LG Business Solutions

LG HVAC SOLUTION

LG OIL-FREE MAGNETIC VSD CENTRIFUGAL CHILLER

Product line-up
(World largest tonnage Oil-free compressor)

Unit: usRT

Model	300	500	1,000	2,000
Magnetic Bearing 	1Comp. 260 ~ 1,100			
	2Comp. 520 ~ 2,200			

* Please contact us if you want a specification other than the standard model. (Customized product available on request)
* Dual compressor model will be available after 1Q of 2018.

World Class High Efficiency

COP **7.0** IPLV **12.0** AHRI Condition

COP **6.4** NPLV **11.7** Korea standard condition (12/7°C, 32/37°C)

* Based on High Effiency Model (500RT)

Energy efficient / Economical

- World class high efficiency of COP 7.0, IPLV 12.0 (AHRI condition, 500RT)
- Maximum 36% annual cost saving (Compared to 1stage centrifugal)

Ultra quiet and compact

- Rotation control reduces noise to 73dB(A) level
- Compact size require less installation space (22% smaller than competitors)

Easy operation and maintenance

- No need of oil related parts, no oil related issues and simple tubing
- Optimized control logic, automated operation maintenance function
- Black box function handles failure fast
- One stop service network

Eco-friendly

- Zero ozone depletion potential R-134a refrigerant
- Comply with LEED criteria (Except some 2 compressor models)

Reliability

- Uninterruptable Power Supply(UPS) prevents damage from sudden power failure

Magnetic bearing and inverter technology leads to increase in part load efficiency and cost saving

Magnetic bearing and inverter technology will save maximum 36% of annual cost compared to 1stage centrifugal.

Applied technology

Magnetic bearing & Inverter

No contact magnetic bearing / No oil related parts

+

High efficiency impeller

Customized impeller based on operating condition (High lift, Low lift)

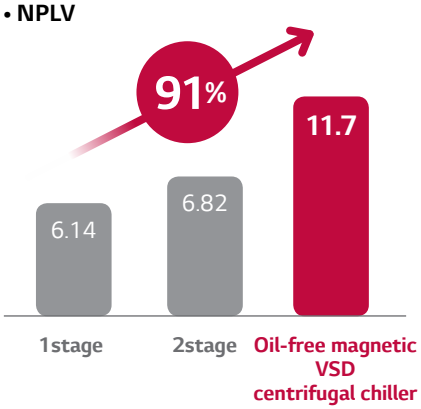
High efficiency falling film heat exchanger (Optional)

Increase efficiency of heat exchanger

Reduce refrigerant charging amount

Energy efficiency comparison

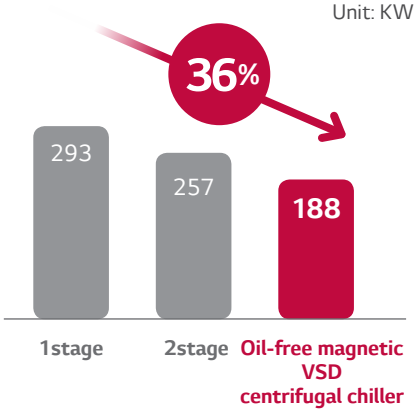
• NPLV



• KS operation condition, 500RT

Annual operation cost comparison

Unit: KW

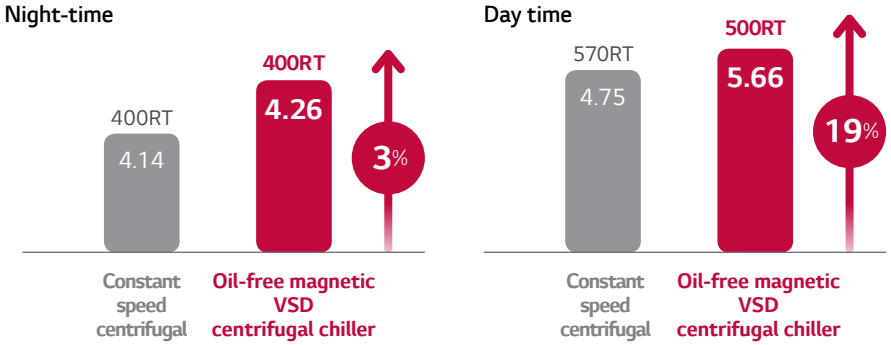


• Based on industrial electricity price
• KS operation condition, 500RT

Centrifugal chiller with thermal ice storage system

Oil-free magnetic VSD centrifugal chiller with thermal ice storage system is 25% more energy efficient than a constant speed centrifugal chiller with thermal ice storage system during the day.

