

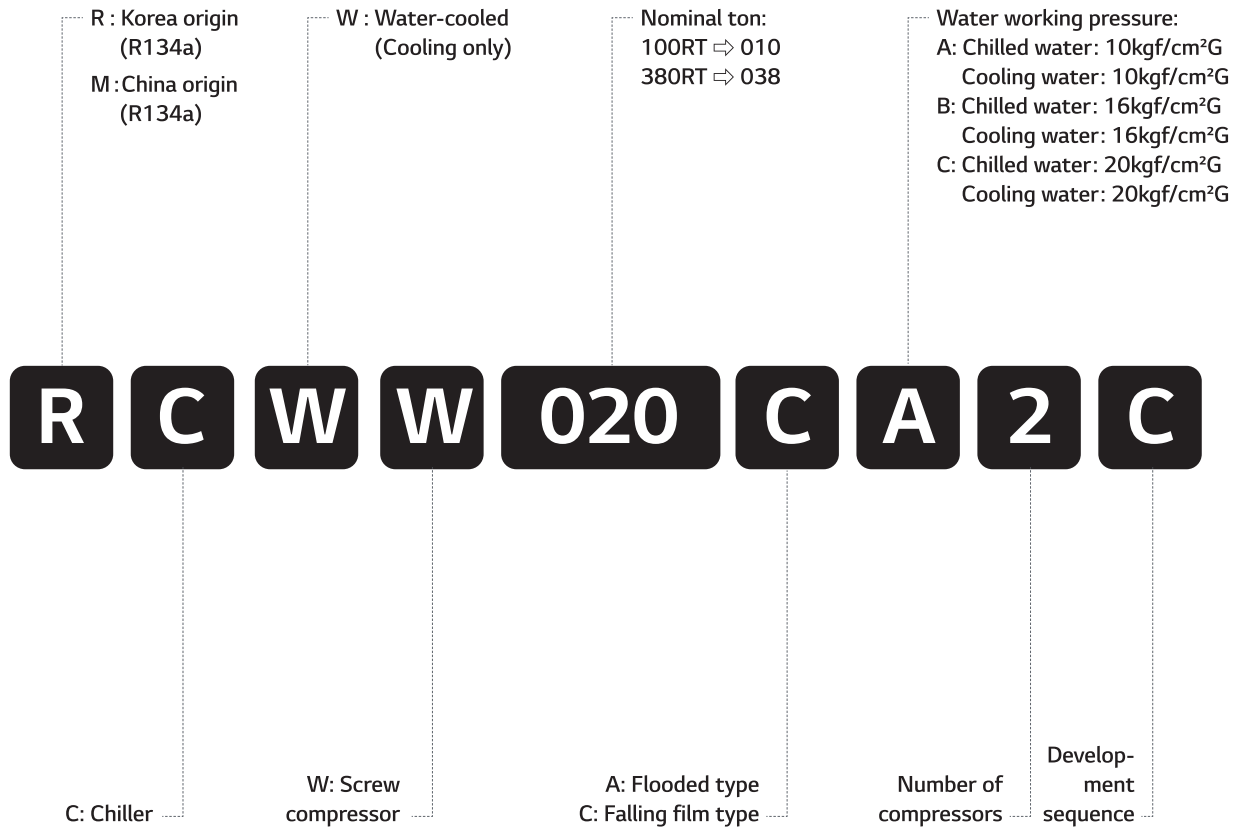
LG HVAC Solution

# Water Cooled Screw Chiller



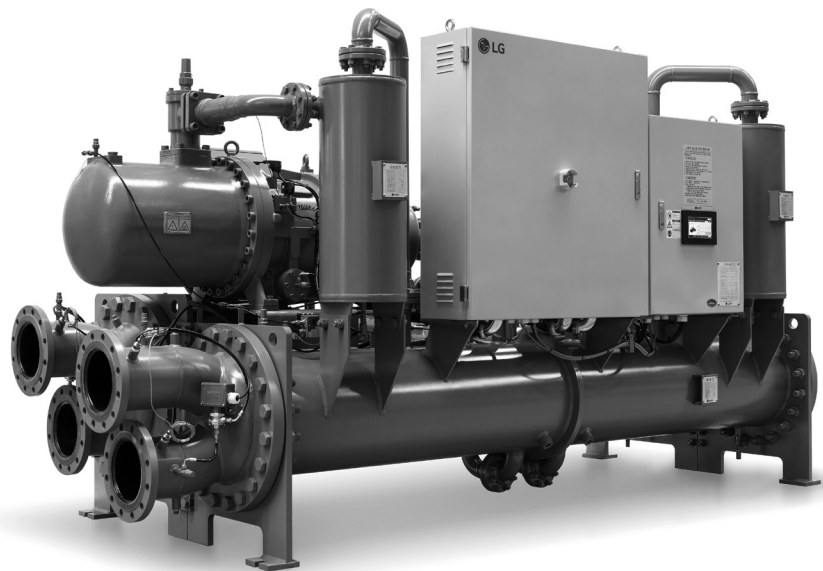
 **LG Electronics**

# Nomenclature






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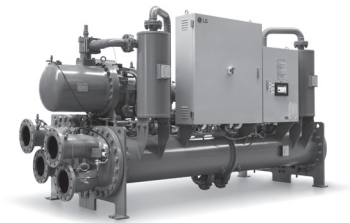
## Line up

[ usRT ]

Model			50	100	150	200	250	300	350	400	450
	Water-Cooled Screw Chiller RCWW Series	50Hz		75					354		
		60Hz		81							422
	Water-Cooled Screw Chiller MCWW Series	50Hz		80					373		
		60Hz		81							391
	Ice-storage Water-Cooled Screw Chiller	50Hz		50		230					
		60Hz		70							290

\* The above range is based on the nominal tonnage.

LG's latest Water cooled screw chiller offers excellent operational efficiency thanks to the company's advanced technologies and unrivalled air conditioning expertise. The new model's advanced capacity control system valve help to improve performance and efficiency. LG's proprietary PID(Proportional, Integral, Differential control), which controls hydraulic-head loss rate, helps to minimize energy loss even further.



- High-performance compressor manufactured by specialized manufacturer is adopted to ensure that the chiller is economical and durable with low vibration and low noise.
- Highly integrated motherboard is adopted and hence the function is strong and reliable.
- Advanced control algorithm is adopted to control chiller in advance and hence avoid frequent stoppage protection of chiller.
- We have set complete safety protection function in order to make chiller safely and reliably run.
- The linkage control and remote monitoring function of peripheral equipment ensure that the chiller can run safely and the operation and monitoring are convenient.
- The selection of excellent raw materials and fittings is the key to guaranteeing chiller quality.

### High efficiency, high reliability

The RCWW & MCWW series is a kind of water-cooled spray screw chiller produced by LGE Corporation. Because of the special structure design, the chiller has high efficiency and high reliability.

### Optimized dedicated motor R134a with high efficiency

Made of premium grade, low-loss core steel with the special slot design, the motors of R134a dedicated com-

pressors can gain the highest efficiency with low power consumption. Besides, different winding for specific voltage and frequency requirement contributes to the best power factor and excellent performance.

### Constructional design of dedicated screw compressor

The screw compressor is characterized by a very compact design. Most of inner dimensions have been totally modified considering displacement volume, size of compression chamber, length & profile of rotors, oil separator specification and oil piping rearrangement, etc. to ensure consistency and cost effectiveness of the compressor.

### Compressor

- Semi-hermetical twin-rotor screw compressor.
- Direct-drive, low speed/RPM for high efficiency and high reliability.
- Only three moving parts, resulting in high reliability with simple solution.
- Field serviceable compressor and easy maintenance.
- Precise rotor tip clearance.
- The world's advanced patent screw tooth with low noise, smooth operation long life advantages.
- A refrigerant dispersing cooling device is set internally for compressor cooling, which uses return-refrigerant cooling.
- Years of research and testing. The LG screw chiller has



amassed thousands of hours of testing, and conditions beyond normal air conditioning applications.

## Unit performance testing

LG began promoting factory performance tests for air-cooled chillers and water-cooled chillers, to show we stand behind the products we design and build. The benefits of a performance test include verification of performance, prevention of operational problems, and assurance of a smooth start-up.

Only a performance test conducted in a laboratory or laboratory grade facility will confirm both performance and operation of a specific chiller. Mostly factory performance tests go smoothly. If a problem occurs, LG personnel easily correct them and chiller is shipped to job site. When a factory performance test is requested, the test can be conducted at the specified, design conditions. The test facility has the capability to control ambient test conditions to assure our customers that our chillers will perform as predicted.

## AHRI certification program and standards and codes

Chillers conform to the following Standards and Codes:

- AHRI 550/590 - water chilling packages using the vapor compression cycle.
- ANSI/ASHRAE 34 - number designation and safety classification of refrigerants.
- ASME Section VIII (Option) - boiler and pressure vessel. (This code is only applied to product manufactured in Korea)
- CE - Conform to CE testing services for construction of chillers and provide CE listed mark.
- ETL - Conforms to ANSI/UL STD 1995 certified to CAN /CSA STD C22.2.
- GB/T 18430.1 - Water chilling (Heat pump) packages using the vapor compression cycle - part 1: Water chilling (Heat pump) packages for industrial & commercial and similar applications. (This code is only applied to product manufactured in China)



## Equipment overview

### Semi-hermetic twin rotor screw compressor

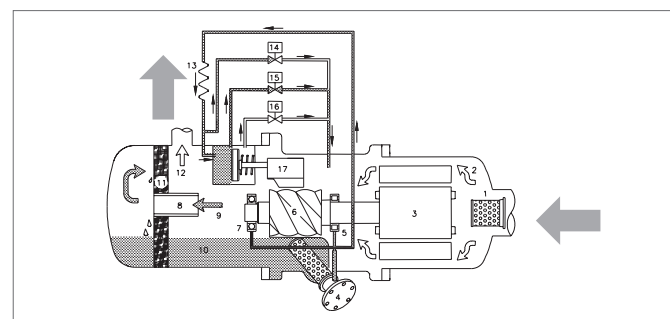
The semi-hermetic screw compressor is developed especially for applications in air-conditioning and refrigeration. With high operating load design, each compressor is of high efficiency and reliability in all operating conditions. Each compressor has the latest and advanced 5-to-6 Patented Screw Rotor Profile designed to ensure high capacity and efficiency in all operating conditions. The

compressor is equipped with separated radial and axial bearings, liquid injection and economizer connection, PTC motor temperature thermistors and discharge temperature thermistors, a motor protector, and oil level switch and oil pressure differential switch and other accessories. The complete accessories and their new designs guarantee the compressor has the best reliability, longest bearing life during heavy duty running and strict operating conditions.

The slide valve for capacity control is located in the compressor chamber. The slide valve is actuated by injection of pressurized oil into the cylinder from the oil sump as well as bypass of oil through solenoid valves in each oil lines with pressure differential.

