

Copeland™ ZH Fixed Speed Scroll Compressor Range for R410A and R407C

Copeland ZH Scroll Compressor Range

The ZH compressor range is optimized for reversible and heat pump applications. In addition to the existing R407C range, a complete new range optimized for R410A has been developed. Both ranges are based on three platform sizes and cover a capacity of 4kW to 38kW.

ZH heating compressors have been optimized for reversible heating systems, they deliver higher capacity and efficiency at low evaporating (heat source) temperatures and are therefore better adapted to heating requirements than standard air conditioning compressors. Due to their larger operating map they also require less additional heating (electrical or gas) to cover the full heating demand on the coldest days and therefore further improve the system seasonal efficiency.

Copeland ZH Scroll Compressors with Enhanced Vapor Injection

ZH heating compressors with Enhanced Vapor Injection have been further optimized to ensure best-in-class performances in dedicated heating applications. This technology allows replacement of traditional boilers in new building and retrofit applications, without the need of substituting existing heating elements in the building.

ZH Copeland scroll heating compressors with Enhanced Vapor Injection have an additional port to inject vapor within the compression process. This improves system performances by increasing the heating capacity for a given compressor displacement. Additional benefits are the reduction of the gas



ZH scroll compressor

discharge temperature and the extension of the operating envelope which enable the production of high temperature water at all working conditions.

ZH heating compressors reach the same high standards of durability and reliability as other Copeland scroll compressors. This includes the ability to handle relatively large amounts of liquid, which is known to damage or cause compressor failures. Fewer moving parts, robust running gear and low vibration due to balanced compression mechanism make the ZH range of Copeland scroll compressors the most reliable solution available in the heat pump market.

ZH Nomenclature Guidelines

ZH**K4E

Qualified for R407C/R134a
without enhanced vapor injection - ** capacity in Btu/h