Comparison of energy efficiency of centrifugal chiller with thermal ice storage system



Advantage of thermal ice storage system

- Prevents surge at a low load condition
- No oil circulation issue at a low load condition
- Reduced initial cost of parasitic equipment (Cooling tower & pumps)
- Higher system efficiency (Improved COP at both night and day)

Model		Units	RCWFLQB				RCWFLQD				RCWFLRB				RCWFLQD				RCWFLSB			
Operating condition		-	Day time 1	Day time 2	Night time 1	Night time 2	Day time 1	Day time 2	Night time 1	Night time 2	Day time 1	Day time 2	Night time 1	Night time 2	Day time 1	Day time 2	Night time 1	Night time 2	Day time 1	Day time 2	Night time 1	Night time 2
General	Cooling capacity	RT	260	260	208.8	198.1	300	300	241.4	229.2	340	340	273.8	260.0	380	380	306.0	290.6	440	440	354.5	336.7
	COP	W/W	5.67	5.29	4.25	4.03	5.61	5.24	4.22	4.00	5.65	5.28	4.25	4.04	5.65	5.28	4.25	4.03	5.70	5.32	4.28	4.07

Model		Units	RCWFLSD				RCWFLTB				RCWFLTD				RCWFLUB				RCWFLUD			
Operating condition		-	Day time 1	Day time 2	Night time 1	Night time 2	Day time 1	Day time 2	Night time 1	Night time 2	Day time 1	Day time 2	Night time 1	Night time 2	Day time 1	Day time 2	Night time 1	Night time 2	Day time 1	Day time 2	Night time 1	Night time 2
General	Cooling capacity	RT	500	500	403.5	383.3	600	600	484.0	459.7	700	700	565.0	536.7	830	830	669.5	635.9	1,000	1,000	806.2	765.7
	COP	W/W	5.66	5.28	4.26	4.05	5.67	5.30	4.27	4.06	5.66	5.28	4.26	4.05	5.67	5.29	4.27	4.06	5.69	5.31	4.28	4.06

Note
1. Daytime condition 1: Chilled water 12/7°C, Cooling water 32/37°C / Daytime condition 2: Chilled water 12/5°C, Cooling water 32/37°C
2. Night time Condition 1: Chilled water outlet -4.5°C, Cooling water inlet 30°C / Night time condition 2: Chilled water outlet -5.6°C, Cooling water inlet 30°C
3. Flow rate is based on day time 1 condition
4. Currents & electricity consumptions are based on 3ø, 380V, 60Hz condition

Increased part load efficiency through high efficiency inverter

Energy friendly

- Soft start / Soft Off system to save initial power cost
- High power factor , low harmonic with pre installed AC/DC reactor
- Satisfy IEEE* – 519(THDv< 5%) standard
  > Active filter applicable according to site condition (Optional)

* IEEE(Institute of Electrical and Electronics Engineers)

High frequency operation

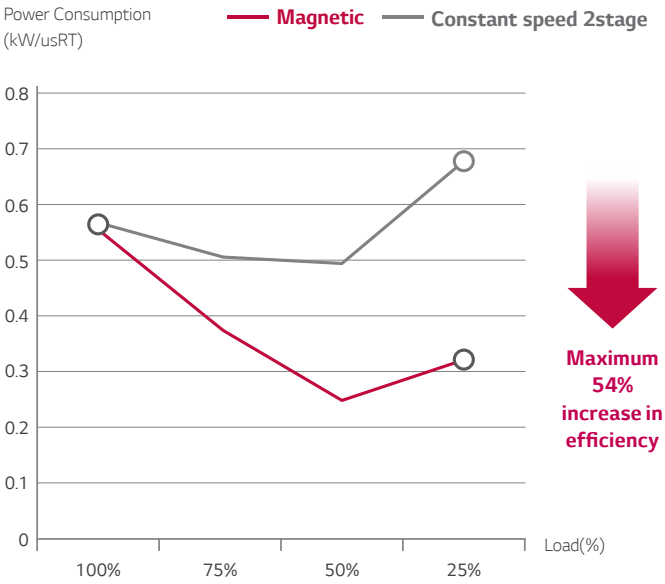
- 0~300Hz(18,000RPM) Motor Operation

LG & Texas instrument & infineon

- Applied LG high efficiency inverter technology
- Reliability guaranteed by integrating Texas Instrument / Infineon parts and technology

DSP	Power device
	
- Applied highly reliable DSP - Global No.1 TEXAS INSTRUMENTS Semiconductor Processor	- Power Module + Driving Circuit - Global No.1 INFINEON Power Device (German Tech.)

