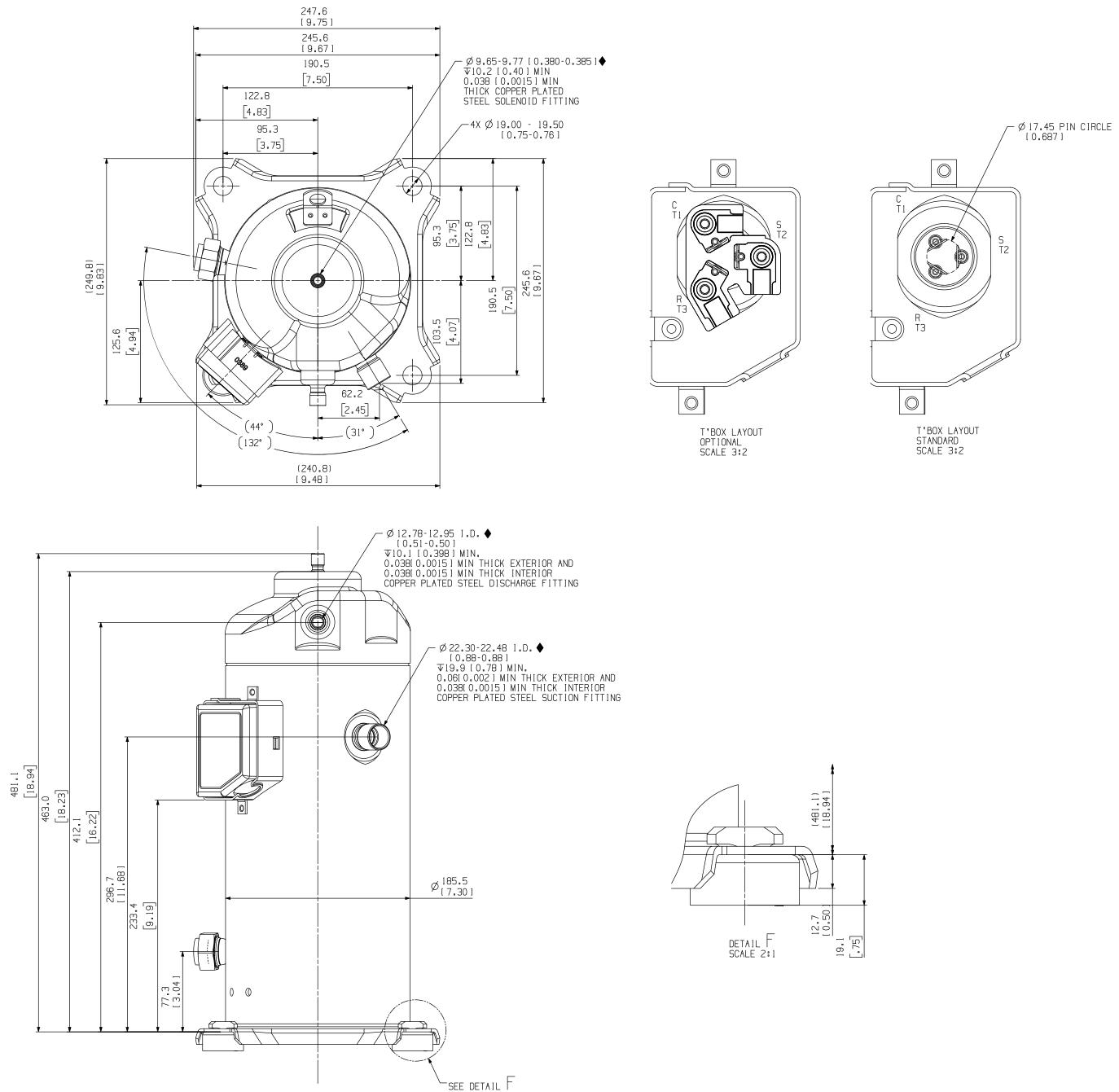
Model		ZBD29KQ ZBD29KQE	ZBD38KQ ZBD38KQE	ZBD45KQ ZBD45KQE	ZBD48KQ ZBD48KQE
Motor type		TFD	TFD	TFD	TFD
Displacement	50 Hz	11.4	11.4	17.1	18.8
	60 Hz	13.8	13.8	20.6	22.6
LRA	50 Hz	TFD	48.0	74.0	100.0
	60 Hz	TFD	46.0	70.0	100.0
Max operating current	50 Hz	TFD	7.9	12.5	15.2
	60 Hz	TFD	10.0	12.5	15.2
Max continuous current	50 Hz	TFD	10.8	14.0	17.0
	60 Hz	TFD	11.0	14.0	18.0
RLA	KQ	TFD	7.9	10.0	12.9
	KQE	TFD	7.7	9.6	12.8
Oil charge, L	TFD	1.36	1.36	1.89	1.89
Oil recharge, L	TFD	1.24	1.24	1.77	1.77
Nominal power (HP)		4	4	6	7
Crankcase heater (W)		70	70	70	70
Connection tube size (inch)					
Discharge tube outer diameter		1/2	1/2	1/2	3/4
Suction tube outer diameter		7/8	7/8	7/8	7/8
Dimension (mm)					
Length		241	241	241	
Width		241	246	246	
Height		479	494	494	
Mounting parts installation size (hole size, mm)		190X190 (8.5)			
Net weight (kg)		72	84	88	90
Sound power (dBA)		78	78	78	78