ZH**KVE

Qualified for R407C only
enhanced vapor injection - ** capacity in kW

ZH**KRE

Qualified for R513A
without enhanced vapour injection ** capacity in kW

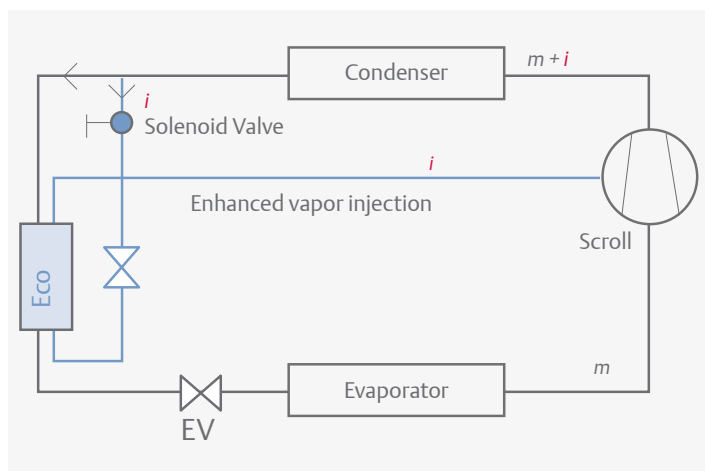
ZH**K1P

Qualified for R410A only
without enhanced vapor injection - ** capacity in kW

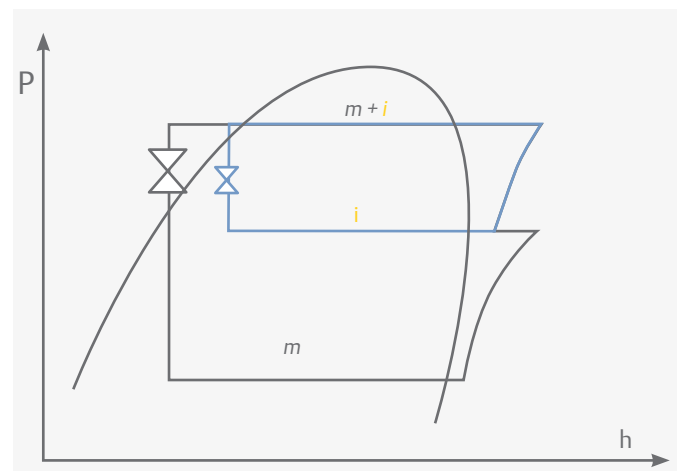
ZH**K1P

Qualified for R410A only
enhanced vapor injection - ** capacity in kW

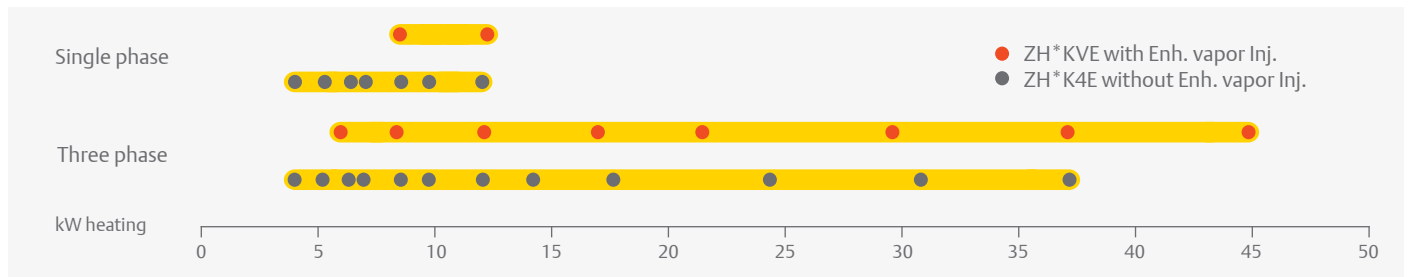
Enhanced Vapor Injection: System Design



Enhanced Vapor Injection: Enthalpy Diagram

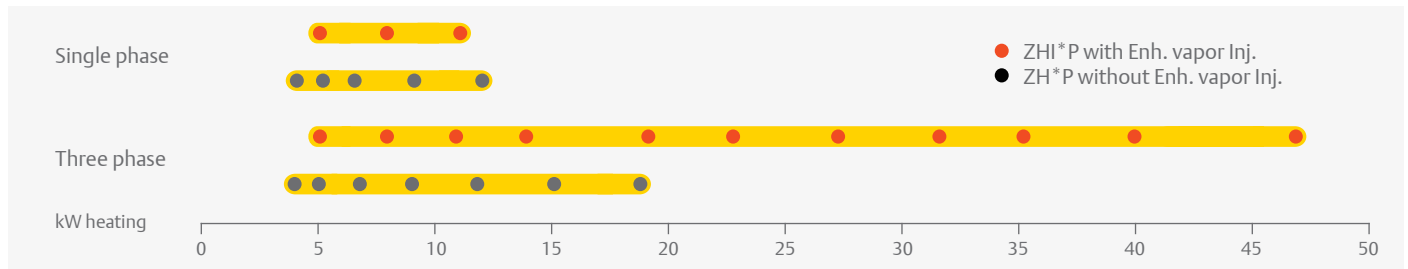


ZH*K4E / ZH*KVE Scroll Compressor Line-up R407C



Conditions: Evaporating -7°C, Condensing 50°C, 4K Subcooling, 5K Superheat

ZH*P / ZHI*P Scroll Compressor Line-up R410A



Conditions: Evaporating -7°C, Condensing 50°C, 4K Subcooling, 5K Superheat

ZH*KRE Scroll Compressor Line-up R513A



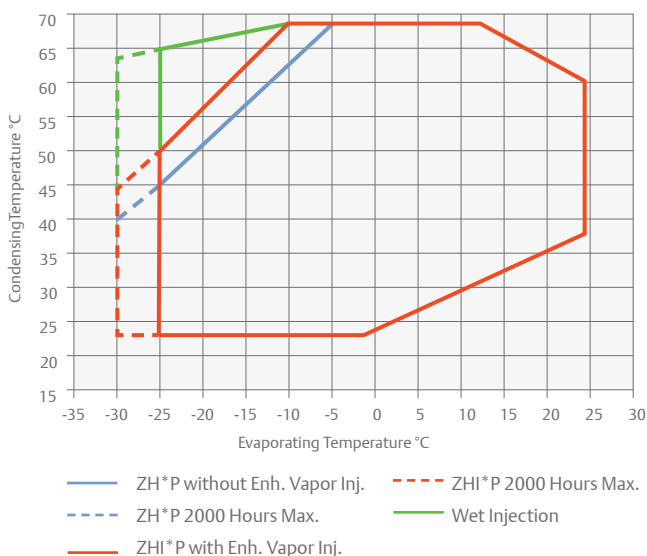
Features and Benefits

- Copeland™ scroll axial and radial compliance for high reliability
- High efficiency and increased heating capacity
- High water temperature for all applications
- Low sound and low vibration level
- Tandem combination for superior seasonal efficiency
- Enhanced Vapor Injection technology for best seasonal efficiency