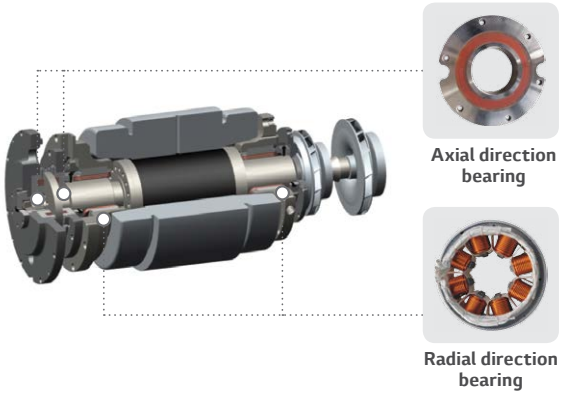
※ DSP : Digital Signal Processor



Magnetic bearing Oil-free centrifugal compressor

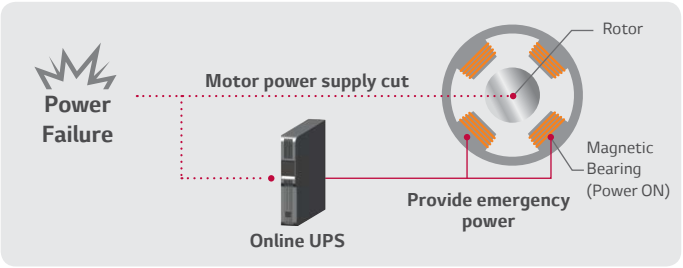
Zero oil related friction loss with magnetic bearing

- No Contact magnetic bearing improves lubricating loss
  > **Increase energy efficiency**
- IGV improves efficiency at low load and protects from surge
  > **Secured stable operation range**
- Direct connection between impeller and drive shaft makes component structure simple
  > **Increase operation reliability**
- Oil-free system design removed all oil related components
  > **Enhanced efficiency by lesser components**



Online UPS* system protects damage from sudden power failure

- In case of sudden power failure, power is being delivered to the motor maintaining levitation and protecting the bearings



- Since the power is being supplied through UPS there is no change in input or affected by noise, delivering high quality power

*UPS: Uninterruptible Power Supply

No contact bearing and one stop manufacturing system will save maintenance cost

LG's Oil-free magnetic VSD centrifugal chiller eliminated oil related components that reduce maintenance cost. Also, in-house developed and assembled compressor makes service easy and fast.

Low maintenance cost

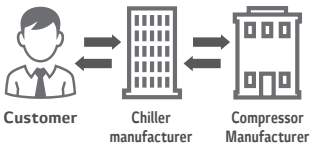
Regular centrifugal chiller		Oil-free magnetic VSD centrifugal chiller
Maintenance criteria		Maintenance criteria
Evaporator/Condenser Tube cleaning Refrigerant check Control Test Test run and cycle check Replace oil/filters*	VS	Evaporator/Condenser Tube cleaning Refrigerant check Control Test Test run and cycle check **No oil/Filters related replacement**

Oil/Filters replacement details (500RT Condition)
- Oil 60L + Oil Filter/O-ring 1set + Dryer 4EA + Straighter 1EA
* Cost of maintenance can vary by sites, work load and contract conditions

Fast maintenance service

Oil/Filters replacement details (500RT Condition)

- Oil 60L + Oil Filter/O-ring 1set + Dryer 4EA + Straighter 1EA
* Cost of maintenance can vary by sites, work load and contract conditions