The screw compressors are equipped with either 3-step/4-step capacity control system or continuous (Stepless) capacity control system. Both of the capacity control systems consist of a modulation slide valve, piston rod, cylinder, piston and piston rings. The slide valve and the piston are connected by a piston rod. The principle of operation is using the oil pressure to drive the piston in the cylinder. The lubrication oil flows from the oil sump through the oil filter cartridge and capillary then fills into the cylinder due to the positive oil pressure bigger than the right side of spring force plus the high pressure gas. The positive pressure differential causes the piston to move toward the right side in the cylinder. When the slide valve moves toward the right side, the effective compression volume in the compression chamber increases. This means the displacement of refrigerant gas also increases, as a result the refrigeration capacity also increases.

However, when any of the step solenoid valve (For 4-step capacity control system) is opened, the high pressure oil in the cylinder bypasses to the suction port, which causes the piston and the slide valve to move toward the left side, and then some of the refrigerant gas bypasses from the compression chamber back to the suction end. As a result, the refrigeration capacity decreases because of the reduction of displacement of refrigerant gas flowing in the system. The piston spring is used to push the piston back to its original position, i.e. minimum load position in order to reduce the starting current for the next starting.

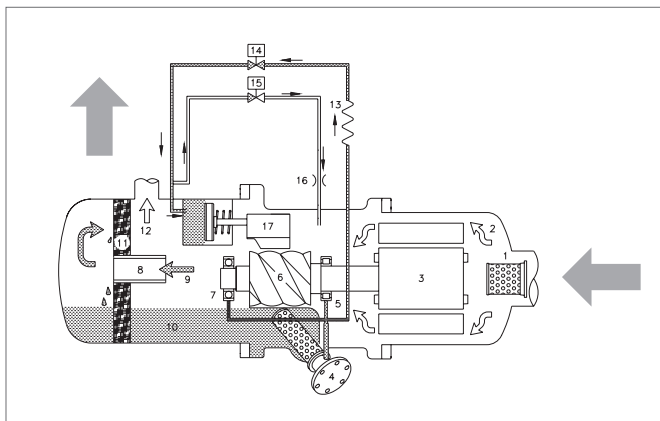


4-steps capacity control



# Equipment overview

No	Component	No	Component
1	Suction filter	10	Lubricant
2	Gas in(Low pressure)	11	Oil separator cartridge
3	Motor	12	Gas out (High pressure without oil)
4	Oil filter cartridge	13	Capillary
5	Suction bearings	14	Solenoid valve, SV2
6	Male rotor	15	Solenoid valve, SV1
7	Discharge bearings	16	Orifice
8	Oil separator baffle	17	Slide valve
9	Gas out(High pressure with oil)		



**Step-less capacity control**

No	Component	No	Component
1	Suction filter	10	Lubricant
2	Gas in(Low pressure)	11	Oil separator demister
3	Motor	12	Gas out(High pressure without oil)
4	Oil filter cartridge	13	Capillary
5	Suction bearings	14	Solenoid valve(min. %), SV 25% / 33%
6	Male rotor	15	Solenoid valve (50% of full load), SV 50%
7	Discharge bearings	16	Solenoid valve(75% / 66% of full load), SV 75% / 66%
8	Oil separator baffle	17	Slide valve
9	Gas out(High pressure with oil)	*	For RC2-100, 140 & 180 the SV50% omitted

## Heat exchanger

### Falling film type evaporator

"Falling film" shell and tube type evaporator having refrigerant in the shell and chilled water inside the tubes. Advantage of this type evaporator is higher heat transfer performance and reduced refrigerant charge.

Distributor located on the top side of inside shell makes uniform flow of refrigerant, this refrigerant flows downward by gravity as a continuous film.

The shell is of welded carbon steel construction with steel tube sheets and copper heat exchange tubes. Removable steel water boxes at both ends of the cooler allow tube cleaning without disturbing the refrigerant circuit.

Tubes are mechanically expanded into tube sheets with double grooves to ensure leak tight and trouble free operation. Multiple compressor/circuit chillers have coolers with separate refrigeration circuits for each compressor.

Each refrigeration circuit is provided with its own pressure relief valve. All chillers are fitted with drain valves on the removable heads and shell. All coolers are factory insulated with 19mm of closed cell expanded synthetic rubber with all joints vapor sealed.

### Expansion device

Expansion unit consists of butterfly valve and orifice. At 100% load situation, the pressure loss at the orifice is smaller than the refrigerant pressure loss in the condenser, thus the super-cooled refrigerant passes through the orifice.

At this stage the maximum amount of refrigerant is flowing into the evaporator. As the load reduces gradually, the circulating amount of refrigerant also reduces and accordingly the refrigerant level in the condenser is getting low.

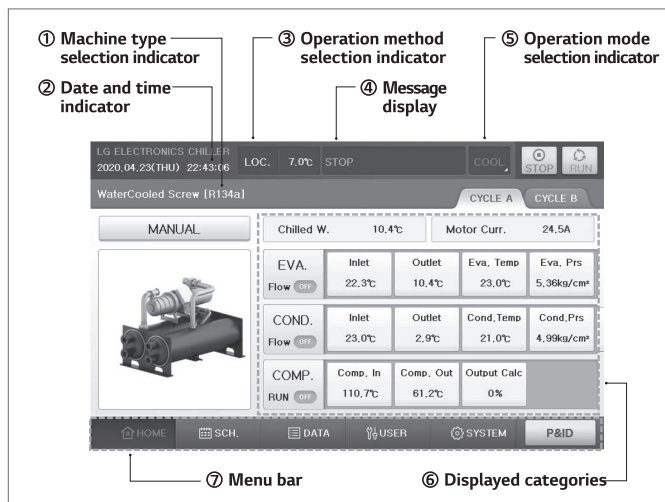
When the amount of liquid refrigerant reduces, the gas amount in the orifice is getting larger, raising the resistance thus controlling the flow rate.

## Control

### Controller system information

Generally controller consist of Display, Master, Slave and Relay board. Each board connect with RS485 communication and include analog input/output, digital input/output channel.

- 7 inch color LCD touch screen with high resolution
- Operation scheduling function
- Real time trend display
- Web Access(Additional accessory)
- Running data acquisition
- Easy-to-read display of operational data
- Certified EMI/EMS
- Communication supported: Modbus, RS485(Standard)
- Language: English/Chinese/Korean



Controller front view

- ① Machine type selection indicator  
It show the currently selected model. You can check detail from 'Control Information set' part.
- ② Date and time indicator  
It show the current time. You can check detail from 'Sys. Info.(System information)' part.
- ③ Operation method selection indicator  
It show the currently selected control mode. You can check detail from 'User set' part.
- ④ Message display  
It show the message about status of product.
- ⑤ Operation mode selection indicator  
It show the currently selected run mode. You can check detail from 'User set' part.
- ⑥ Displayed categories  
It show the currently information of product.
- ⑦ Menu bar  
It show the functions for menu operation button.

## Features of control unit

The Control unit of LG chiller controls temperature, pressure, current and capacity control valve using high capacity microprocessor. It is constructed to provide the high reliability chiller operation using LG's unique optimum control algorithm.

## Controller system composition diagram

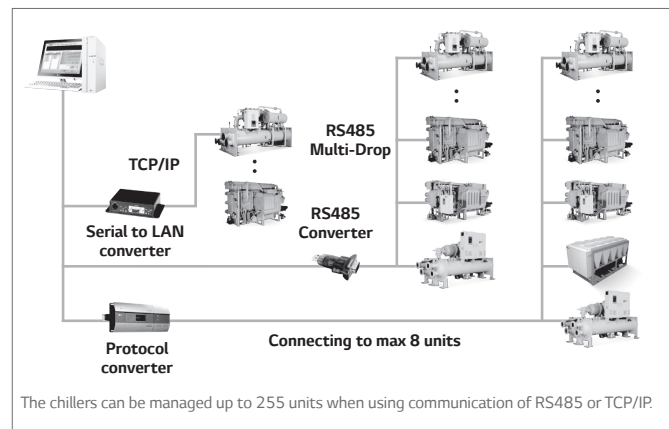
Master board and slave board have the same hardware and they are set as master or slave by DIP switch setting. This board consist of analog input/output, digital input/output and communication connections.

## BMS support function

Screw chiller's basic communication protocol is Modbus protocol, and it is compatible with the higher level communication methods.

Communication protocol support

- Protocol and communication method
  - Standard : Modbus, RS-485
  - Option : BACnet, TCP/IP



Detailed diagrams of BMS

## NFB(Non-Fused Breaker) power disconnect switch

A non-fused disconnect is available as a factory-installed option for all units with single point power connection units. This option is that power supply is disconnected during service & repair.

## Suction service isolation valve

Service suction isolation valve is installed with unit for each refrigerant circuit as a standard.

## General options

### Vibration isolation

For installation on building roofs or in sensitive noise areas(Hospitals, studios and some residential areas) pre-selected spring type isolators with 1" or 2" deflection are available as a factory option shipped loose part for field installation.

### Power factor correction

Provide equipment with power factor correction capacitors as required to maintain a displacement power factor of 95% at all load conditions.