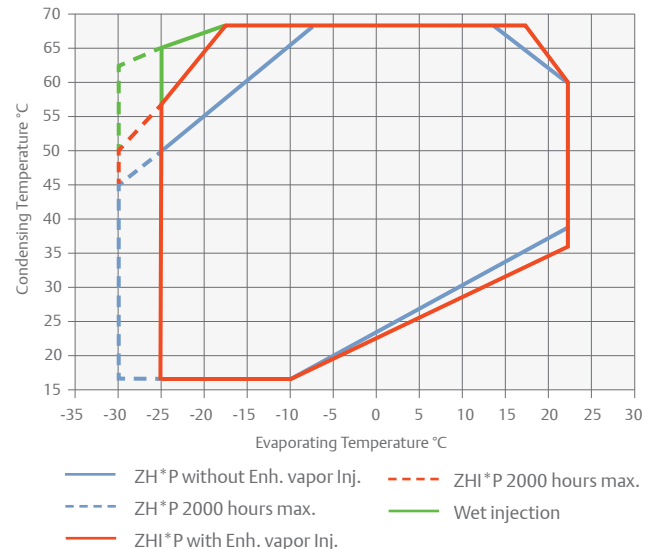
Maximum Allowable Pressure (PS)

- ZH(I)04K1P to ZH(I)23K1P:
Low Side PS 28 bar(g) / High Side PS 45 bar(g)
- ZHI27K1P to ZHI46K1P:
Low Side PS 29.5 bar(g) / High Side PS 53 bar(g)
- ZH12K4E to ZH45K4E:
Low Side PS 20 bar(g) / High Side PS 32 bar(g)
- ZH56K4E to ZH11M4E:
Low Side PS 22.6 bar(g) / High Side PS 32 bar(g)
- ZH09KVE to ZH18KVE:
Low Side PS 20 bar(g) / High Side PS 32 bar(g)
- ZH24KVE to ZH48KVE:
Low Side PS 22.6 bar(g) / High Side PS 32 bar(g)

Operating Envelope R410A Heating



Operating Envelope R407C Heating



Refer to Emerson's Select Software for individual model operating envelopes and other refrigerants.

Technical Overview

R410A	Nominal hp	Capacity (kW)	COP	Displacement (m³/h)	Stub Suction (inch)	Stub 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 **	
ZH04 K1P	1.8	4.2	2.8	3.4	3/4	1/2	0.7	229/198/388	22	PFZ	TFM	9	5	50	28	62
ZH05 K1P	2.0	5.0	2.8	4.0	3/4	1/2	0.7	229/198/388	22	PFZ	TFM	13	5	60	28	62
ZH06 K1P	2.7	6.6	2.9	5.1	7/8	1/2	1.2	242/242/418	31	PFZ	TFM	17	6	83	44	62
ZH09 K1P	3.5	9.0	3.1	6.9	7/8	1/2	1.2	242/242/418	33	PFZ	TFM	23	7	108	52	62
ZH12 K1P	4.5	11.4	3.0	8.9	7/8	1/2	1.2	242/242/418	35	PFZ	TFM	28	10	130	62	65
ZH15 K1P	5.0	15.1	3.1	11.7	7/8	1/2	1.9	245/249/442	39		TFM		13		75	67
ZH19 K1P	6.5	18.7	3.2	14.8	7/8	3/4	1.9	239/244/443	39		TFM		17			67
ZHI05 K1P	1.9	5.2	3.0	3.4	3/4	1/2	0.7	229/198/388	22	PFZ	TFM	14	4	60	28	63
ZHI08 K1P	2.8	8.2	3.1	5.1	7/8	1/2	1.2	242/242/418	31	PFZ	TFM	19	6	108	43	63
ZHI11 K1P	3.6	10.8	3.2	6.9	7/8	1/2	1.2	242/242/418	31	PFZ	TFM	25	9	130	52	65
ZHI14 K1P	4.6	13.9	3.3	8.9	7/8	1/2	1.2	242/242/418	34		TFM		11		70	65
ZHI18 K1P	5.0	17.9	3.4	11.7	7/8	1/2	1.9	249/245/443	41		TFM		15			67
ZHI23 K1P	6.5	22.8	3.4	14.8	7/8	3/4	1.9	239/244/443	41		TFM		19			67
ZHI27 K1P	9.0	27.0	3.3	16.8	1 3/8	7/8	3.3	280/280/533	63		TFD		21.0		118	77
ZHI32 K1P	10.0	31.7	3.2	19.8	1 3/8	7/8	3.3	280/280/533	63		TFD		26.0		140	75
ZHI35 K1P	12.0	35.6	3.2	22.1	1 3/8	7/8	3.3	280/284/568	63		TFD		32.5		174	76
ZHI40 K1P	13.0	39.7	3.3	24.9	1 3/8	7/8	3.3	284/280/568	64		TFD		33.0		174	76
ZHI46 K1P	15.0	46.6	3.3	29.1	1 3/8	7/8	3.4	284/280/568	64		TWD		37.4		168	78