Oil-free magnetic VSD centrifugal chiller

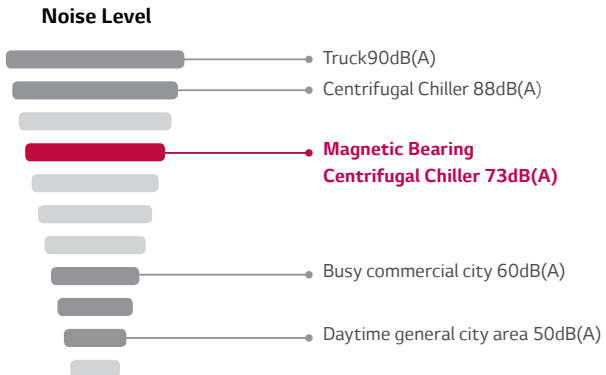
- In-house developed/assembled compressor
- Direct maintenance
  → reduced service time
- Easy supply of chiller component

Ultra quiet and compact

Low maintenance cost

Low noise achieved through load base rotation control

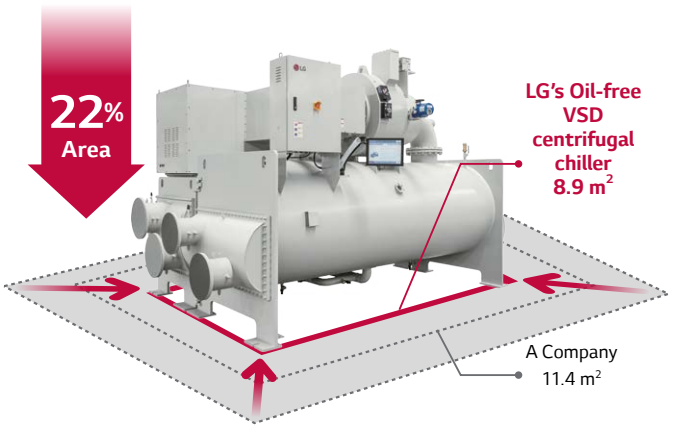
- Low noise by controlling number of rotation
  › Lowest at 73db(A)Favorable at noise sensitive areas



Fast maintenance service

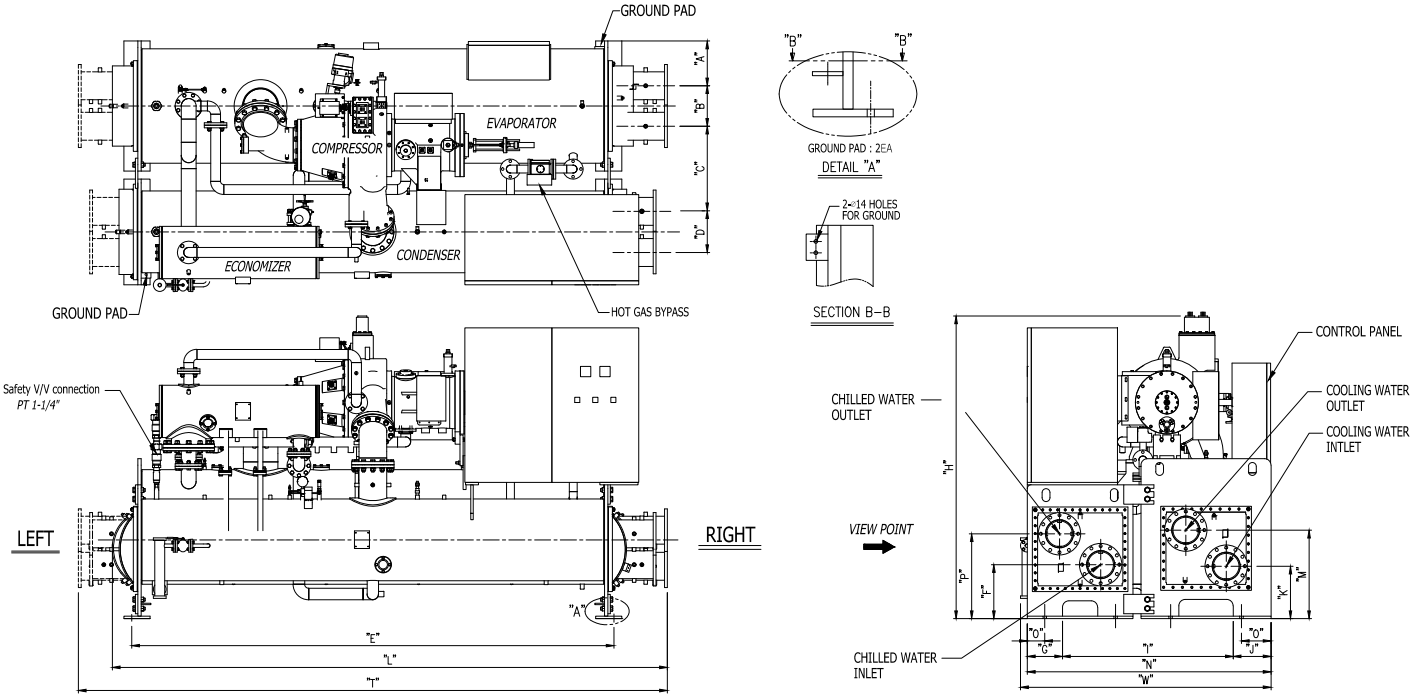
Compact product requires less installation space

