



# Commercial Air Conditioners 2017



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## Magnetic Full Falling Film Centrifugal Chiller

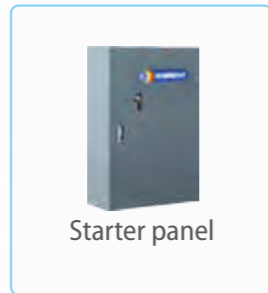
Cooling Capacity: 150~700RT  
50/60Hz



# Unit Member



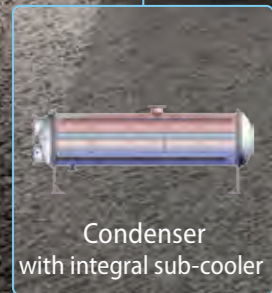
Full falling film evaporator(patented)



Starter panel



Magnetic compressor with integral VFD



Condenser with integral sub-cooler



Economizer



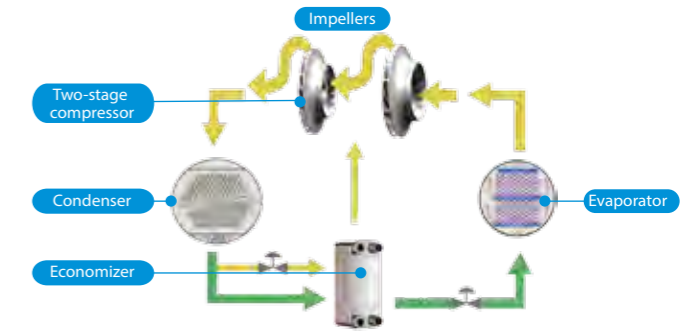
Control panel

# Features

## Energy Saving

### Two-stage compressing >>

- ❖ 6% higher efficiency than single-stage compression.
- ❖ Lower speed and higher reliability.



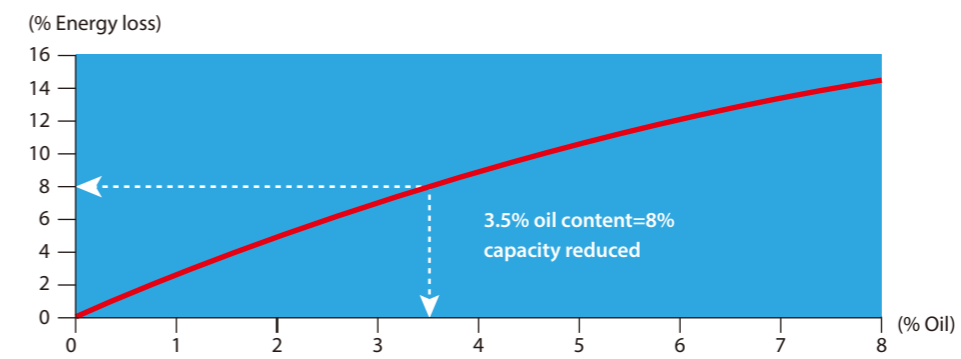
### High-speed permanent magnet motor >>

- ❖ Motor efficiency exceeds 95%, with the highest efficiency up to 97%.
- ❖ High power density and compact size.
- ❖ The motor is cooled by refrigerant, high efficiency and long life span.

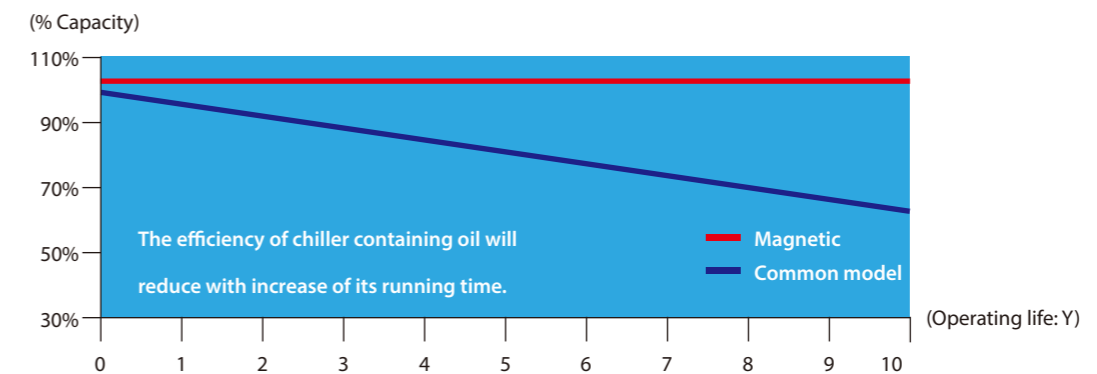


### Heat transfer optimization through oil-free design >>

- ❖ Adopting magnetic bearing and without the need for lubrication. The refrigerating system can realize 100% oil free operation to eliminate the heat transfer loss resulting from lubricating oil.