# Accessories and options



## Water-Cooled Screw chiller standard summary

Division		Standard	Option
Comp.	*Power Supply(3Ph)	<input type="checkbox"/> 380V	<input type="checkbox"/> 400V <input type="checkbox"/> 415V <input type="checkbox"/> 440V <input type="checkbox"/> 460V <input type="checkbox"/> 480V
	*Hertz	<input type="checkbox"/> 50Hz	<input type="checkbox"/> 60Hz
	Capacity Control Type	<input type="checkbox"/> Step	
Control Panel	Communication	<input type="checkbox"/> Modbus	<input type="checkbox"/> BACnet <input type="checkbox"/> TCP/IP <input type="checkbox"/> etc(   )
	Protection Grade	<input type="checkbox"/> IP41	<input type="checkbox"/> etc(   )
Power Connection		<input type="checkbox"/> Standard(Single)	<input type="checkbox"/> Multi Power Connection
Factory Wiring		<input type="checkbox"/> Open Wiring	<input type="checkbox"/> Flexible Wiring
Starter Panel	*Supplied by	<input type="checkbox"/> Factory	<input type="checkbox"/> Supplied by Customer
	*Starter Type	<input type="checkbox"/> Y-Delta(Open)	<input type="checkbox"/> Direct <input type="checkbox"/> Soft Starter <input type="checkbox"/> SPG (VSD Starter Only) <input type="checkbox"/> etc(   )
	*Mounted Type	<input type="checkbox"/> Unit Mounted	
	Misc. Options	<input type="checkbox"/> N/A	<input type="checkbox"/> Ground Fault Protection <input type="checkbox"/> Power Factor Correction Capacitor <input type="checkbox"/> Integrating Watt-meter
	Power Access	<input type="checkbox"/> From the Top	<input type="checkbox"/> From the Bottom
	Protection Grade	<input type="checkbox"/> IP41	<input type="checkbox"/> etc(   )
EVAP.	Internal Inspection Lamp	<input type="checkbox"/> N/A	<input type="checkbox"/> Yes
	*Waterbox Pressure	<input type="checkbox"/> 150 psig(10kg/cm <sup>2</sup> )	<input type="checkbox"/> 230 psig(16kg/cm <sup>2</sup> ) <input type="checkbox"/> 300 psig(20kg/cm <sup>2</sup> )
	Nozzle Type	<input type="checkbox"/> ANSI-Flange	<input type="checkbox"/> ANSI-Victaulic(AGS) <input type="checkbox"/> ANSI-Victaulic(OGS) <input type="checkbox"/> etc(   )
	Safety Valve type	<input type="checkbox"/> Relief V/V(Single)	<input type="checkbox"/> Relief V/V(Dual)
Pipe Direction(C.P Front st.)		<input type="checkbox"/> Right	<input type="checkbox"/> Left
COND.	*Waterbox Pressure	<input type="checkbox"/> 150 psig(10kg/cm <sup>2</sup> )	<input type="checkbox"/> 230 psig(16kg/cm <sup>2</sup> ) <input type="checkbox"/> 300 psig(20kg/cm <sup>2</sup> )
	Nozzle Type	<input type="checkbox"/> ANSI-Flange	<input type="checkbox"/> ANSI-Victaulic(AGS) <input type="checkbox"/> ANSI-Victaulic(OGS) <input type="checkbox"/> etc(   )
	Safety Valve type	<input type="checkbox"/> Relief V/V(Single)	<input type="checkbox"/> Relief V/V(Dual)
	Pipe Direction(C.P Front st.)		<input type="checkbox"/> Right
*Refrigerant Charge		<input type="checkbox"/> Separated Shipping	<input type="checkbox"/> Factory Charge <input type="checkbox"/> Customer Supplied
Packing		<input type="checkbox"/> Shrink Film	<input type="checkbox"/> Wooden Packing
Insulation		<input type="checkbox"/> 19mm	<input type="checkbox"/> 38mm <input type="checkbox"/> N/A
Isolation		<input type="checkbox"/> Neoprene PAD	<input type="checkbox"/> Spring 1inch
Anchor Bolt for Foundation		<input type="checkbox"/> N/A	<input type="checkbox"/> Yes
Counter Pipe Flange		<input type="checkbox"/> N/A	<input type="checkbox"/> Yes
*Certification		<input type="checkbox"/> Standard(KGS)	<input type="checkbox"/> ASME VII Only <input type="checkbox"/> CE(PED) <input type="checkbox"/> PED <input type="checkbox"/> (C)UL(ETL) <input type="checkbox"/> GB
Factory Performance Test&Process Inspec.		<input type="checkbox"/> N/A	<input type="checkbox"/> Report Only <input type="checkbox"/> Customer Witness <input type="checkbox"/> Process Inspection
Operating Training		<input type="checkbox"/> N/A	<input type="checkbox"/> Yes
Warranty-Compressor		<input type="checkbox"/> 1yr	<input type="checkbox"/> etc(   )
Warranty-Ass'y		<input type="checkbox"/> 1yr	<input type="checkbox"/> etc(   )
Labor Warranty		<input type="checkbox"/> N/A	<input type="checkbox"/> etc(   )
Standard Specification		1) Color : Dawn Gray - Starter / Control Panel : Warm Gray 2) Standard Provide Emergency Stop Switch 3) Evaporator / Condenser Flow Proof Type : DP Switch 4) Water Box Type : Head(Circle) 5) Waterside Temp. Sensor : Single 6) Hex. Pressure Transmitter : Single	

\* Standard specifications is partially changed depending on the chiller origin.



# Specification | 60Hz



## RCWW Series

Model		Unit	RCWW008CA1C	RCWW010CA1C	RCWW012CA1C	RCWW012CA2C	RCWW014CA1C	RCWW014CA2C
Unit Capacity		usRT	81	108	123	119	141	136
		kW	286.1	380.8	433.9	417.0	496.4	479.3
Compressors	Power Supply		3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz
	Starter Type		Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA
	RLA	A	91	121	141	65 / 65	162	76 / 76
	Starting Current	A	245	317	378	227	363	268
	Refrigerant Circuits	EA	1	1	1	2	1	2
Evaporator	Inlet/Outlet Temperature		°C	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67
	Flow Rate	m <sup>3</sup> /h	44	59	67	64	77	74
	Pressure Drop	mAq	3.91	3.65	2.74	5.70	3.57	5.77
	Connection	A	100	100	125	125	125	125
Condenser	Inlet/Outlet Temperature		°C	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61
	Flow Rate	m <sup>3</sup> /h	57	76	86	83	99	95
	Pressure Drop	mAq	3.86	3.21	2.56	6.30	3.33	5.53
	Connection	A	100	100	125	125	125	125
Weight	Shipping	kg	2,700	3,000	3,270	3,870	3,600	4,210
	Operating	kg	3,050	3,350	3,720	4,320	4,050	4,660
Dimension	Length	mm	3,644	3,644	3,666	4,665	3,666	4,664
	Width	mm	1,097	1,097	1,141	1,488	1,141	1,483
	Height	mm	2,290	2,290	2,620	1,952	2,710	2,044
Refrigerant		kg	140	140	170	100 / 100	170	100 / 100
Oil		L	16	17	19	16 / 16	23	16 / 16

## MCWW Series

Model		Unit	MCWW008AA1A	MCWW010AA1A	MCWW011AA1A	MCWW012AA1A	MCWW014AA1A	MCWW016AA1A
Unit Capacity		usRT	81	97	110	120	141	165
		kW	284.7	340.1	388.3	422.0	496.9	580.8
Compressors	Power Supply		3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz
	Starter Type		Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA
	RLA	A	94	119	130	142	163	194
	Starting Current	A	270	273	328	328	372	583
	Refrigerant Circuits	EA	1	1	1	1	1	1
Evaporator	Inlet/Outlet Temperature		°C	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67
	Flow Rate	m <sup>3</sup> /h	44.01	52.59	60.03	65.24	76.82	89.80
	Pressure Drop	mAq	4.20	4.34	4.70	4.35	4.65	5.10
	Connection	A	100	100	100	100	100	100
Condenser	Inlet/Outlet Temperature		°C	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61
	Flow Rate	m <sup>3</sup> /h	56.71	67.98	77.33	84.21	98.63	115.3
	Pressure Drop	mAq	7.45	6.38	6.89	6.92	6.47	7.32
	Connection	A	100	100	100	100	100	100
Weight	Shipping	kg	2,900	3,300	3,500	3,800	4,100	4,600
	Operating	kg	3,200	3,600	3,800	4,100	4,500	5,000
Dimension	Length	mm	3,069	3,069	3,088	3,088	3,141	3,179
	Width	mm	1,412	1,412	1,466	1,466	1,568	1,568
	Height	mm	1,859	1,859	1,879	1,879	1,961	1,961
Refrigerant		kg	80	100	110	120	140	160
Oil		L	16	15	18	20	20	23

Note:

- 1 usRT = 3,024kcal/hr = 3.517kW, 1mH<sub>2</sub>O = 9.8kPa
2. Fouling factor of water in condenser is 0.0440m<sup>2</sup>°C/kW, in evaporator is 0.0176m<sup>2</sup>°C/kW
3. Cooling water temperature outlet is 34.61°C, inlet is 29.44°C Chilled water temperature outlet is 6.67°C, inlet is 12.22°C
4. Due to our policy of innovation some specifications may be changed without prior notification.
5. All data in this table is rated in accordance with AHRI Standard 550/590.

# Specification | 60Hz



## RCWW Series

Model		Unit	RCWW016CA1C	RCWW016CA2C	RCWW018CA1C	RCWW018CA2C	RCWW020CA1C	RCWW020CA2C
Unit Capacity		usRT	159	165	186	182	209	192
		kW	558.6	578.7	652.5	640.9	733.8	675.6
Compressors	Power Supply		3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz
	Starter Type		Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA
	RLA	A	177	91 / 91	207	101 / 101	234	105 / 105
	Starting Current	A	460	336	513	367	600	386
	Refrigerant Circuits	EA	1	2	1	2	1	2
Evaporator	Inlet/Outlet Temperature		12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67
	Flow Rate	m <sup>3</sup> /h	86	89	101	99	114	105
	Pressure Drop	mAq	3.42	8.37	3.34	7.72	3.83	6.50
	Connection	A	125	125	125	125	125	125
Condenser	Inlet/Outlet Temperature		29.44 / 34.61	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61
	Flow Rate	m <sup>3</sup> /h	111	114	130	127	146	134
	Pressure Drop	mAq	3.13	7.95	3.58	7.14	3.20	5.91
	Connection	A	125	125	125	125	125	125
Weight	Shipping	kg	3,820	4,500	4,120	4,800	4,390	5,050
	Operating	kg	4,270	4,950	4,700	5,380	4,970	5,630
Dimension	Length	mm	3,666	4,664	3,670	4,691	3,670	4,691
	Width	mm	1,141	1,524	1,188	1,577	1,188	1,577
	Height	mm	2,768	1,957	2,793	2,000	2,793	2,000
Refrigerant	kg	170	100 / 100	200	110 / 110	200	110 / 110	
Oil	L	26	16 / 16	28	16 / 16	28	16 / 16	

## MCWW Series

Model		Unit	MCWW018AA1A	MCWW020AA1A	MCWW020AA2A	MCWW022AA2A	MCWW024AA2A	MCWW026AA2A
Unit Capacity		usRT	184	196	194	220	239	259
		kW	648.5	687.6	681.2	773.3	841.7	909.3
Compressors	Power Supply		3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz
	Starter Type		Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA
	RLA	A	213	222	118 / 118	131 / 131	142 / 142	154 / 154
	Starting Current	A	643	728	392	459	471	526
	Refrigerant Circuits	EA	1	1	2	2	2	2
Evaporator	Inlet/Outlet Temperature		12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67
	Flow Rate	m <sup>3</sup> /h	100.3	106.3	105.3	119.6	130.1	140.6
	Pressure Drop	mAq	5.08	4.53	5.58	4.77	5.33	6.21
	Connection	A	100	150	150	150	150	150
Condenser	Inlet/Outlet Temperature		29.44 / 34.61	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61
	Flow Rate	m <sup>3</sup> /h	128.5	136.6	136.0	154.2	168.1	181.4
	Pressure Drop	mAq	7.26	5.92	12.4	10.2	10.8	12.6
	Connection	A	100	150	150	150	150	150
Weight	Shipping	kg	5,000	5,500	5,800	6,400	6,700	6,800
	Operating	kg	5,400	5,900	6,200	6,800	7,100	7,300
Dimension	Length	mm	3,179	3,179	4,444	4,444	4,471	4,471
	Width	mm	1,568	1,568	1,599	1,599	1,706	1,706
	Height	mm	1,961	1,961	1,924	1,924	2,039	2,039
Refrigerant	kg	180	200	100 / 100	110 / 110	120 / 120	130 / 130	
Oil	L	28	28	15 / 15	18 / 18	20 / 20	23 / 23	

Note:

- 1 usRT = 3,024kcal/hr = 3.517kW, 1mH<sub>2</sub>O = 9.8kPa
2. Fouling factor of water in condenser is 0.0440m<sup>2</sup>·°C/kW, in evaporator is 0.0176m<sup>2</sup>·°C/kW
3. Cooling water temperature outlet is 34.61°C, inlet is 29.44°C Chilled water temperature outlet is 6.67°C, inlet is 12.22°C
4. Due to our policy of innovation some specifications may be changed without prior notification.
5. All data in this table is rated in accordance with AHRI Standard 550/590.