- Compact size with single large tonnage compressor that requires less installation space
- Favorable to small area that needs remodeling



- 500RT cooling capacity, data from catalogues

1 Compressor

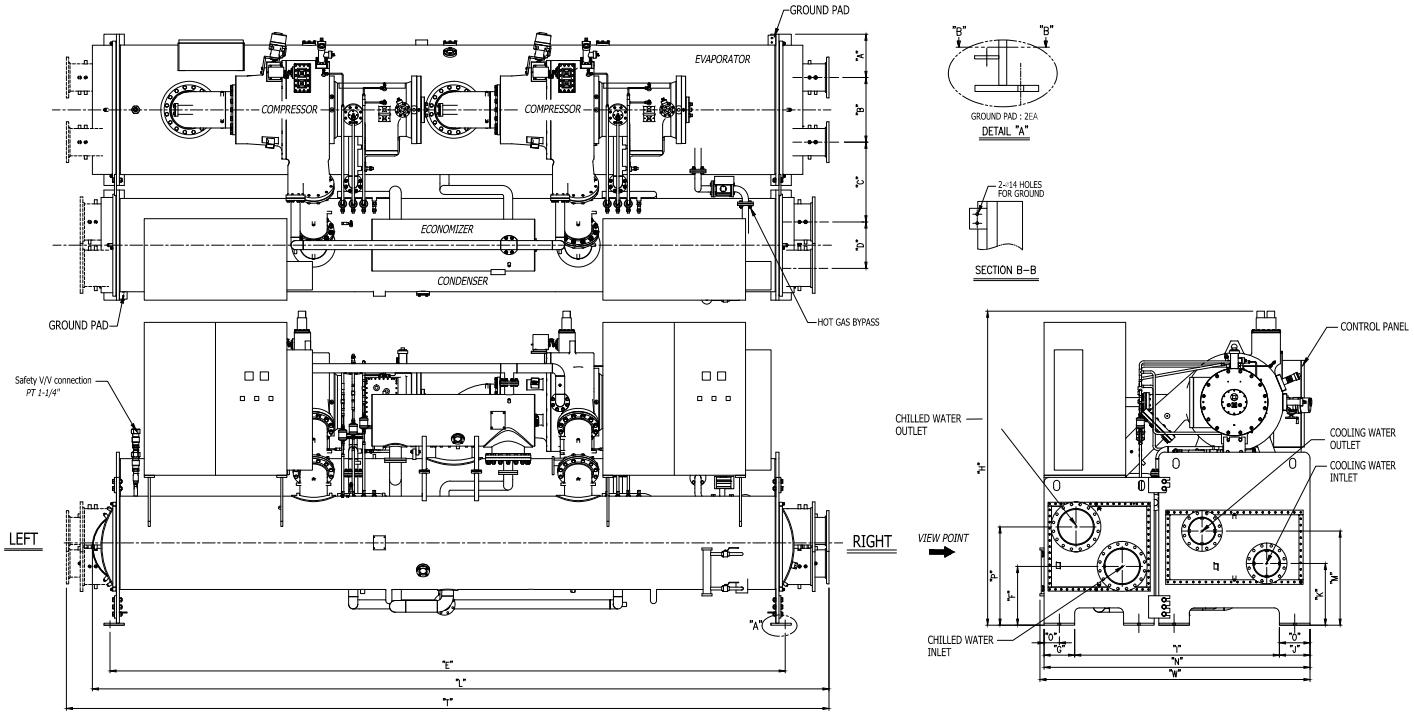


Unit : mm

Model	Evaporator	Condenser	L	T	W	H	A	B	C	D	E	F	G	I	J	K	M	N	O	P
RCWFLAB~AD	AQ	AK	4,156	4,574	1,995	2,020	330	314	550	320	3,746	393	273	1,201	293	380	661	1,767	215	633
RCWFLJB~BB	AR~BK	AQ~BN	4,156	4,574	2,134	2,280	330	314	580	320	3,746	405	273	1,201	293	392	673	1,767	215	645
RCWFLBD	BL	BN	4,156	4,574	2,255	2,315	330	314	660	320	3,746	418	273	1,326	293	405	686	1,892	230	658
RCWFLCB	CL	BK	4,156	4,574	2,360	2,479	400	314	660	320	3,746	431	273	1,326	293	418	699	1,891	230	250
RCWFLCD	CM	BL	4,156	4,574	2,535	2,656	400	350	700	350	3,746	443	323	1,576	343	430	711	2,242	245	250
RCWFLDB~DD	CF~DB	CFDB	4,156	4,574	2,730	2,806	400	350	750	350	3,746	456	373	1,576	393	443	724	2,342	260	300

Note
1. The height is measured from the bottom of the heat exchanger bed.
   This value does not include the height of the foundation and the vibration-absorbing pedestal.
2. All of the chilled water and cooling water connection flanges are of ANSI 150lb..
3. The water pipe facility shall be designed to prevent external force to the chiller.
4. The minimum spaces shall be provided around the chiller as follow :
   - Length direction of the chiller. 1,500 mm~2,000mm
     One of the left and the right side shall be provided with space for Tube replacement.(3,700~6,700mm)