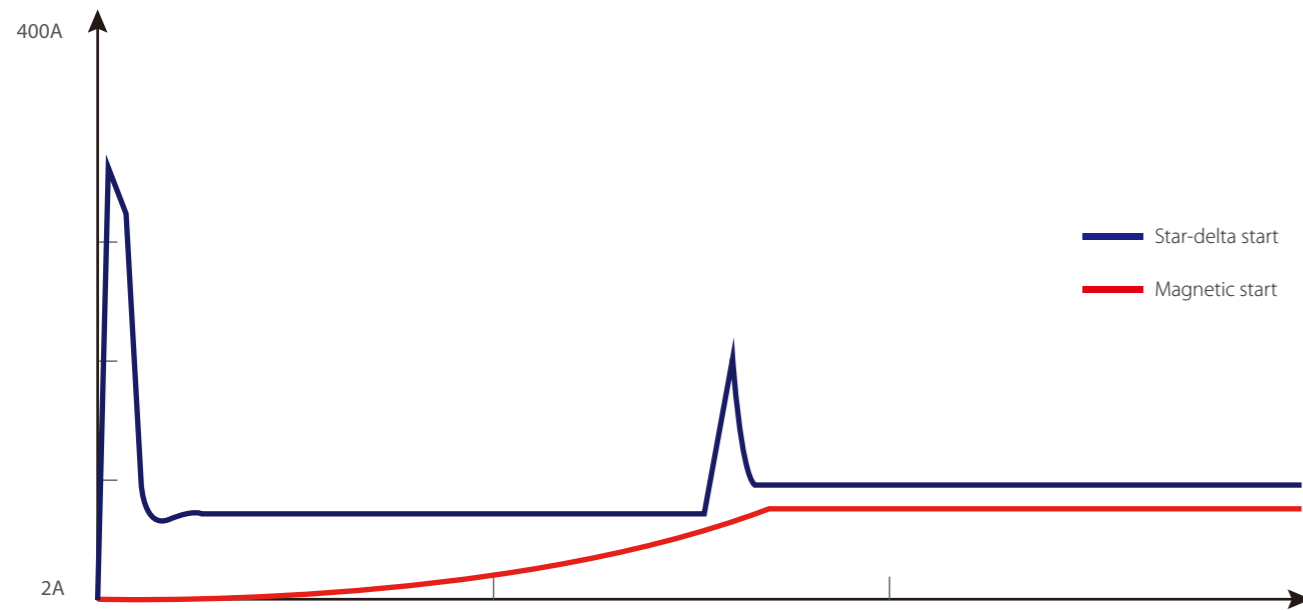
AHRI data indicates that when the lubricating oil amount of centrifugal chiller evaporator reaches 3.5%, COP will reduce by over 8%.



Year-by-year operation comparison between Magnetic and common model.

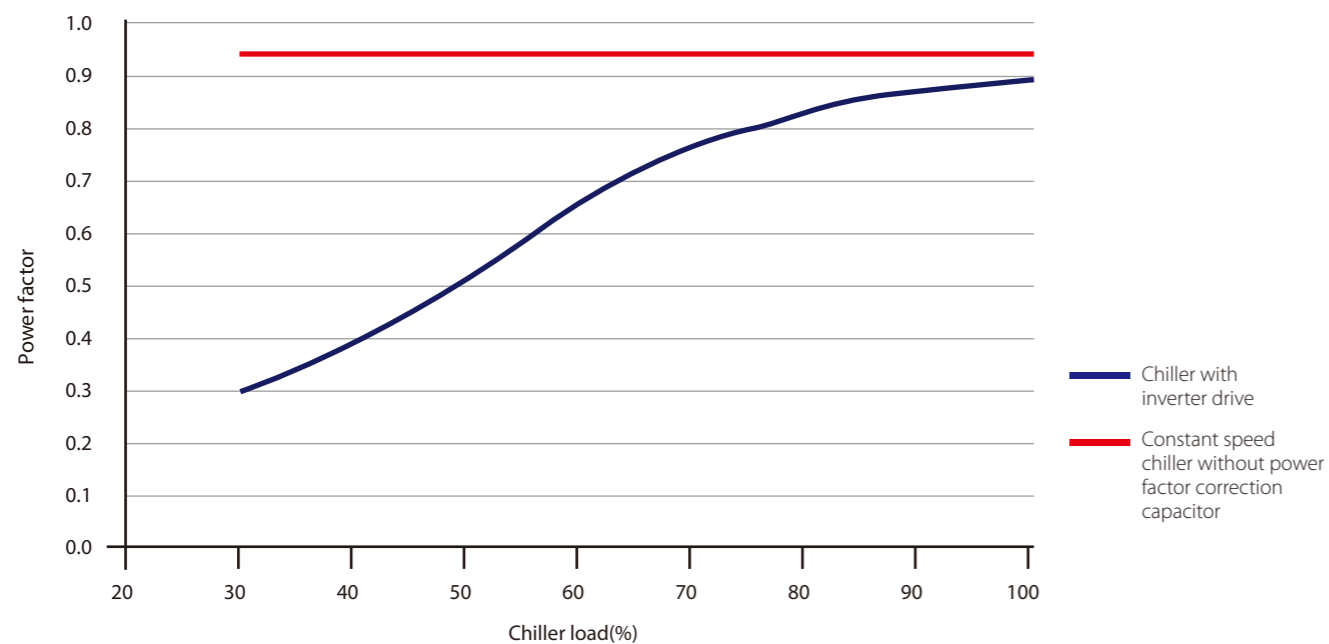
### Zero in-rush current >>

❖ The rotor is levitating in the non-contact magnetic bearing when the unit is started. As the starting torque is small, a smooth starting process becomes possible in combination with the optimum control of soft start and VFD. The starting current of a single compressor is only 2A and no impact on the grid.