# Specification | 60Hz



## RCWW Series

Model		Unit	RCWW022CA2C	RCWW024CA2C	RCWW028CA2C	RCWW032CA2C	RCWW036CA2C	RCWW040CA2C
Unit Capacity		usRT	221	250	287	323	377	422
		kW	776.0	879.0	1,009	1,136	1,326	1,483
Compressors	Power Supply		3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz
	Starter Type		Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA
	RLA	A	121 / 121	141 / 141	161 / 161	177 / 177	206 / 206	234 / 234
	Starting Current	A	438	519	525	637	719	834
	Refrigerant Circuits	EA	2	2	2	2	2	2
Evaporator	Inlet/Outlet Temperature	°C	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67
	Flow Rate	m <sup>3</sup> /h	120	136	156	176	205	229
	Pressure Drop	mAq	6.15	7.16	7.72	6.85	7.79	8.40
	Connection	A	150	150	200	200	200	200
Condenser	Inlet/Outlet Temperature	°C	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61
	Flow Rate	m <sup>3</sup> /h	153	174	200	225	262	294
	Pressure Drop	mAq	6.51	5.94	5.99	6.30	6.12	6.98
	Connection	A	150	150	200	200	200	200
Weight	Shipping	kg	5,340	5,660	6,290	6,670	7,290	7,690
	Operating	kg	6,020	6,340	7,090	7,470	8,270	8,670
Dimension	Length	mm	4,695	4,695	4,766	4,766	4,790	4,790
	Width	mm	1,697	1,697	1,746	1,746	1,828	1,828
	Height	mm	2,219	2,219	2,203	2,361	2,489	2,489
Refrigerant		kg	140 / 140	140 / 140	160 / 160	160 / 160	180 / 180	180 / 180
Oil		L	17 / 17	19 / 19	23 / 23	26 / 26	28 / 28	28 / 28

## MCWW Series

Model		Unit	MCWW028AA2A	MCWW032AA2A	MCWW037AA2A	MCWW039AA2A
Unit Capacity		usRT	283	330	369	392
		kW	993.8	1160	1299	1380
Compressors	Power Supply		3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz	3 Ph / 380 V / 60 Hz
	Starter Type		Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA
	RLA	A	163 / 163	193 / 193	213 / 213	220 / 220
	Starting Current	A	535	777	856	949
	Refrigerant Circuits	EA	2	2	2	2
Evaporator	Inlet/Outlet Temperature	°C	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67
	Flow Rate	m <sup>3</sup> /h	153.7	179.4	200.8	213.3
	Pressure Drop	mAq	5.93	5.81	7.01	7.91
	Connection	A	150	200	200	200
Condenser	Inlet/Outlet Temperature	°C	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61
	Flow Rate	m <sup>3</sup> /h	197.2	230.4	257.2	273.7
	Pressure Drop	mAq	11.8	12.6	13.9	12.2
	Connection	A	150	200	200	200
Weight	Shipping	kg	7,000	7,300	7,800	8,200
	Operating	kg	7,500	7,800	8,300	8,700
Dimension	Length	mm	4,596	4,414	4,414	4,414
	Width	mm	1,706	1,756	1,756	1,783
	Height	mm	2,073	2,129	2,129	2,129
Refrigerant		kg	140 / 140	160 / 160	190 / 190	200 / 200
Oil		L	20 / 20	23 / 23	28 / 28	28 / 28

Note:

- 1 usRT = 3,024kcal/hr = 3.517kW, 1mH<sub>2</sub>O = 9.8kPa
- 2 Fouling factor of water in condenser is 0.0440m<sup>2</sup>°C/kW, in evaporator is 0.0176m<sup>2</sup>°C/kW
- 3 Cooling water temperature outlet is 34.61°C, inlet is 29.44°C Chilled water temperature outlet is 6.67°C, inlet is 12.22°C
- 4 Due to our policy of innovation some specifications may be changed without prior notification.
- 5 All data in this table is rated in accordance with AHRI Standard 550/590.



# Specification | 50Hz



## RCWW Series

Model		Unit	RCWW008CA1C	RCWW010CA1C	RCWW012CA1C	RCWW012CA2C	RCWW014CA1C	RCWW014CA2C
Unit Capacity		usRT	75	102	118	113	132	138
		kW	263.0	359.6	415.4	398.9	465.1	486.9
Compressors	Power Supply		3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz
	Starter Type		Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA
	RLA	A	85	118	138	63 / 63	150	76 / 76
	Starting Current	A	218	320	285	218	340	276
	Refrigerant Circuits	EA	1	1	1	2	1	2
Evaporator	Inlet/Outlet Temperature		12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67
	Flow Rate	m <sup>3</sup> /h	41	56	64	62	72	75
	Pressure Drop	mAq	3.31	3.26	2.51	5.23	3.14	5.95
	Connection	A	100	100	125	125	125	125
Condenser	Inlet/Outlet Temperature		29.44 / 34.61	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61
	Flow Rate	m <sup>3</sup> /h	52	72	82	79	92	96
	Pressure Drop	mAq	3.29	2.89	2.34	5.80	2.92	5.62
	Connection	A	100	100	125	125	125	125
Weight	Shipping	kg	2,780	3,040	3,470	3,950	3,650	4,350
	Operating	kg	3,130	3,390	3,920	4,400	4,100	4,800
Dimension	Length	mm	3,644	3,644	3,666	4,665	3,666	4,664
	Width	mm	1,095	1,185	1,141	1,488	1,141	1,504
	Height	mm	2,290	2,318	2,710	1,952	2,735	2,044
Refrigerant	kg	140	140	170	100 / 100	170	100 / 100	
Oil	L	17	19	23	16 / 16	26	16 / 16	

## MCWW Series

Model		Unit	MCWW008AA1A	MCWW010AA1A	MCWW011AA1A	MCWW012AA1A	MCWW014AA1A
Unit Capacity		usRT	81	100	109	120	139
		kW	283.5	350.7	384.0	423.0	489.5
Compressors	Power Supply		3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz
	Starter Type		Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA
	RLA	A	100	121	133	143	167
	Starting Current	A	233	270	292	407	447
	Refrigerant Circuits	EA	1	1	1	1	1
Evaporator	Inlet/Outlet Temperature		12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67
	Flow Rate	m <sup>3</sup> /h	43.82	54.22	59.37	65.39	75.68
	Pressure Drop	mAq	4.17	4.61	4.60	4.37	4.52
	Connection	A	100	100	100	100	100
Condenser	Inlet/Outlet Temperature		29.40 / 34.61	29.40 / 34.61	29.40 / 34.61	29.40 / 34.61	29.40 / 34.61
	Flow Rate	m <sup>3</sup> /h	56.13	69.47	75.89	83.77	96.32
	Pressure Drop	mAq	7.30	6.66	6.64	6.85	6.17
	Connection	A	100	100	100	100	100
Weight	Shipping	kg	3,000	3,400	3,600	3,900	4,300
	Operating	kg	3,300	3,700	3,900	4,200	4,600
Dimension	Length	mm	3,069	3,069	3,088	3,088	3,141
	Width	mm	1,412	1,412	1,466	1,466	1,568
	Height	mm	1,859	1,859	1,879	1,879	1,961
Refrigerant	kg	80	100	110	120	140	
Oil	L	15	20	23	23	23	

Note:

- 1 usRT = 3,024kcal/hr = 3.517kW, 1mH<sub>2</sub>O = 9.8kPa
2. Fouling factor of water in condenser is 0.0440m<sup>2</sup>·°C/kW, in evaporator is 0.0176m<sup>2</sup>·°C/kW
3. Cooling water temperature outlet is 34.61°C, inlet is 29.44°C Chilled water temperature outlet is 6.67°C, inlet is 12.22°C
4. Due to our policy of innovation some specifications may be changed without prior notification.
5. All data in this table is rated in accordance with AHRI Standard 550/590.

# Specification | 50Hz



## RCWW Series

Model		Unit	RCWW016CA1C	RCWW016CA2C	RCWW018CA1C	RCWW018CA2C	RCWW020CA2C
Unit Capacity		usRT	155	152	174	160	184
		kW	543.5	533.7	612.3	562.3	646.0
Compressors	Power Supply		3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz
	Starter Type		Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA
	RLA	A	174	84 / 84	195	88 / 88	102 / 102
	Starting Current	A	427	303	483	320	363
	Refrigerant Circuits	EA	1	2	1	2	2
Evaporator	Inlet/Outlet Temperature		°C	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67
	Flow Rate	m <sup>3</sup> /h	84	83	95	87	100
	Pressure Drop	mAq	3.24	7.13	2.95	5.96	5.95
	Connection	A	125	125	125	125	125
Condenser	Inlet/Outlet Temperature		°C	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61
	Flow Rate	m <sup>3</sup> /h	108	106	121	111	128
	Pressure Drop	mAq	2.97	6.80	3.15	5.51	5.39
	Connection	A	125	125	125	125	125
Weight	Shipping	kg	3,950	4,540	4,210	4,860	5,110
	Operating	kg	4,400	4,990	4,790	5,440	5,690
Dimension	Length	mm	3,666	4,664	3,670	4,691	4,691
	Width	mm	1,141	1,524	1,216	1,577	1,577
	Height	mm	2,740	1,957	2,793	2,000	2,000
Refrigerant		kg	170	100 / 100	200	110 / 110	110 / 110
Oil		L	28	16 / 16	28	16 / 16	17 / 17

## MCWW Series

Model		Unit	MCWW016AA1A	MCWW019AA1A	MCWW020AA2A	MCWW022AA2A	MCWW024AA2A
Unit Capacity		usRT	163	187	200	217	240
		kW	573.7	659.4	702.3	764.8	843.6
Compressors	Power Supply		3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz
	Starter Type		Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA
	RLA	A	187	210	120 / 120	133 / 133	144 / 144
	Starting Current	A	522	663	390	425	550
	Refrigerant Circuits	EA	1	1	2	2	2
Evaporator	Inlet/Outlet Temperature		°C	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67
	Flow Rate	m <sup>3</sup> /h	88.70	101.9	108.6	118.3	130.4
	Pressure Drop	mAq	4.97	5.25	5.93	4.67	5.35
	Connection	A	100	100	150	150	150
Condenser	Inlet/Outlet Temperature		°C	29.40 / 34.61	29.40 / 34.61	29.40 / 34.61	29.40 / 34.61
	Flow Rate	m <sup>3</sup> /h	112.9	129.2	139.0	151.3	167.2
	Pressure Drop	mAq	7.02	7.34	12.9	9.83	10.7
	Connection	A	100	100	150	150	150
Weight	Shipping	kg	4,800	5,200	5,800	6,300	6,600
	Operating	kg	5,200	5,600	6,200	6,700	7,000
Dimension	Length	mm	3,179	3,179	4,444	4,444	4,471
	Width	mm	1,568	1,568	1,599	1,599	1,706
	Height	mm	1,961	1,961	1,924	1,924	2,039
Refrigerant		kg	160	190	100 / 100	110 / 110	120 / 120
Oil		L	28	28	20 / 20	23 / 23	23 / 23

Note:

- 1 usRT = 3,024kcal/hr = 3.517kW, 1mH<sub>2</sub>O = 9.8kPa
- 2 Fouling factor of water in condenser is 0.0440m<sup>2</sup>°C/kW, in evaporator is 0.0176m<sup>2</sup>°C/kW
- 3 Cooling water temperature outlet is 34.61°C, inlet is 29.44°C Chilled water temperature outlet is 6.67°C, inlet is 12.22°C
- 4 Due to our policy of innovation some specifications may be changed without prior notification.
- 5 All data in this table is rated in accordance with AHRI Standard 550/590.