   - Control panel : 1,500mm
   - Inverter panel: 2,000mm
   - Height : 1,000mm
5. All specifications are subject to change without notice.

2 Compressor



Unit : mm

Model	Evaporator	Condenser	L	T	W	H	A	B	C	D	E	F	G	I	J	K	M	N	O	P
RCWFLAG~AK	AU	AR	7,006	7,424	1,995	2,020	330	314	550	320	6,624	393	273	1,201	293	380	661	1,767	215	633
RCWFLJG~BG	AX~BJ	AT~BR	7,006	7,424	2,134	2,280	330	314	580	320	6,624	405	273	1,201	293	392	673	1,767	215	645
RCWFLBDK	BM	BT	7,006	7,424	2,255	2,315	330	314	660	320	6,624	418	273	1,326	293	405	686	1,892	230	658
RCWFLCG~CK	CQ	DN	7,006	7,424	2,535	2,656	400	314	660	320	6,624	431	273	1,326	293	430	711	1,892	230	683
RCWFLDG~DK	DL~DM	DL	7,006	7,424	2,730	2,806	400	350	750	350	6,624	443	323	1,576	343	443	724	2,342	245	696

Note
1. The height is measured from the bottom of the heat exchanger bed.
   This value does not include the height of the foundation and the vibration-absorbing pedestal.
2. All of the chilled water and cooling water connection flanges are of ANSI 150lb..
3. The water pipe facility shall be designed to prevent external force to the chiller.
4. The minimum spaces shall be provided around the chiller as follow :
   • Length direction of the chiller. 1,500 mm~2,000mm
   One of the left and the right side shall be provided with space for Tube replacement.(3,700~6,700mm)
   • Control panel : 1,500mm
   • Inverter panel: 2,000mm
   • Height : 1,000mm
5. All specifications are subject to change without notice.

AHRI Condition(550/590)