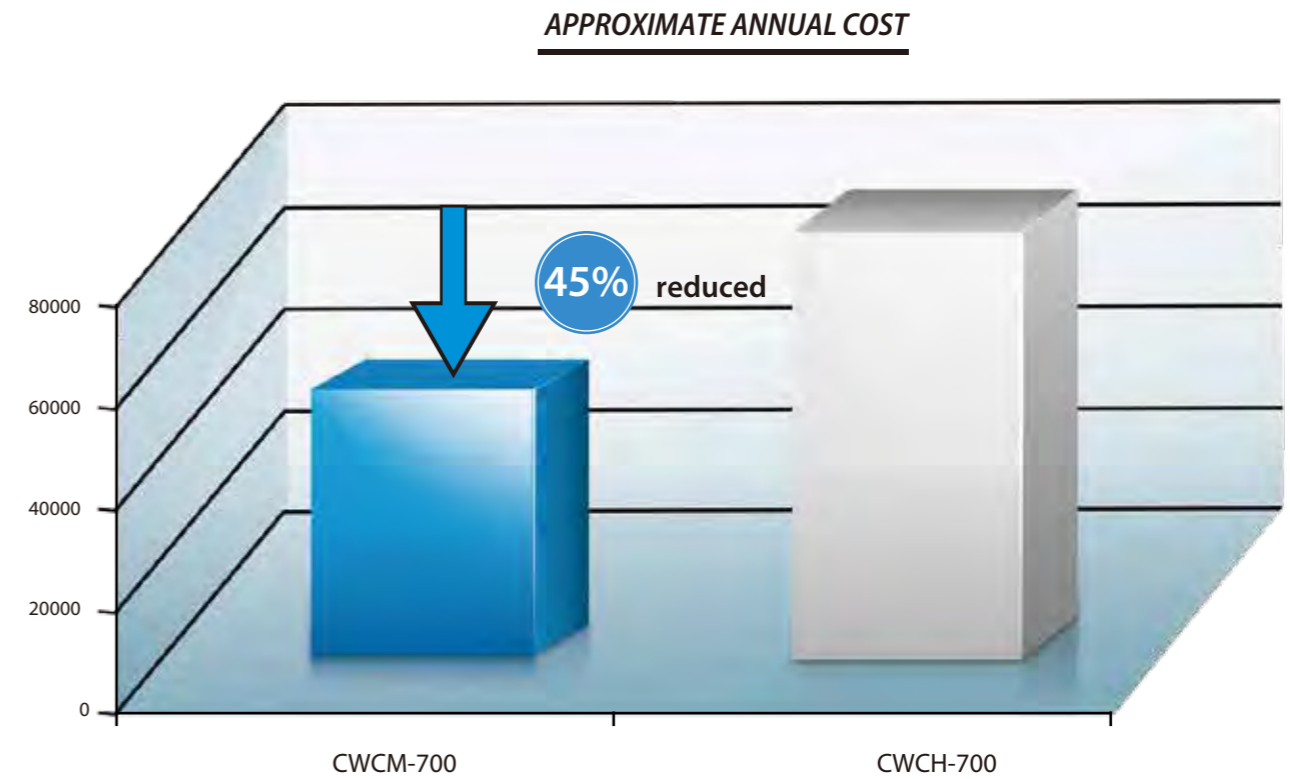
### 0.95 power factor >>

❖ The high power factor eliminates the need for a power factor connection capacitor.



### Energy cost comparison >>

❖ Compare a 700RT magnetic centrifugal chiller to a typical centrifugal chiller. During one year, a system can help customers get an annual saving rate of 45%. For the whole operating life, the operating cost saving is considerable and it is worth to invest a magnetic centrifugal chiller system.



Input values	
Based on	IPLV
Standard	AHRI
Capacity (RT)	700
Operating Hrs	4000
kW/h Rate (\$)	0.0813

Model	ACL(AHRI)	IPLV	Operating Cost (\$)
CWCM-700	406	11.23	41338
CWCH-700	406	6.229	74526

# Technology leading

## Magnetic compressor >>

- ❖ Magnetic compressor is a miniaturized, highly innovative compressor with magnetic bearing, VFD and permanent magnetic synchronous motor technologies.
- ❖ Realized oil-free, effective and safe operation.



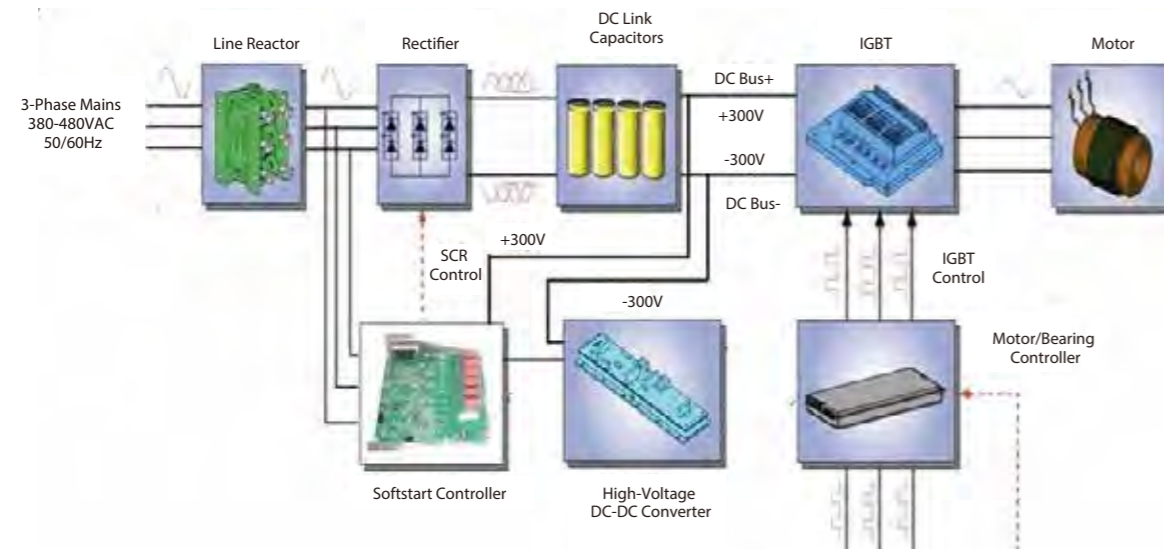
## High efficiency direct-drive technology >>

- ❖ No acceleration gear and transmission loss, higher efficiency.
- ❖ Simpler transmission system, less moving parts, higher reliability.
- ❖ Magnetic technology is combined to significantly reduce the running noise.