Conditions: Evaporating -7°C, Condensing 50°C, Superheat 5K, Subcooling 4K
* 1 Ph: 230V/ 50Hz
** 3 Ph: 380-420V/ 50Hz
*** @ 1m: sound pressure level at 1m distance from the compressor, free field condition

R407C	Nominal hp	Capacity (kW)	COP	Displacement (m³/h)	Stub Suction (inch)	Stub 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 **	
ZH12K4E	1.7	3.7	3.0	4.7	3/4	1/2	0.7	272/193/388	21	PFZ		10		44		53
ZH15K4E	2.0	4.6	3.0	5.8	3/4	1/2	1.3	243/243/364	23	PFJ	TFD	12	4	61	26	60
ZH06KVE	2.5	6.1	3.3	5.8	3/4	1/2	1.3	243/243/364	28		TFM		4		26	58
ZH19K4E	2.5	5.9	3.0	7.3	3/4	1/2	1.5	243/242/387	25	PFJ	TFD	17	6	74	32	60
ZH09KVE	3.0	8.3	3.3	8.0	3/4	1/2	1.5	243/243/386	30	PFZ	TFD	21	7	97	40	62
ZH21K4E	3.0	6.5	3.1	8.0	3/4	1/2	1.5	243/242/387	27	PFJ	TFD	19	5	76	32	61
ZH26K4E	3.5	8.2	3.1	10.0	3/4	1/2	1.5	243/242/400	28	PFJ	TFD	21	7	97	46	64
ZH13KVE	4.0	11.9	3.4	11.7	7/8	1/2	1.9	244/241/438	38	PFJ	TFD	30	10	160	74	68
ZH30K4E	4.0	9.5	3.1	11.7	7/8	1/2	1.9	247/241/438	38	PFJ	TFD	25	8	108	64	65
ZH38K4E	5.0	11.7	3.2	14.4	7/8	1/2	1.9	247/241/438	38	PFZ	TFD	31	10	150	64	66
ZH18KVE	6.0	16.8	3.4	17.1	7/8	1/2	1.9	244/241/438	40		TFD		14		101	65
ZH45K4E	6.0	14.0	3.2	17.1	7/8	1/2	1.9	250/246/438	40		TFD		12		74	67
ZH24KVE	7.5	21.5	3.3	20.9	1 3/8	7/8	4.0	368/321/525	93		TWD		18		99	75
ZH56K4E	7.5	17.4	3.1	20.9	1 3/8	7/8	4.0	357/321/497	93		TWD		17		99	75
ZH33KVE	10.0	29.7	3.4	29.0	1 3/8	7/8	4.0	368/321/525	93		TWD		24		127	73
ZH75K4E	10.0	24.2	3.2	28.8	1 3/8	7/8	4.0	357/321/497	93		TWD		21		127	75
ZH40KVE	13.0	37.3	3.4	35.5	1 3/8	7/8	4.1	368/321/532	95		TWD		30		167	75
ZH92K4E	13.0	30.7	3.3	35.6	1 3/8	7/8	4.1	356/320/505	95		TWD		25		167	75
ZH48KVE	15.0	45.0	3.5	42.8	1 5/8	1 1/8	4.1	368/323/579	112		TWD		36		198	77

Conditions: Evaporating -7°C, Condensing 50°C, Superheat 5K, Subcooling 4K
* 1 Ph: 230V/ 50Hz
** 3 Ph: 380-420V/ 50Hz
*** @ 1m: sound pressure level at 1m distance from the compressor, free field condition