Model		Units	RCWFLAB		RCWFLAD		RCWFLJB		RCWFLJD		RCWFLBB		
General	Cooling capacity	usRT	260	280	300	320	340	360	380	400	420	440	460
		kW	914	985	1,055	1,125	1,196	1,266	1,336	1,407	1,477	1,547	1,617
	Input Power	kW	141.2	155.8	164.1	179.1	184.5	200.5	207.3	219.6	227.4	237.4	253.3
	Input Power(Ton)	kW/usRT	0.543	0.556	0.547	0.560	0.543	0.557	0.546	0.549	0.541	0.540	0.551
	COP	-	6.47	6.32	6.43	6.28	6.48	6.31	6.44	6.40	6.49	6.52	6.39
	IPLV	kW/usRT	0.302	0.303	0.304	0.306	0.305	0.306	0.305	0.306	0.305	0.306	0.307
		-	11.65	11.60	11.55	11.51	11.52	11.48	11.52	11.48	11.53	11.50	11.47
	Product Weight	kg	6,350	6,350	6,350	6,350	6,800	6,800	7,200	7,200	8,800	8,800	8,500
	Operating Weight	kg	7,320	7,320	7,320	7,320	7,730	7,730	8,160	8,160	10,080	10,080	9,680
Comprssors	Quantity	EA	1	1	1	1	1	1	1	1	1	1	1
	Motor rotor power	kW	160	160	190	190	210	210	230	230	260	260	260
Condenser	Condenser size	A	150	150	200	200	200	200	200	200	200	200	200
	Flow rate	m^3/h	182	196	210	224	237	252	265	280	293	307	322
	Pressure drop	mH_2O	4.4	5.1	5.2	5.8	6.2	6.9	6.0	6.6	5.9	6.4	7.0
	Number of passes	EA	2	2	2	2	2	2	2	2	2	2	2
Evaporator	Evaporator size	A	150	150	200	200	200	200	200	200	200	200	200
	Flow rate	m^3/h	157	169	181	194	206	218	230	242	254	266	278
	Pressure drop	mH_2O	3.9	4.4	4.6	5.1	4.6	5.0	4.8	5.3	4.9	5.3	5.7
	Number of passes	EA	2	2	2	2	2	2	2	2	2	2	2

Model		Units	RCWFLBD			RCWFLCB		RCWFLCD		RCWFLDB			RCWFLDD	
General	Cooling capacity	usRT	480	500	550	600	650	700	750	800	850	900	1000	1100
		kW	1,688	1,758	1,934	2,110	2,286	2,461	2,637	2,813	2,989	3,165	3,516	3,868
	Input Power	kW	262.0	270.3	310.8	320.4	360.0	374.7	414.3	431.1	458.8	498.9	532.9	612.8
	Input Power(Ton)	kW/usRT	0.546	0.541	0.565	0.534	0.554	0.535	0.552	0.539	0.540	0.554	0.533	0.557
	COP	-	6.44	6.50	6.22	6.59	6.35	6.57	6.37	6.53	6.51	6.34	6.60	6.31
	IPLV	kW/usRT	0.307	0.308	0.310	0.307	0.309	0.308	0.309	0.307	0.308	0.309	0.306	0.308
		-	11.45	11.43	11.36	11.45	11.40	11.42	11.37	11.47	11.43	11.39	11.47	11.41
	Product Weight	kg	9,200	9,200	9,200	10,800	10,800	11,300	11,300	12,400	12,400	12,400	13,500	13,500
	Operating Weight	kg	10,540	10,540	10,540	12,500	12,500	13,130	13,130	14,510	14,510	14,510	16,110	16,110
Comprssors	Quantity	EA	1	1	1	1	1	1	1	1	1	1	1	1
	Motor rotor power	kW	320	320	320	370	370	420	420	510	510	510	630	630
Condenser	Condenser size	A	250	250	250	250	250	250	250	300	300	300	300	300
	Flow rate	m^3/h	335	349	386	418	455	488	525	558	593	630	696	771
	Pressure drop	mH_2O	7.1	7.6	9.2	7.3	8.5	8.0	9.1	6.9	7.7	8.6	7.1	8.6
	Number of passes	EA	2	2	2		2	2	2	2	2	2	2	2
Evaporator	Evaporator size	A	200	200	200	250	250	250	250	300	300	300	300	300
	Flow rate	m^3/h	290	302	333	363	393	423	454	484	514	544	605	665
	Pressure drop	mH_2O	5.6	6.0	7.1	5.5	6.3	6.0	6.8	5.1	5.7	6.3	5.3	6.2
	Number of passes	EA	2	2	2	2	2	2	2	2	2	2	2	2

Note :
1. 1 usRT = 3,024 kcal/hr = 3.517kW, 1mH2O = 9.8MPa
2. Operation condition:
• Evaporator. Entering temperature: 12˚C, Leaving temperature: 7˚C
• Condenser. Entering temperature: 32˚C, Leaving temperature: 37˚C
4. The fouling factor of chilled water. 0.018m2·˚C /kW, The fouling factor of cooling water. 0.044m2·˚C /kW
5. All data in this table have been rated in accordance with AHRI Standard 550/590.
6. All specifications are subject to change without notice.
7. Please contact us, if you want a specification that not be included in table. (Customization available on request)

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