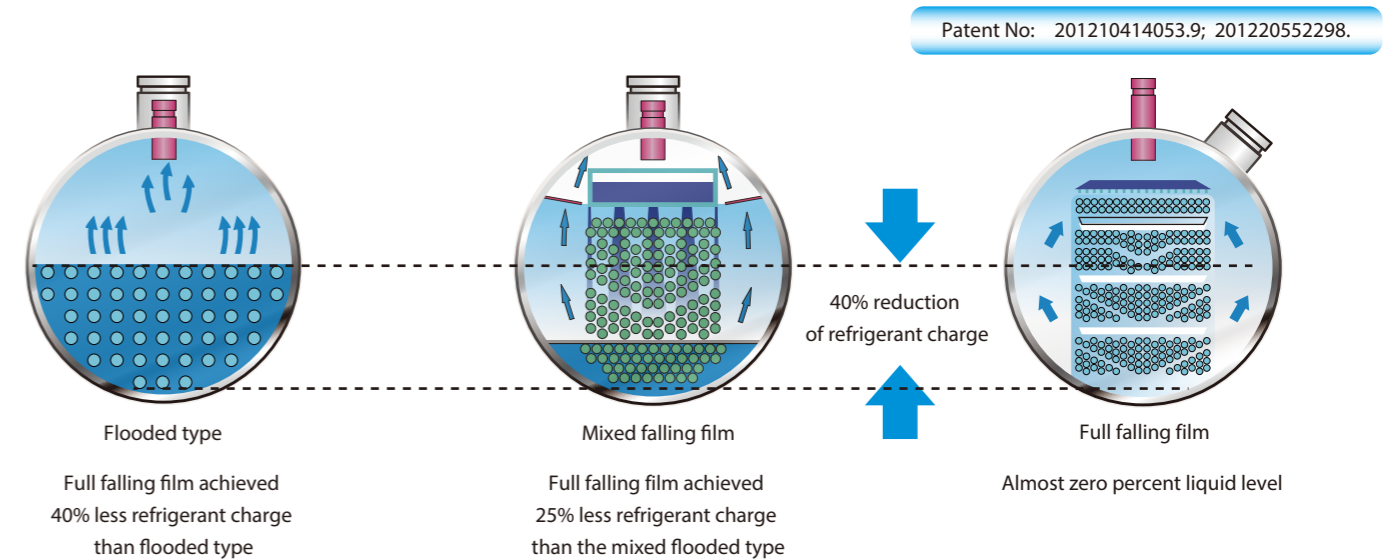
## Digital control >>

- ❖ The magnetic compressor uses the integral variable frequency drive and soft starter.
- ❖ VFD+IGV regulation, chiller capacity range can be 10-100%.
- ❖ Lower in-rush current.
- ❖ Intelligent control to avoid surge and choke points.



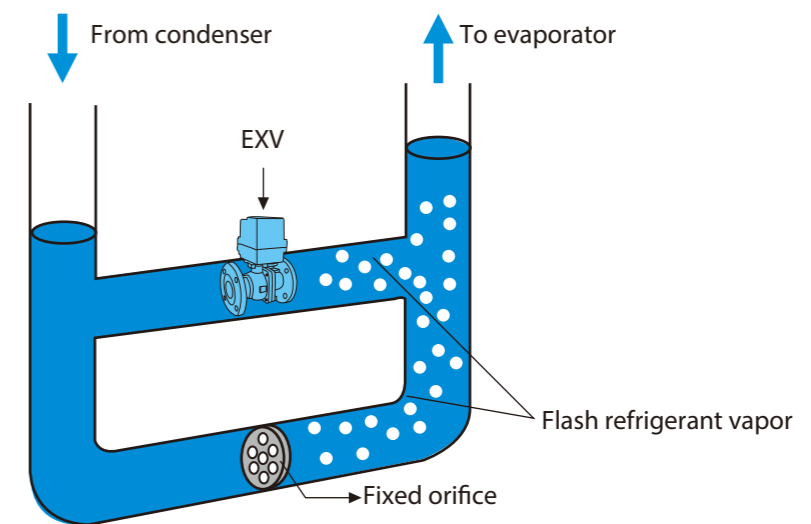
## Full Falling-film Evaporating Technology >>

- ❖ First created the application of full falling film evaporator and adopted spray technology to achieve film evaporation on the surface of heat exchange tube, greatly increase the overall heat transfer efficiency and reduce refrigerant charge by up to 40%.
- ❖ The patented refrigerant distributor can improve the homogeneity of liquid, avoid drying, fully display the performance of heat exchange tube and increase the unit efficiency.



## Advanced throttling technology >>

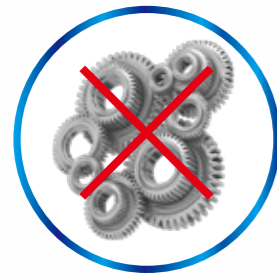
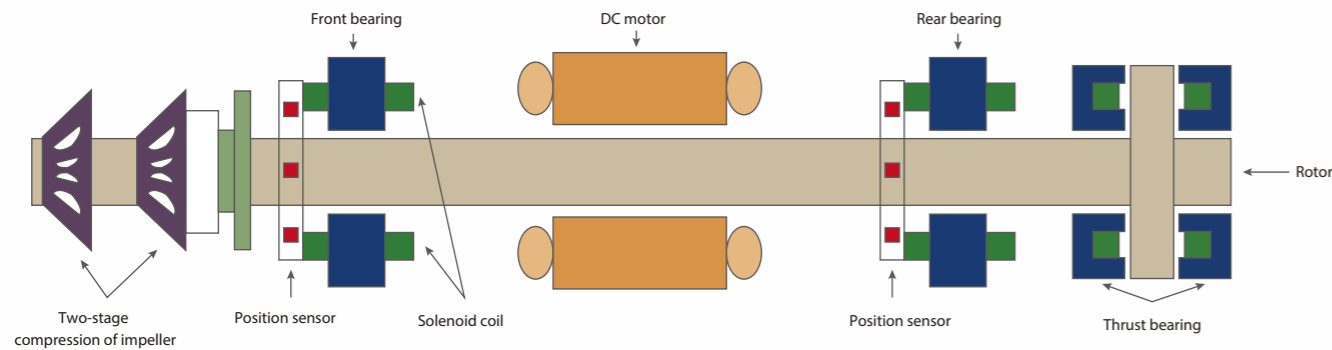
- ❖ Adopting the throttle method of Fixed orifice+EXV:  
Precisely liquid level control, best performance of condenser and evaporator.  
Fast response, avoid hot gas bypass, higher efficiency in part load.  
Energy saving and reliable.



# Less maintenance

## Less moving parts >>

- ❖ Magnetic bearing guarantees total levitating of the rotor during operation. No contact between the bearing and rotor, no friction and structural vibration.
- ❖ The motor directly drives the rotor, the compressor has one moving component and system without oil supply system and oil recovery system, greatly reduced unit parts, less fault points and higher reliability.



No gear drive



No mechanical bearing



No lubricating system

## Intelligent surge control >>

- ❖ Real-time monitoring of compressor running status, adjust compressor speed and inlet guide vane opening through the powerful control system to ensure safe and high efficiency of compressor.

## Power outage protection >>

- ❖ Each compressor has four 8,000µF capacitors for energy storage and to filter DC voltage fluctuations. In case of a power failure, the capacitors provide continuity power to the bearings to keep the shaft levitated, allowing the motor to turn into a generator and to power itself down to a stop. Extended life testing confirms the system's remarkable durability.