# Specification | 50Hz



## RCWW Series

Model		Unit	RCWW022CA2C	RCWW024CA2C	RCWW028CA2C	RCWW032CA2C	RCWW036CA2C
Unit Capacity		usRT	208	239	269	314	354
		kW	733.2	841.2	945.1	1,106	1,244
Compressors	Power Supply		3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz
	Starter Type		Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA
	RLA	A	117 / 117	137 / 137	149 / 149	174 / 174	194 / 194
	Starting Current	A	437	422	489	600	677
	Refrigerant Circuits	EA	2	2	2	2	2
Evaporator	Inlet/Outlet Temperature		12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67
	Flow Rate	m <sup>3</sup> /h	113	130	146	171	192
	Pressure Drop	mAq	5.50	6.56	6.78	6.49	6.87
	Connection	A	150	150	200	200	200
Condenser	Inlet/Outlet Temperature		29.44 / 34.61	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61	29.44 / 34.61
	Flow Rate	m <sup>3</sup> /h	145	166	187	219	246
	Pressure Drop	mAq	5.84	5.42	5.25	5.96	5.39
	Connection	A	150	150	200	200	200
Weight	Shipping	kg	5,420	6,060	6,390	6,930	7,460
	Operating	kg	6,100	6,740	7,190	7,730	8,440
Dimension	Length	mm	4,695	4,695	4,766	4,766	4,790
	Width	mm	1,683	1,750	1,745	1,746	1,828
	Height	mm	2,219	2,220	2,297	2,383	2,489
Refrigerant		kg	140 / 140	140 / 140	160 / 160	160 / 160	180 / 180
Oil		L	19 / 19	23 / 23	26 / 26	28 / 28	28 / 28

## MCWW Series

Model		Unit	MCWW028AA2A	MCWW030AA2A	MCWW032AA2A	MCWW038AA2A
Unit Capacity		usRT	278	305	326	376
		kW	979.0	1074	1146	1321
Compressors	Power Supply		3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz	3 Ph / 380 V / 50 Hz
	Starter Type		Y-DELTA	Y-DELTA	Y-DELTA	Y-DELTA
	RLA	A	166 / 166	175 / 175	187 / 187	209 / 209
	Starting Current	A	613	652	708	873
	Refrigerant Circuits	EA	2	2	2	2
Evaporator	Inlet/Outlet Temperature		12.22 / 6.67	12.22 / 6.67	12.22 / 6.67	12.22 / 6.67
	Flow Rate	m <sup>3</sup> /h	151.4	166.0	177.2	204.2
	Pressure Drop	mAq	5.75	5.88	5.67	7.25
	Connection	A	150	150	200	200
Condenser	Inlet/Outlet Temperature		29.40 / 34.61	29.40 / 34.61	29.40 / 34.61	29.40 / 34.61
	Flow Rate	m <sup>3</sup> /h	192.6	211.5	225.6	258.6
	Pressure Drop	mAq	11.3	10.5	12.1	14.0
	Connection	A	150	150	200	200
Weight	Shipping	kg	6,900	7,100	7,500	8,000
	Operating	kg	7,400	7,600	8,000	8,500
Dimension	Length	mm	4,596	4,656	4,701	4,701
	Width	mm	1,706	1,706	1,756	1,756
	Height	mm	2,073	2,073	2,129	2,129
Refrigerant		kg	140 / 140	150 / 150	160 / 160	190 / 190
Oil		L	23 / 23	28 / 28	28 / 28	28 / 28

Note:

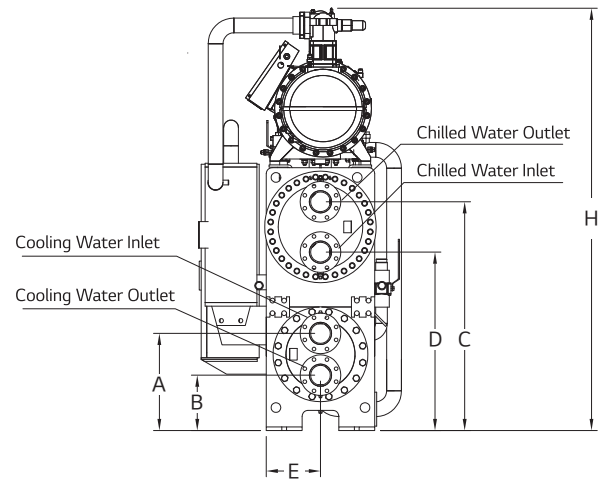
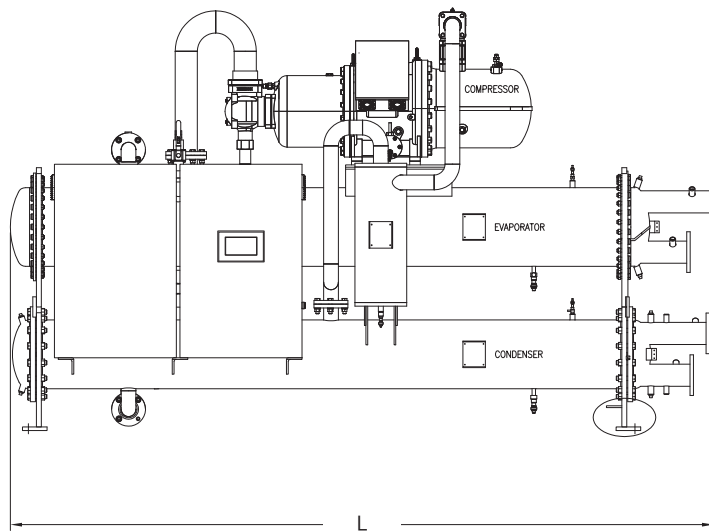
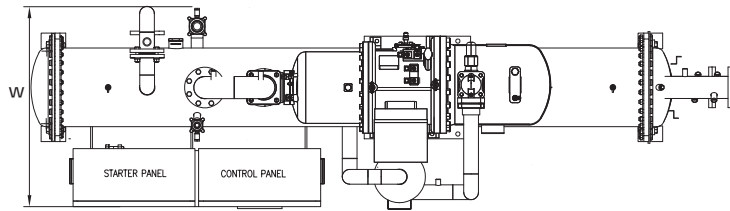
- 1 usRT = 3,024kcal/hr = 3.517kW, 1mH<sub>2</sub>O = 9.8kPa
2. Fouling factor of water in condenser is 0.0440m<sup>2</sup>·°C/kW, in evaporator is 0.0176m<sup>2</sup>·°C/kW
3. Cooling water temperature outlet is 34.61°C, inlet is 29.44°C Chilled water temperature outlet is 6.67°C, inlet is 12.22°C
4. Due to our policy of innovation some specifications may be changed without prior notification.
5. All data in this table is rated in accordance with AHRI Standard 550/590.



# Outline drawing | 1 Compressor model



## 1 Compressor model



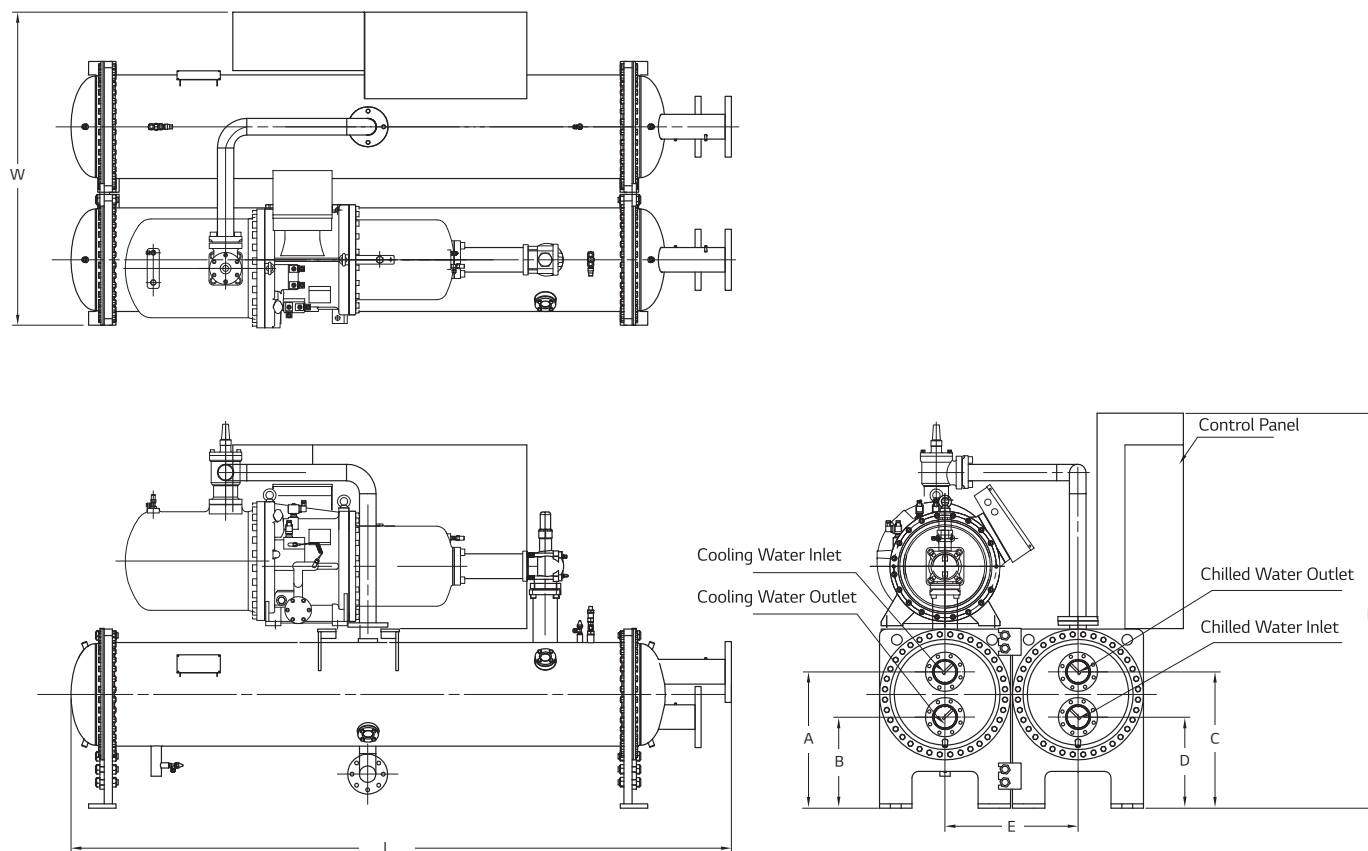
Tolerance : Chiller dimension  $\pm 50$ , Pipe Dimension  $\pm 30$ mm / Unit : mm