R513A	Nominal hp	Capacity (kW)	COP	Displacement (m³/h)	Stub Suction (inch)	Stub 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 *	1 Ph *	1 Ph *	
ZH21KRE	2.0	3.1	2.1	8.0	3/4	1/2	1.5	243/242/387	27	PFJ	19	76	61
ZH26KRE	3.0	3.1	2.1	10.0	3/4	1/2	1.5	243/242/400	28	PFJ	21	97	63

Conditions: Evaporating -7°C, Condensing 50°C, Superheat 5K, Subcooling 4K
* 1 Ph: 230V/ 50Hz
*** @ 1m: sound pressure level at 1m distance from the compressor, free field condition

Capacity Data

Condensing Temperature +50°C															
R410A	Heating Capacity (kW)							R410A	Power Input (kW)						
	Evaporating Temperature (°C)								Evaporating Temperature (°C)						
Model	-30	-15	-10	-5	0	+5	+15	Model	-30	-15	-10	-5	0	+5	+15
ZH04 K1P	n.a.	3.3	3.9	4.5	5.2	6.0	7.6	ZH04 K1P	n.a.	1.4	1.5	1.5	1.5	1.5	1.5
ZH09 K1P	n.a.	7.1	8.2	9.5	10.9	12.5	16.4	ZH09 K1P	n.a.	2.8	2.9	3.0	3.0	3.0	3.0
ZH12 K1P	n.a.	9.2	10.5	12.1	13.9	15.9	21.0	ZH12 K1P	n.a.	3.7	3.7	3.8	3.8	3.8	3.8
ZH15 K1P	n.a.	12.0	13.8	15.9	18.4	21.1	27.7	ZH15 K1P	n.a.	4.7	4.9	5.0	5.1	5.2	5.2
ZH19 K1P	n.a.	15.2	17.5	20.2	23.2	26.7	35.1	ZH19 K1P	n.a.	6.0	6.2	6.3	6.4	6.5	6.5
Models With Enhanced Vapor Injection															
ZHI05 K1P	2.6	4.2	4.8	5.4	6.1	6.9	8.6	ZHI05 K1P	1.7	1.7	1.7	1.8	1.8	1.8	1.7
ZHI08 K1P	5.0	6.7	7.6	8.4	9.4	10.5	13.1	ZHI08 K1P	2.5	2.6	2.6	2.6	2.6	2.6	2.4
ZHI11 K1P	6.4	9.0	10.1	11.3	12.6	14.0	17.2	ZHI11 K1P	3.2	3.3	3.3	3.3	3.3	3.3	3.1
ZHI14 K1P	8.5	11.6	13.0	14.5	16.2	18.1	22.3	ZHI14 K1P	3.9	4.1	4.2	4.2	4.2	4.2	4.0
ZHI18 K1P	10.8	14.9	16.7	18.7	20.9	23.2	28.7	ZHI18 K1P	5.1	5.3	5.4	5.4	5.4	5.3	5.2
ZHI23 K1P	13.8	19.0	21.3	23.9	26.6	29.7	36.7	ZHI23 K1P	6.6	6.8	6.9	6.9	6.9	6.8	6.6
ZHI27 K1P	14.2	22.1	25.1	28.4	31.8	35.5	43.8	ZHI27 K1P	7.9	8.2	8.2	8.1	8.1	7.9	7.5
ZHI32 K1P	16.4	26.1	29.5	33.2	37.1	41.4	51.1	ZHI32 K1P	8.7	9.7	9.8	9.8	9.7	9.6	9.4
ZHI35 K1P	19.5	29.2	33.1	37.3	41.9	46.7	57.4	ZHI35 K1P	11.0	10.8	10.9	11.0	11.1	11.2	11.1
ZHI40 K1P	21.7	32.5	36.9	41.7	47.0	52.7	65.6	ZHI40 K1P	12.0	12.0	12.1	12.1	12.2	12.2	12.3
ZHI46 K1P	26.1	38.7	43.5	48.7	54.3	60.4	74.0	ZHI46 K1P	13.2	14.0	14.1	14.1	14.1	14.1	14.0