## Less maintenance >>

- ❖ No oil system, no need for regular maintenance. 95% maintenance procedures reduced.
- ❖ Modular design of compressor, all parts are universal, plug and play, easy to maintain.

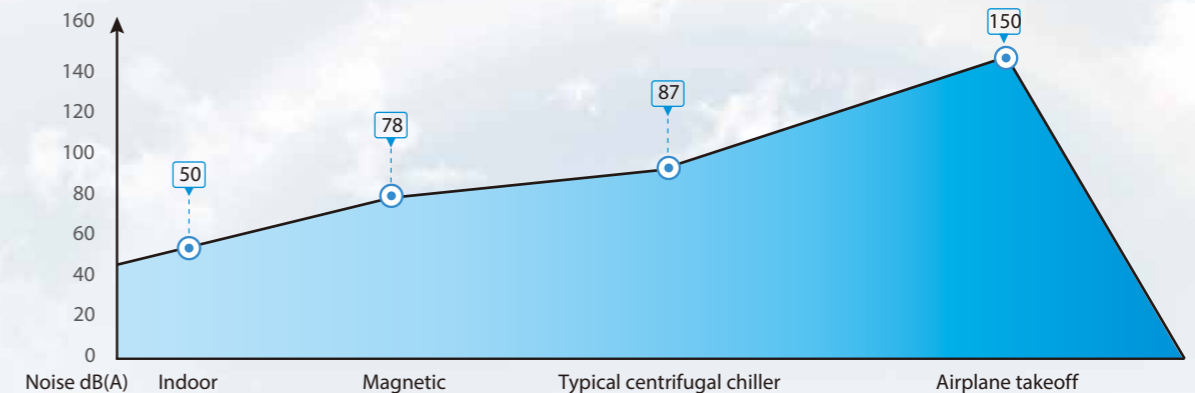
No.	Maintenance items	R123 chiller	R134a chiller	Magnetic centrifugal chiller(oil-free)
1	Oil change	Once a year	Once every three years	No
2	Oil filter change	Once a year	Once a year	No
3	Oil pump pressure detect	4 times a year	4 times a year	No
4	Oil quality check	Once a week	Once a week	No
5	Oil filter pressure drop detect	Once a month	Once a month	No
6	Compressor vibration test	Once a year	Once a year	No
7	Oil pump insulation check	Once every three years	Once every three years	No
8	Oil heater check	Once every three years	Once every three years	No
9	Motor winding check	Once a year	Once a year	No
10	Contactors and overload setting check	Once a year	Once a year	No
11	Refrigerant cleanliness check	Once a week	No	No
12	Refrigerant filter change	4 times a year	No	No

Comparison between various centrifugal chillers maintenance items.

# Environmental friendly

## Quieter operation >>

- ❖ No physical contact between moving metal parts, very low sound and vibration levels are achieved.
- ❖ With reference to AHRI standard 575, sound pressure ratings as low as 78dB(A). That makes it ideal for sound sensitive environments such as schools, performance halls, museums, condominiums and libraries.



## LEED >>

- ❖ Zero-ozone depletion R134a refrigerant, friendly and doesn't have an elimination cycle.
- ❖ Full falling-film technology reduces refrigerant charge by up to 40%, which will enable you to qualify for maximum Leadership in Energy and Environmental Design (LEED) points for Enhanced Refrigerant Management. And with chiller's high efficiency, you could also earn additional points for the Optimize Energy Performance (EAc1) credit.