Frequency	Model	Chiller Dimension			Pipe Dimension				
		L	W	H	A	B	C	D	E
60Hz	RCWW008CA1C	3,644	1,097	2,290	519	259	1,206	946	310
	RCWW010CA1C	3,644	1,097	2,290	519	259	1,206	946	310
	RCWW012CA1C	3,666	1,141	2,620	604	364	1,210	1,470	338
	RCWW014CA1C	3,666	1,141	2,710	604	364	1,470	1,210	338
	RCWW016CA1C	3,666	1,141	2,768	604	364	1,470	1,210	338
	RCWW018CA1C	3,670	1,188	2,793	559	399	1,468	1,208	338
	RCWW020CA1C	3,670	1,188	2,793	559	399	1,468	1,208	338
50Hz	RCWW008CA1C	3,644	1,095	2,290	519	259	1,206	946	310
	RCWW010CA1C	3,644	1,185	2,318	519	259	1,206	946	310
	RCWW012CA1C	3,666	1,141	2,620	604	364	1,210	1,470	338
	RCWW014CA1C	3,666	1,141	2,735	604	364	1,470	1,210	338
	RCWW016CA1C	3,666	1,141	2,740	604	364	1,470	1,210	338
	RCWW018CA1C	3,670	1,216	2,793	559	399	1,468	1,208	338

# Outline drawing | 1 Compressor model



## 1 Compressor model



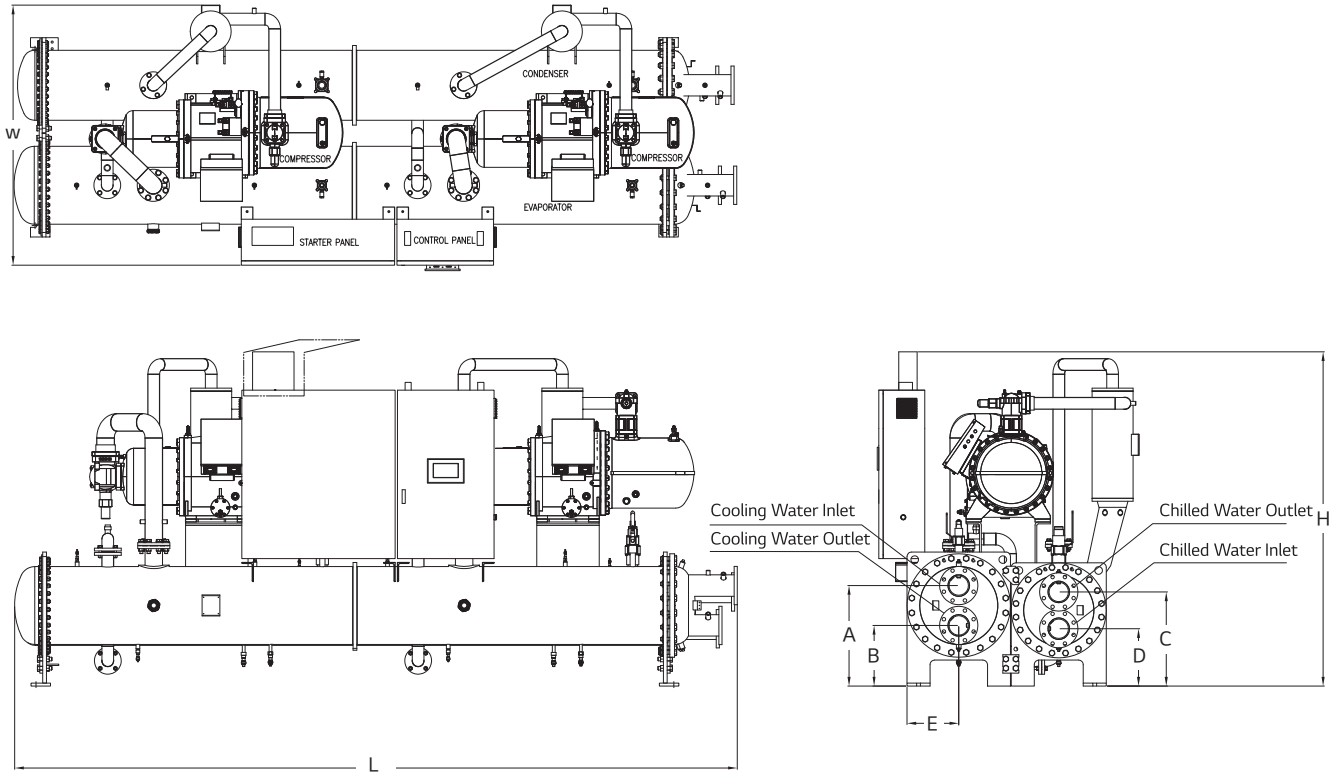
Tolerance : Chiller dimension  $\pm 50$ , Pipe Dimension  $\pm 30$ mm / Unit : mm

Frequency	Model	Chiller Dimension			Pipe Dimension				
		L	W	H	A	B	C	D	E
60Hz	MCWW008AA1A	3,069	1,412	1,859	612	402	612	402	616
	MCWW010AA1A	3,069	1,412	1,859	615	405	615	405	616
	MCWW011AA1A	3,088	1,466	1,879	630	370	632	422	643
	MCWW012AA1A	3,088	1,466	1,879	630	370	632	422	643
	MCWW014AA1A	3,141	1,568	1,961	705	405	705	405	720
	MCWW016AA1A	3,179	1,568	1,961	705	405	705	405	720
	MCWW018AA1A	3,179	1,568	1,961	705	405	705	405	720
50Hz	MCWW020AA1A	3,179	1,568	1,961	692	392	707	407	776
	MCWW008AA1A	3,069	1,412	1,859	615	405	615	405	616
	MCWW010AA1A	3,069	1,412	1,859	615	405	615	405	616
	MCWW011AA1A	3,088	1,466	1,879	630	370	632	422	643
	MCWW012AA1A	3,088	1,466	1,879	630	370	632	422	643
	MCWW014AA1A	3,141	1,568	1,961	705	405	705	405	720
	MCWW016AA1A	3,179	1,568	1,961	705	405	705	405	720
MCWW019AA1A	3,179	1,568	1,961	705	405	705	405	720	

# Outline drawing | 2 Compressor model



## 2 Compressor model



Tolerance : Chiller dimension  $\pm 50$ , Pipe Dimension  $\pm 30\text{mm}$  / Unit : mm

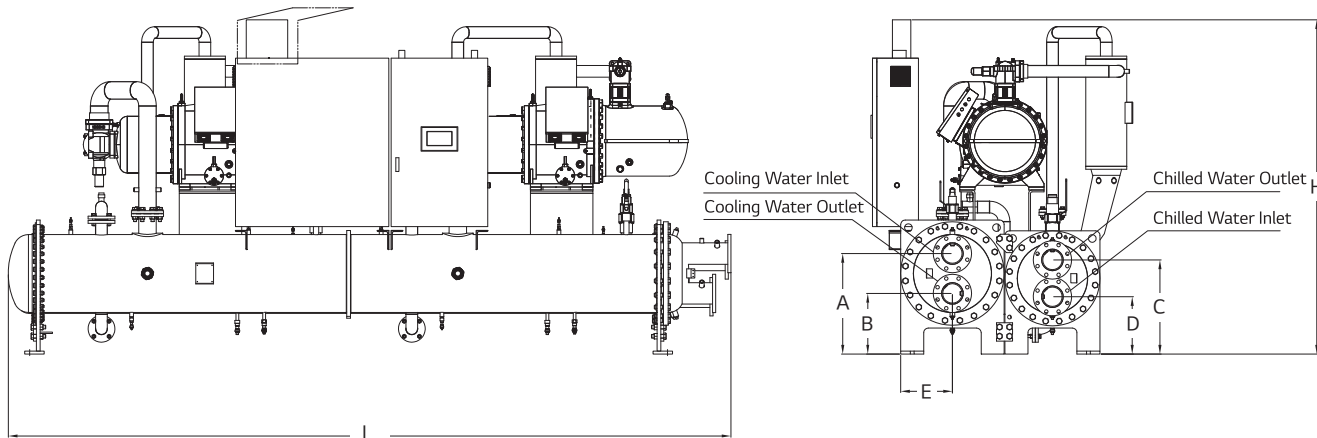
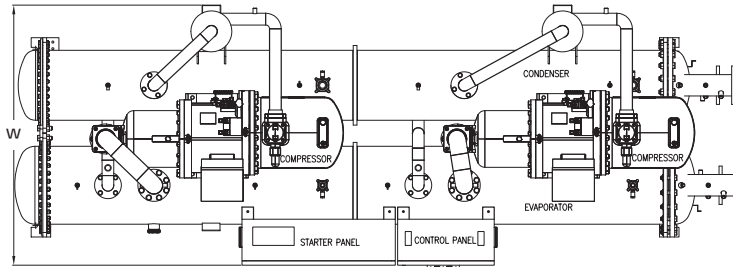
Frequency	Model	Chiller Dimension			Pipe Dimension				
		L	W	H	A	B	C	D	E
60Hz	RCWW012CA2C	4,665	1,488	1,952	599	299	543	283	310
	RCWW014CA2C	4,664	1,483	2,044	563	303	543	283	310
	RCWW016CA2C	4,664	1,524	1,957	563	303	543	283	310
	RCWW018CA2C	4,691	1,577	2,000	591	331	567	327	338
	RCWW020CA2C	4,691	1,577	2,000	591	331	567	327	338
	RCWW022CA2C	4,695	1,697	2,219	717	457	642	382	373
	RCWW024CA2C	4,695	1,697	2,219	717	457	642	382	373
	RCWW028CA2C	4,766	1,729	2,203	737	437	697	397	398
	RCWW032CA2C	4,766	1,746	2,361	737	437	713	413	398
	RCWW036CA2C	4,790	1,828	2,489	728	428	682	362	423
50Hz	RCWW012CA2C	4,665	1,488	1,952	599	299	543	283	310
	RCWW014CA2C	4,664	1,504	2,044	563	303	543	283	310
	RCWW016CA2C	4,664	1,524	1,957	563	303	543	283	310
	RCWW018CA2C	4,691	1,577	2,000	591	331	567	327	338
	RCWW020CA2C	4,691	1,577	2,000	591	331	567	327	338
	RCWW022CA2C	4,695	1,683	2,219	717	457	642	382	373
	RCWW024CA2C	4,695	1,750	2,220	717	457	642	382	373
	RCWW028CA2C	4,766	1,745	2,297	737	437	697	397	398
	RCWW032CA2C	4,766	1,746	2,383	737	437	713	413	398
	RCWW036CA2C	4,790	1,828	2,489	728	428	682	362	423