Conditions: Suction Superheat 5K / Subcooling 4K

Condensing Temperature +50°C															
R407C	Heating Capacity (kW)							R407C	Power Input (kW)						
	Evaporating Temperature (°C)								Evaporating Temperature (°C)						
Model	-30	-15	-10	-5	0	+5	+15	Model	-30	-15	-10	-5	0	+5	+15
ZH12K4E	n.a.	2.8	3.3	3.9	4.6	5.4	7.5	ZH12K4E	n.a.	1.2	1.2	1.3	1.3	1.3	1.4
ZH15K4E	n.a.	3.6	4.3	5.0	5.8	6.8	9.2	ZH15K4E	n.a.	1.5	1.5	1.6	1.6	1.6	1.9
ZH21K4E	n.a.	5.1	5.9	6.9	8.1	9.6	13.2	ZH21K4E	n.a.	2.0	2.1	2.1	2.2	2.3	2.4
ZH26K4E	n.a.	6.3	7.4	8.7	10.3	12.1	16.5	ZH26K4E	n.a.	2.5	2.6	2.7	2.7	2.8	3.0
ZH30K4E	n.a.	7.3	8.6	10.1	11.9	14.0	19.2	ZH30K4E	n.a.	2.9	3.0	3.1	3.2	3.3	3.4
ZH38K4E	n.a.	9.0	10.6	12.5	14.6	17.2	23.4	ZH38K4E	n.a.	3.5	3.6	3.8	3.9	4.0	4.2
ZH45K4E	n.a.	10.8	12.7	14.9	17.4	20.3	27.2	ZH45K4E	n.a.	4.2	4.3	4.5	4.6	4.7	5.1
ZH56K4E	n.a.	13.4	15.8	18.6	21.8	25.5	34.1	ZH56K4E	n.a.	5.3	5.5	5.7	6.0	6.2	6.8
ZH75K4E	n.a.	18.5	21.9	25.8	30.3	35.5	47.6	ZH75K4E	n.a.	7.0	7.4	7.7	8.0	8.2	8.5
ZH92K4E	n.a.	23.4	27.8	32.8	38.5	45.1	60.3	ZH92K4E	n.a.	8.5	9.0	9.5	10.0	10.4	11.2
ZH11M4E	n.a.	28.4	33.6	39.5	46.3	54.3	72.7	ZH11M4E	n.a.	10.3	10.9	11.5	11.9	12.5	13.4
Models With Enhanced Vapor Injection															
ZH06KVE	3.3	4.9	5.7	6.5	7.4	8.4	10.8	ZH06KVE	1.7	1.8	1.9	1.9	2.0	2.0	2.1
ZH09KVE	4.1	6.6	7.6	8.7	9.9	11.2	14.3	ZH09KVE	2.1	2.4	2.4	2.5	2.6	2.6	2.6
ZH13KVE	5.7	9.5	10.9	12.5	14.3	16.2	20.7	ZH13KVE	3.0	3.4	3.5	3.5	3.6	3.6	3.7
ZH18KVE	8.0	13.5	15.4	17.6	20.0	22.6	28.7	ZH18KVE	4.2	4.8	4.9	5.0	5.1	5.1	5.2
ZH24KVE	9.7	17.0	19.6	22.5	25.5	28.9	36.7	ZH24KVE	5.2	6.2	6.4	6.6	6.7	6.8	7.0
ZH33KVE	14.3	23.7	27.2	31.1	35.3	40.0	50.7	ZH33KVE	7.0	8.2	8.5	8.8	9.1	9.3	9.6
ZH40KVE	18.1	29.6	34.1	39.1	44.7	50.9	65.5	ZH40KVE	8.9	10.2	10.6	11.0	11.3	11.7	12.4
ZH48KVE	21.1	35.6	41.1	47.2	54.1	61.8	80.4	ZH48KVE	10.0	12.2	12.7	13.2	13.5	14.0	15.1

Conditions: Suction Superheat 5K / Subcooling 4K

Condensing Temperature +50℃															
R513A	Heating Capacity (kW)							R513A	Power Input (kW)						
	Evaporating Temperature (℃)								Evaporating Temperature (℃)						
Model	-30	-15	-10	-5	0	+5	+15	Model	-30	-15	-10	-5	0	+5	+15
ZH21KRE		3.4	4.0	4.8	5.6	6.6	9.0	ZH21KRE		1.4	1.5	1.5	1.6	1.6	1.7
ZH26KRE		4.5	5.3	6.2	7.2	8.4	11.5	ZH26KRE		1.9	1.9	2.0	2.0	2.1	2.2

Conditions: Suction Superheat 5K / Subcooling 4K
Single phase only