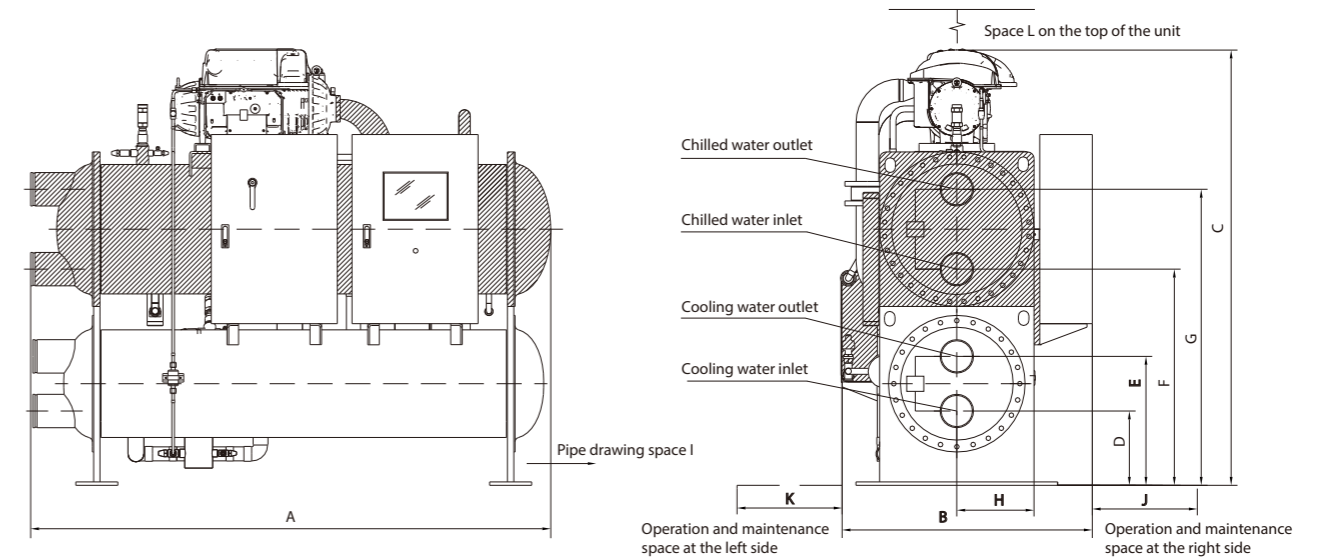
# Specifications

Model(CCWD-***)		150	200	250	300	350	400	450	500	550	600	650	700	
Cooling capacity	RT	150	190	250	300	350	400	450	500	550	600	650	700	
	kW	527.4	668.0	879.0	1055	1231	1406	1582	1758	1934	2110	2286	2461	
	104 kcal/h	45	57	76	91	106	121	136	151	166	181	197	212	
Efficiency	Power input	kW	90.79	111.7	145.3	178.8	198.3	226.7	255.4	282.2	304.5	340.6	367.8	391.6
	COP	kW/kW	5.809	5.978	6.051	5.900	6.205	6.205	6.194	6.230	6.351	6.193	6.213	6.285
Compressor	Configured power	kW	120	240	240	240	240	360	360	360	480	480	480	
	Power supply	380V-3Ph-50/60Hz												
	Starting method	VFD												
	Motor cooled by	Refrigerant												
Evaporator	Chilled water flow	m <sup>3</sup> /h	82	103	136	163	191	218	245	272	299	327	354	381
	Chilled water inlet/outlet temp	kPa	72.8	75.9	44.9	47.2	48.1	73.2	74.1	75.3	47.8	48.5	49.8	51.6
	Pass		2	2	2	2	2	2	2	2	2	2	2	2
	Chilled water inlet/outlet temp	°C	12.22/6.67											
	Fouling factor	m <sup>2</sup> ·°C/kW	0.0176											
	Connection type	Victaulic												
Water pipe connection		DN150	DN150	DN200	DN200	DN200	DN200	DN200	DN200	DN200	DN250	DN250	DN250	DN250
Condenser	Cooling water flow	m <sup>3</sup> /h	102	136	170	204	238	273	307	341	375	409	443	477
	Cooling water pressure drop	kPa	31.7	4.1	48.2	49.6	50.9	77.3	81.3	82.6	55.9	55.9	57	58
	Pass		2	2	2	2	2	2	2	2	2	2	2	2
	Cooling water inlet/outlet temp	°C	29.44/34.67											
	Fouling factor	m <sup>2</sup> ·°C/kW	0.044											
	Connection type	Victaulic												
Water pipe connection		DN150	DN150	DN200	DN200	DN200	DN200	DN200	DN200	DN200	DN250	DN250	DN250	DN250
Weight	Shipping weight	kg	2565	2685	3235	3375	3515	4160	4300	4440	6730	6870	6990	7110
	Running weight	kg	2685	2805	3355	3495	3635	4280	4420	4560	6850	6990	7110	7230
Dimension	Unit length	mm	2500	2500	3500	3500	3500	4000	4000	4000	4100	4100	4100	4100
	Unit width	mm	1180	1180	1180	1180	1180	1380	1380	1380	2500	2500	2500	2500
	Unit height	mm	2075	2075	2075	2075	2075	2155	2155	2155	2150	2150	2150	2150
	Packing length	mm	2500	2500	3500	3500	3500	4000	4000	4000	4100	4100	4100	4100
	Packing width	mm	1650	1650	1650	1650	1650	1850	1850	1850	2500	2500	2500	2500
	Packing height	mm	2225	2225	2225	2225	2225	2305	2305	2305	2300	2300	2300	2300

Note:  
 Performance and efficiency are based on AHRI 550/590-2011.  
 The design max. working pressure for both evaporator and condenser are 1.0MPa, higher pressure demand can be customized.