# Outline drawing | 2 Compressor model



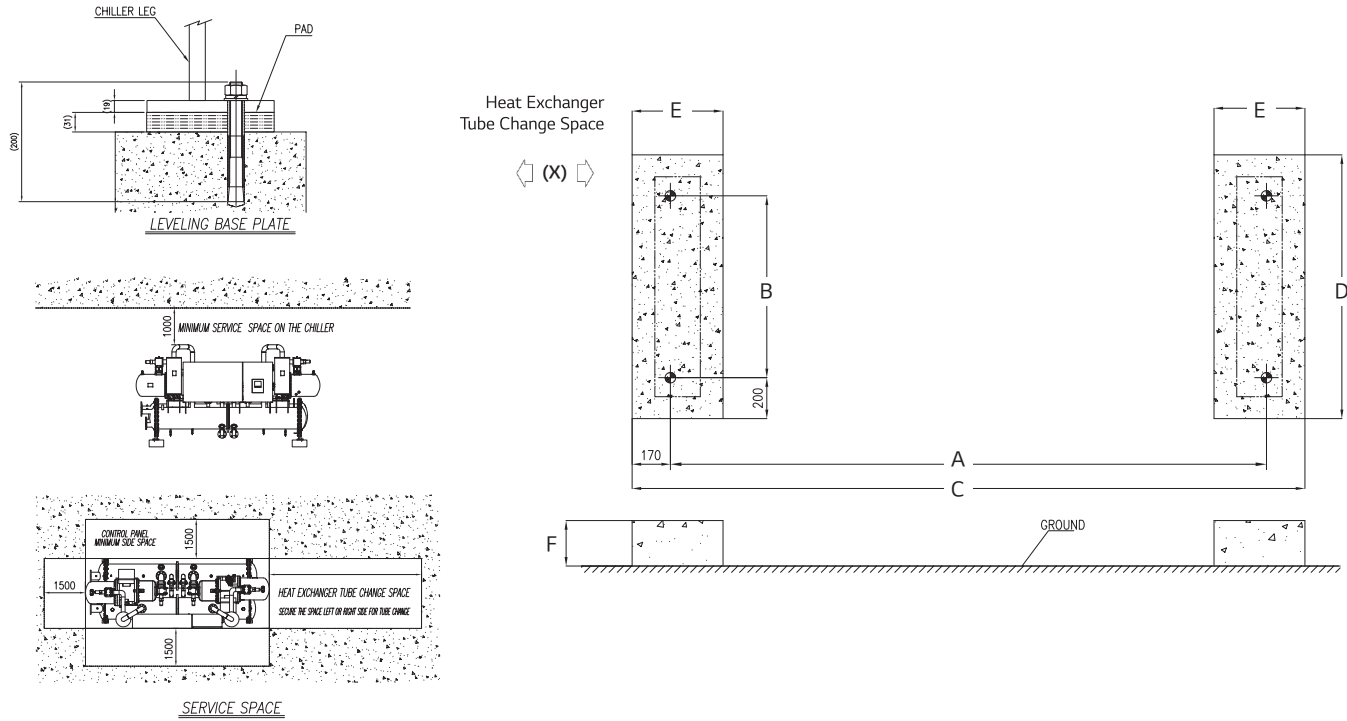
## 2 Compressor model



Tolerance : Chiller dimension  $\pm 50$ , Pipe Dimension  $\pm 30$ mm / Unit : mm

Frequency	Model	Chiller Dimension			Pipe Dimension				
		L	W	H	A	B	C	D	E
60Hz	MCWW020AA2A	4,444	1,599	1,924	692	392	675	415	723
	MCWW022AA2A	4,444	1,599	1,924	692	392	675	415	723
	MCWW024AA2A	4,471	1,706	2,039	755	405	757	457	803
	MCWW026AA2A	4,471	1,706	2,039	755	405	757	457	803
	MCWW028AA2A	4,596	1,706	2,073	755	405	757	457	803
	MCWW032AA2A	4,414	1,756	2,129	820	470	847	547	828
	MCWW037AA2A	4,414	1,756	2,129	820	470	847	547	828
	MCWW039AA2A	4,414	1,783	2,129	820	470	845	495	855
50Hz	MCWW020AA2A	4,444	1,599	1,924	692	392	675	415	723
	MCWW022AA2A	4,444	1,599	1,924	692	392	675	415	723
	MCWW024AA2A	4,471	1,706	2,039	755	405	757	457	803
	MCWW028AA2A	4,596	1,706	2,073	755	405	757	457	803
	MCWW030AA2A	4,656	1,706	2,073	755	405	757	457	803
	MCWW032AA2A	4,701	1,756	2,129	820	470	847	547	828
MCWW038AA2A	4,701	1,756	2,129	820	470	847	547	828	

# Foundation



Unit : mm

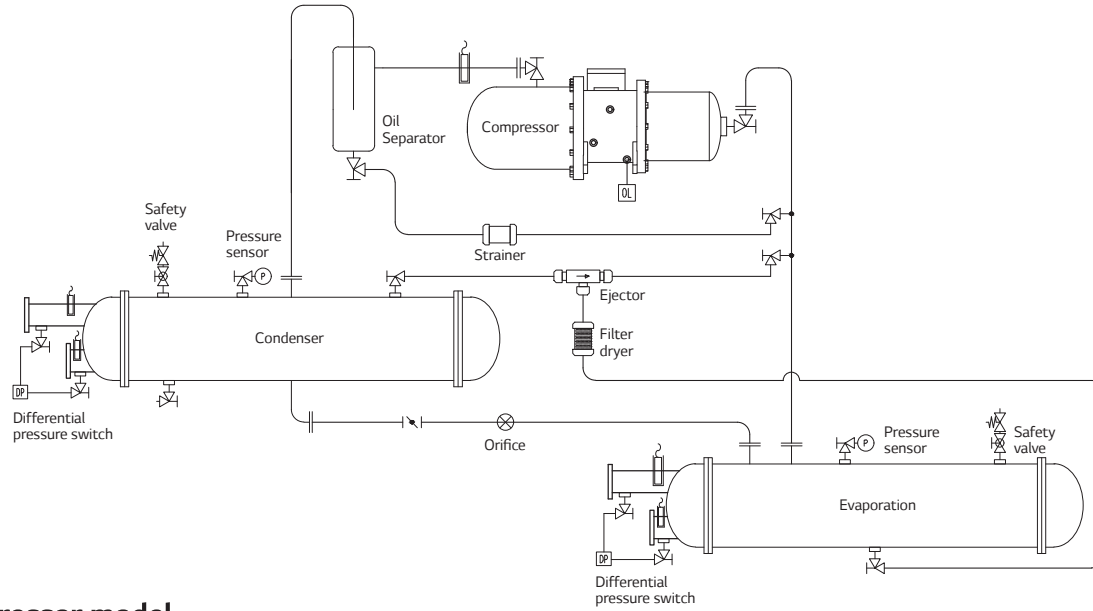
Model		Dimension						
		A	B	C	D	E	F	(X)
1 Comp.	RCWW008CA1C	3,134	470	3,474	870	500	200	2,500
	RCWW010CA1C	3,134	470	3,474	870	500	200	2,500
	RCWW012CA1C	3,134	525	3,474	925	500	200	2,500
	RCWW014CA1C	3,134	525	3,474	925	500	200	2,500
	RCWW016CA1C	3,134	525	3,474	925	500	200	2,500
	RCWW018CA1C	3,134	558	3,474	958	500	200	2,500
	RCWW020CA1C	3,134	558	3,474	958	500	200	2,500
2 Comp.	RCWW012CA2C	4,159	1,051	4,499	1,451	500	200	4,100
	RCWW014CA2C	4,159	1,051	4,499	1,451	500	200	4,100
	RCWW016CA2C	4,159	1,051	4,499	1,451	500	200	4,100
	RCWW018CA2C	4,159	1,150	4,499	1,550	500	200	4,100
	RCWW020CA2C	4,159	1,150	4,499	1,550	500	200	4,100
	RCWW022CA2C	4,159	1,275	4,499	1,675	500	200	4,100
	RCWW024CA2C	4,159	1,275	4,499	1,675	500	200	4,100
	RCWW028CA2C	4,159	1,395	4,499	1,795	500	200	4,100
	RCWW032CA2C	4,159	1,395	4,499	1,795	500	200	4,100
	RCWW036CA2C	4,159	1,495	4,499	1,895	500	200	4,100
	RCWW040CA2C	4,159	1,495	4,499	1,895	500	200	4,100

Model		Dimension						
		A	B	C	D	E	F	(X)
1 Comp.	MCWW008AA1A	2,702	1,072	3,042	1,472	500	200	2,500
	MCWW010AA1A	2,702	1,072	3,042	1,472	500	200	2,500
	MCWW011AA1A	2,702	1,126	3,042	1,526	500	200	2,500
	MCWW012AA1A	2,702	1,126	3,042	1,526	500	200	2,500
	MCWW014AA1A	2,702	1,280	3,042	1,680	500	200	2,500
	MCWW016AA1A	2,702	1,280	3,042	1,680	500	200	2,500
	MCWW018AA1A	2,702	1,280	3,042	1,680	500	200	2,500
	MCWW019AA1A	2,702	1,280	3,042	1,680	500	200	2,500
	MCWW020AA1A	2,702	1,392	3,042	1,792	500	200	2,500
2 Comp.	MCWW020AA2A	3,960	1,286	4,300	1,686	500	200	3,700
	MCWW022AA2A	3,960	1,286	4,300	1,686	500	200	3,700
	MCWW024AA2A	3,960	1,446	4,300	1,846	500	200	3,700
	MCWW026AA2A	3,960	1,446	4,300	1,846	500	200	3,700
	MCWW028AA2A	3,960	1,446	4,300	1,846	500	200	3,700
	MCWW030AA2A	3,960	1,446	4,300	1,846	500	200	3,700
	MCWW032AA2A	3,960	1,496	4,300	1,896	500	200	3,700
	MCWW037AA2A	3,960	1,496	4,300	1,896	500	200	3,700
	MCWW038AA2A	3,960	1,496	4,300	1,896	500	200	3,700
MCWW039AA2A	3,960	1,550	4,300	1,950	500	200	3,700	