Dimensional drawing

ZBD29KQ(E)

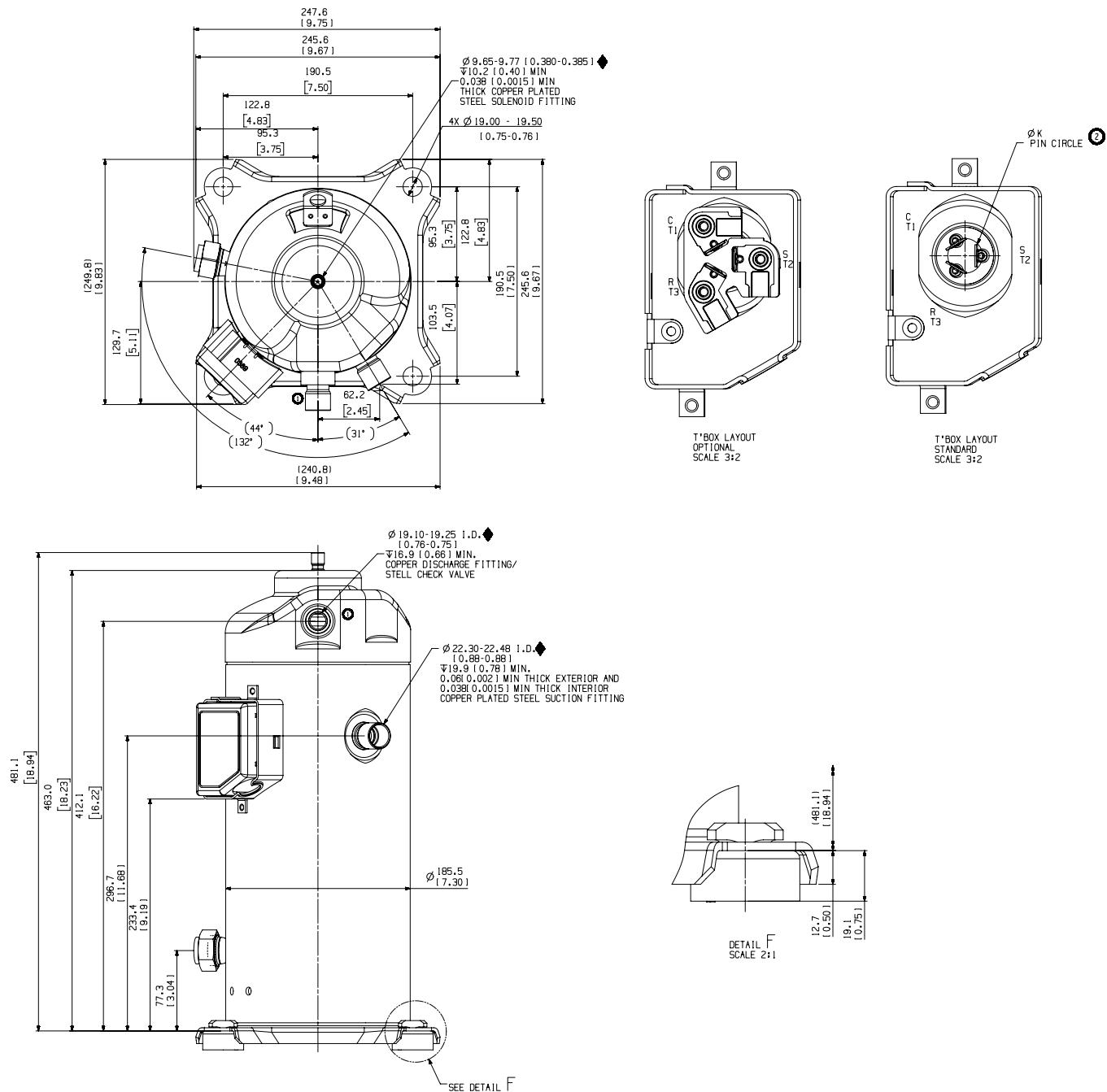


Dimensional drawing ZBD38-45KQ(E)



Dimensional drawing

ZBD48KQ(E)



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