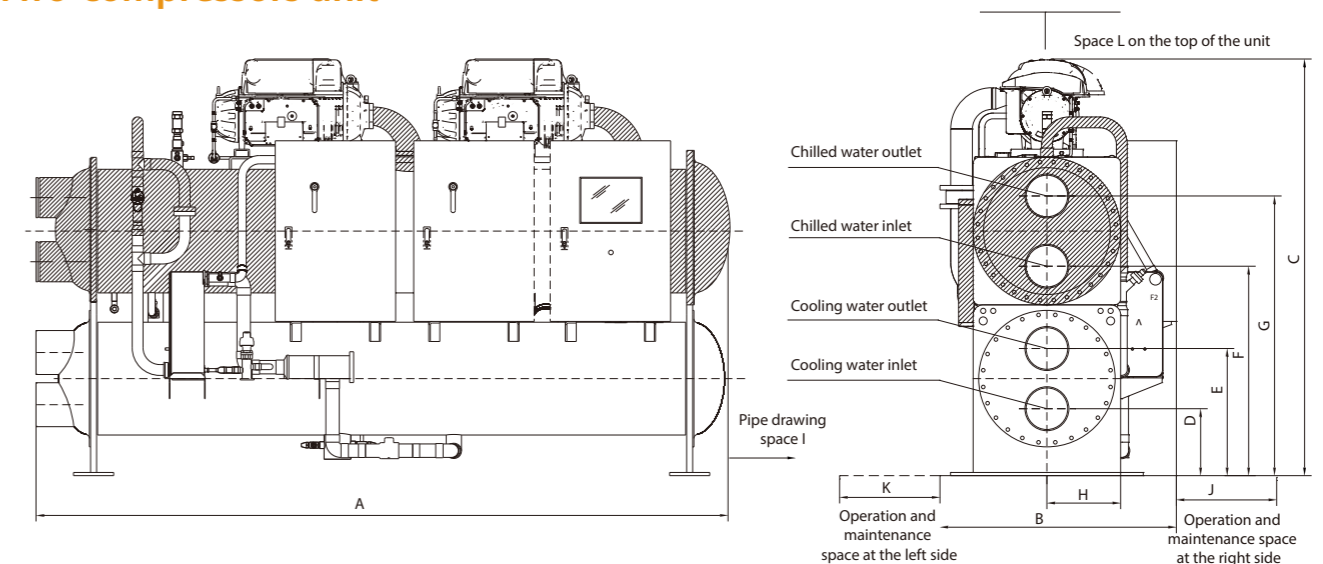
# Dimensions

## Single-compressor unit >>



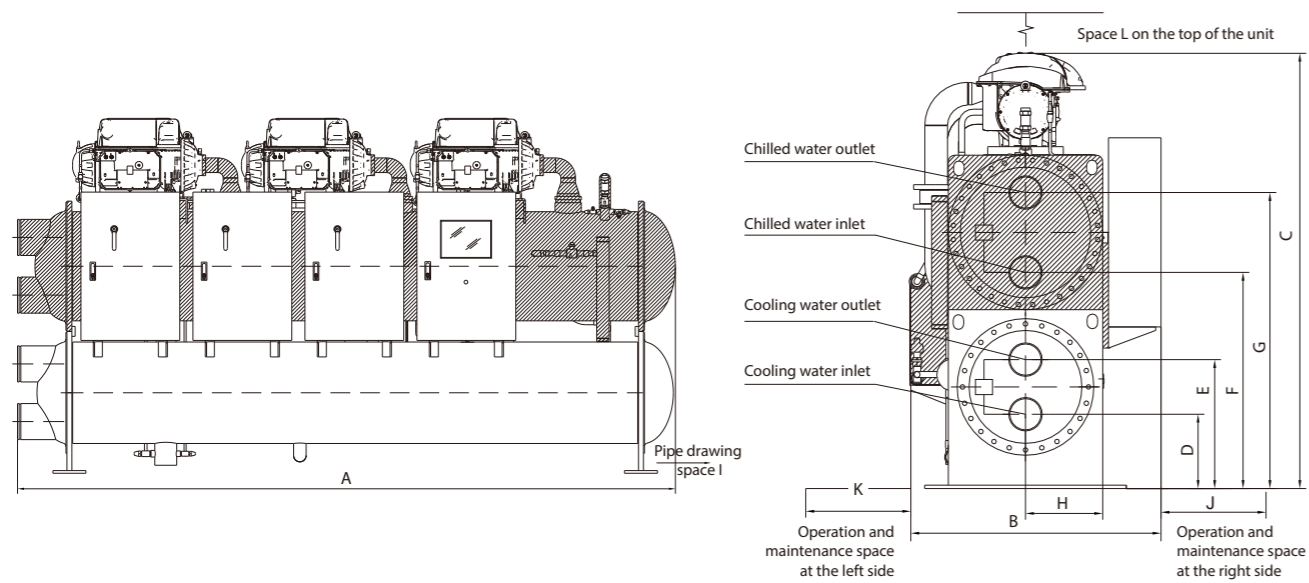
Model	Dimensions			Location dimension of connecting pipe						Maintenance space				Diameter of connecting pipe for evaporator	Diameter of connecting pipe for condenser
	Length A	Width B	Height C	D	E	F	G	H	M	I	J	K	L		
CCWD-150	2500	1180	2075	355	615	1030	1410	368	/	2500	1200	1200	1500	DN150	DN150
CCWD-200	2500	1180	2075	355	615	1030	1410	368	/	2500	1200	1200	1500	DN150	DN150

## Two-compressors unit >>



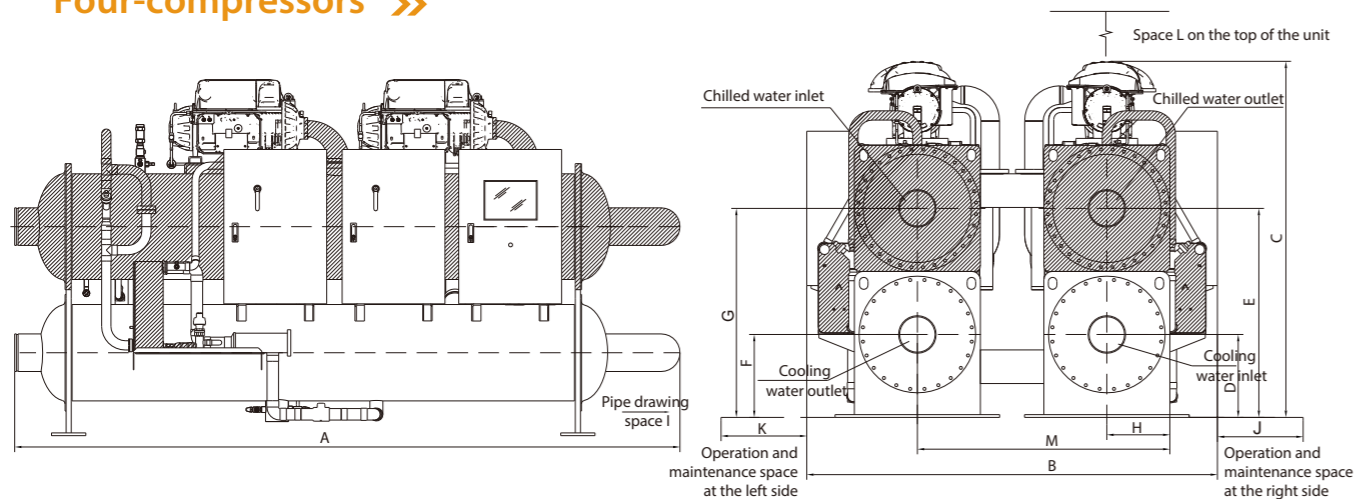
Model	Dimensions			Location dimension of connecting pipe						Maintenance space				Diameter of connecting pipe for evaporator	Diameter of connecting pipe for condenser
	Length A	Width B	Height C	D	E	F	G	H	M	I	J	K	L		
CCWD-250	3500	1180	2075	335	635	1045	1395	368	/	3500	1200	1200	1500	DN200	DN200
CCWD-300	3500	1180	2075	335	635	1045	1395	368	/	3500	1200	1200	1500	DN200	DN200
CCWD-350	3500	1180	2075	335	635	1045	1395	368	/	3500	1200	1200	1500	DN200	DN200

### Three-compressors >>



Model	Dimensions			Location dimension of connecting pipe						Maintenance space				Diameter of connecting pipe for condenser	Diameter of connecting pipe for evaporator
	Length A	Width B	Height C	D	E	F	G	H	M	I	J	K	L		
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	
CCWD-400	4000	1380	2155	315	665	1080	1430	395	/	4000	1200	1200	1500	DN200	DN200
CCWD-450	4000	1380	2155	315	665	1080	1430	395	/	4000	1200	1200	1500	DN200	DN200
CCWD-500	4000	1380	2155	315	665	1080	1430	395	/	4000	1200	1200	1500	DN200	DN200

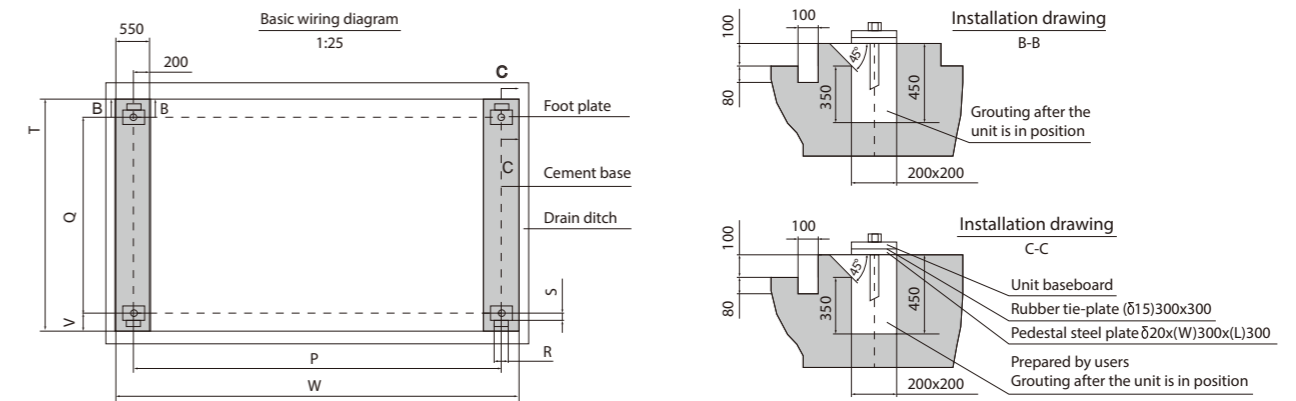
### Four-compressors >>



Model	Dimensions			Location dimension of connecting pipe						Maintenance Space				Diameter of connecting pipe for evaporator	Diameter of connecting pipe for evaporator
	Length A	Width B	Height C	D	E	F	G	H	M	I	J	K	L		
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	
CCWD-550	4100	2500	2150	485	1220	485	1220	368	1488	3500	1200	1200	1500	DN250	DN250
CCWD-600	4100	2500	2150	485	1220	485	1220	368	1488	3500	1200	1200	1500	DN250	DN250
CCWD-650	4100	2500	2150	485	1220	485	1220	368	1488	3500	1200	1200	1500	DN250	DN250
CCWD-700	4100	2500	2150	485	1220	485	1220	368	1488	3500	1200	1200	1500	DN250	DN250

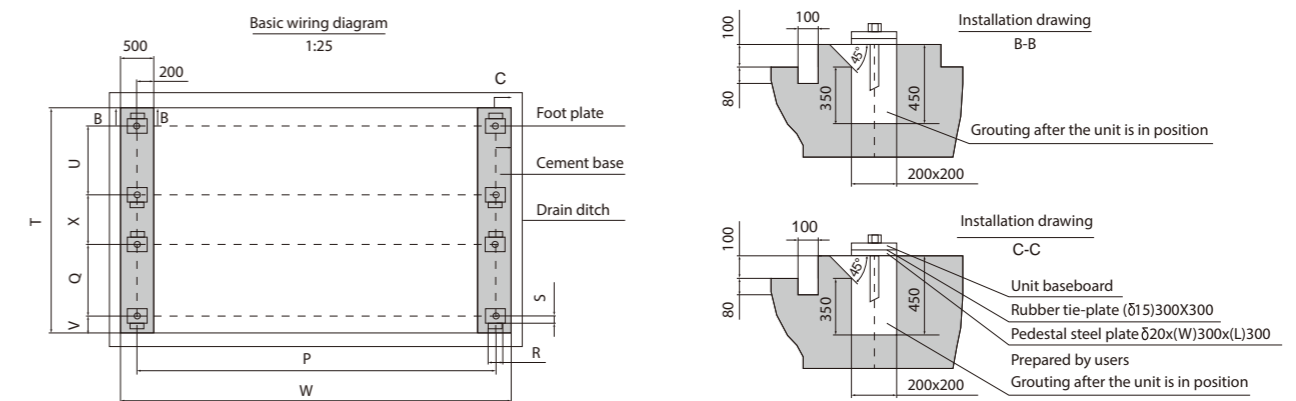
### Basic Layout of Unit

#### Basic layouts for single-, two- and three-compressors units >>



Model	Dimensions						
	P	Q	R	S	T	W	V
	mm	mm	mm	mm	mm	mm	mm
CCWD-150	1970	860	200	50	1560	2670	350
CCWD-200	1970	860	200	50	1560	2670	350
CCWD-250	2970	860	200	50	1560	3670	350
CCWD-300	2970	860	200	50	1560	3670	350
CCWD-350	2970	860	200	50	1560	3670	350
CCWD-400	3470	990	200	50	1690	4170	350
CCWD-450	3470	990	200	50	1690	4170	350
CCWD-500	3470	990	200	50	1690	4170	350

#### Basic layout of four-compressors unit >>



Model	Dimensions									
	P	Q	R	S	T	W	V	U	X	
	mm	mm	mm	mm	mm	mm	mm	mm	mm	
CCWD-550	2970	860	200	50	2680	3670	350	860	260	
CCWD-600	2970	860	200	50	2680	3670	350	860	260	
CCWD-650	2970	860	200	50	2680	3670	350	860	260	
CCWD-700	2970	860	200	50	2680	3670	350	860	260	

# Options/Accessories

Accessories	Standard	Optional
Power supply	380V-3Ph-50Hz	50Hz: 400V 60Hz: 380V, 400V, 460V, 575V
Water inlet/outlet connection type	Victaulic	Flange
High pressure water boxes	1.0MPa	1.6MPa, 2.0MPa
Water boxes	Compact	Marine
Pressure vessel pass	2	1 or 3
Chiller sequence management (Chiller Plant Manager)	×	√
Chiller vibration isolator	×	Rubber or spring
Heat recovery	×	Full recovery
Chilled water Delta T	5°C	6°C~11°C
Centrifugal heat pump	×	Hot water temperature up to 60°C
Water storage	×	√
Ice storage	×	√
Communication protocol	Modbus-RTU (RS485)	BACnet
Hot gas bypass	×	√
Flow switch	×	Paddle or differential pressure
Witness performance testing	×	√

# Memo

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