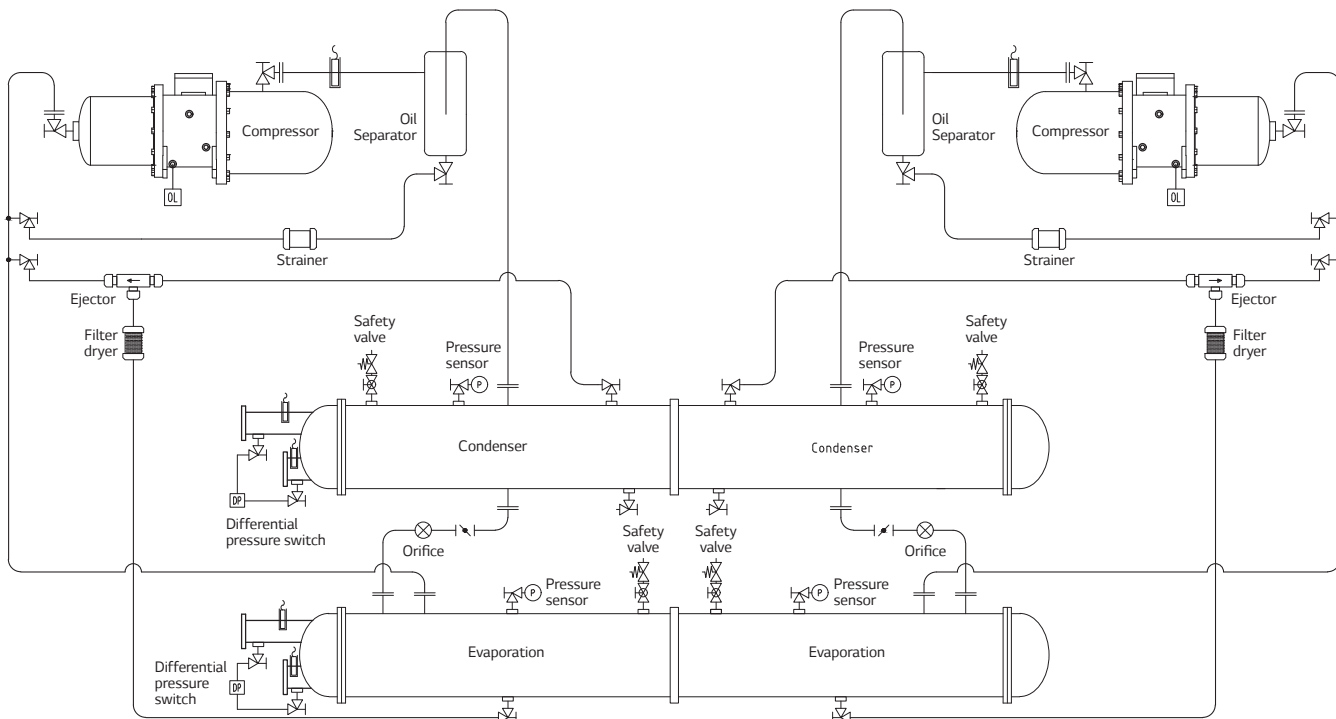
Note:  
1. It is possible to differ depend on site condition.

# Piping diagram

## 1 Compressor model



## 2 Compressor model



Symbol	Description	Symbol	Description	Symbol	Description	Symbol	Description
	Solenoid valve		Butterfly valve		Low pressure switch		Temperature sensor
	Electric expansion valve		Check valve		Differential pressure switch		Strainer
	Expansion device		Tee		Oil level switch		Filter dryer
	Angle valve		Flange connection		Flow switch		Sight glass
	Ball valve		Reducer		Pressure sensor		Ejector
	Safety valve		High pressure switch				

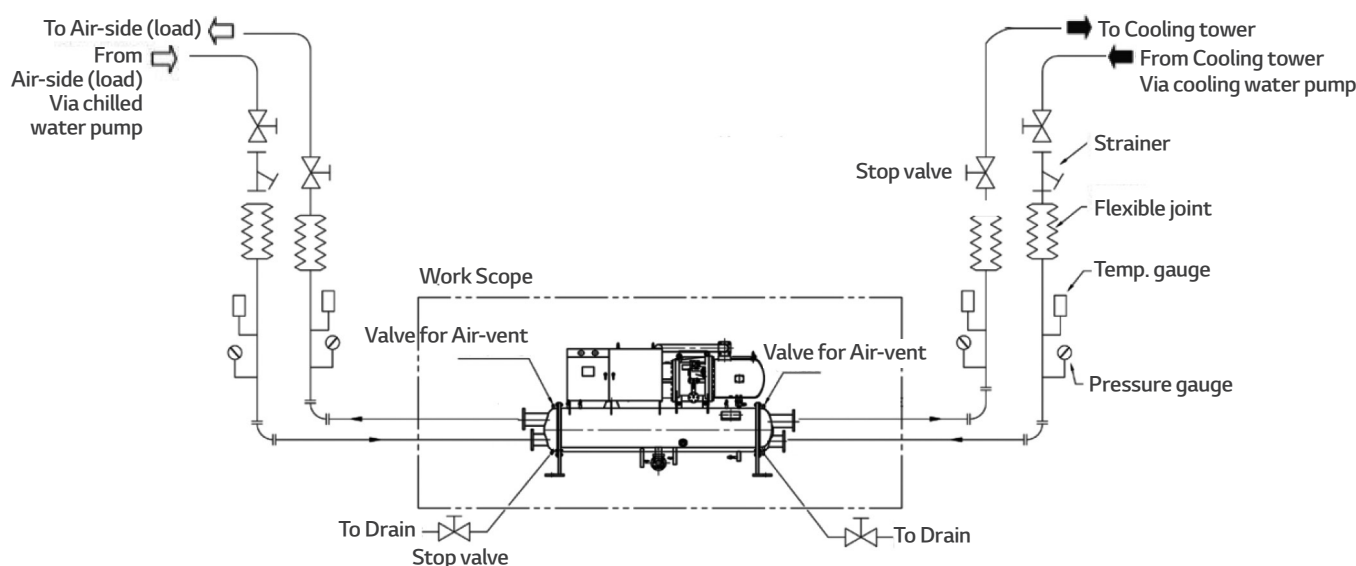
Note:  
1. It is possible to differ depend on origin and site condition.

## Checking of the site information

Before installing the chiller unit, check the site in advance, review the necessary details and coordinate the followings with the site personnel so that the installation can be performed safely and accurately.

- 1) Work scope and unit data: Check the site installation work scope and approved document
- 2) Installation location: Check the environmental condition to install according to the article 3-2.
- 3) Check the entrance size(Width, length and height) to the installing site in advance not to have any trouble in moving. Then check and review the detail method and order for moving the unit.

## The environmental condition of installation site

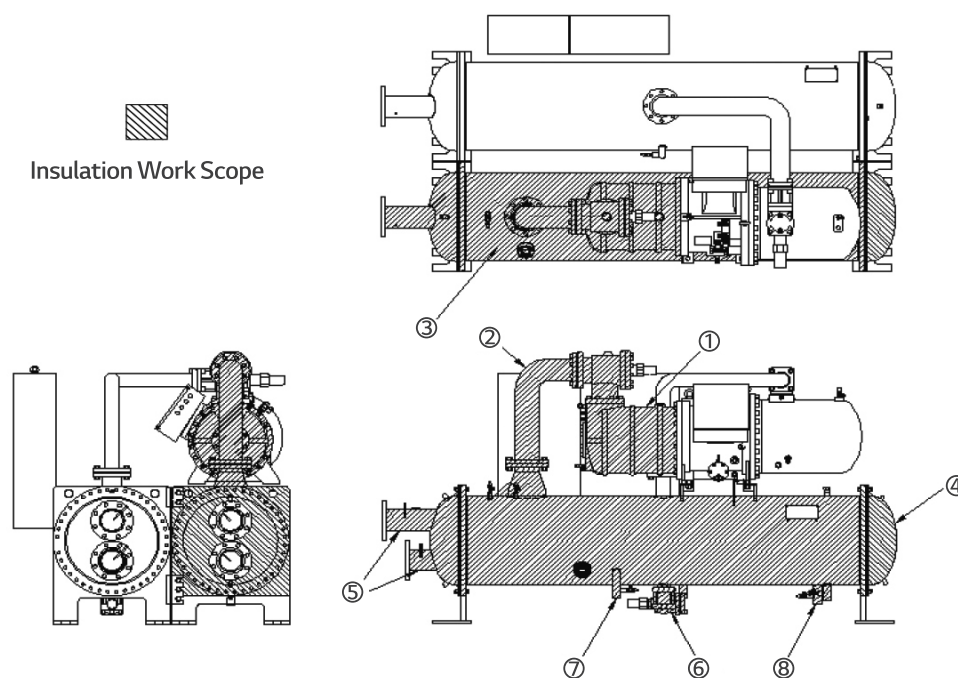


The site space to install or store the product along with the following environmental condition should be considered.

- 1) Be careful not to damage the piping, insulation materials and wires of the chiller unit when storing and installing. The site should have ventilation measures for the refrigerant leakage.
- 2) Select site where the temperature is below 40 °C all the time with good ventilation. When the unit is to be stored for long term, pay a close attention to the temperature of the site to be maintained below 40 °C all the time. If the chiller unit is charged with refrigerant and the pressure of the unit exceeds the limit, the pressure relief valve will be operated and discharge the refrigerant gas resulting in the loss of refrigerant gas along with potential loss of lives. If the machine room temperature is over 40 °C, the pressure vessel should be reconfigured. Check the set pressure for the relief valve of the chiller unit and maintain the room below the relief valve operating temperature consulting the authorized service engineer of LG Electronics.
- 3) Store the chiller unit in dry and safe location without any vibration.
- 4) The floor surface to install the chiller unit should be flat and of sufficient strength and mass to support the chiller operating weight.
- 5) Avoid place of any fire or flammable materials near. When installed in parallel to the heating object such as a boiler, sufficient care to the radiation heat is required.
- 6) Be careful with high humidity as it causes the electric error and the corrosion of the chiller unit.
- 7) Select the site where less dust are as the dust cause electric error.
- 8) Provide enough space around the unit to allow the installation and maintenance personnel access to all service points such as replacing heat exchanger tubes and waterbox to open.
- 9) Secure maximum or safe height to fit to the crane for easy lifting and lowering of the chiller unit.
- 10) Secure good drainage from the machine room.
- 11) Secure sufficient lighting considering the repair and maintenance.
- 12) This chiller unit is manufactured for indoor use. Therefore avoid installing outdoors or a place under direct sunlight.
- 13) Protect the unit by vinyl cover form dust and rains.
- 14) When installing the chiller unit, plan appropriately in accordance with the installation of High Pressure Gas Safety Control Act.(Local standard)

## Caution for insulation work

- 1) Be careful not to cover the operating part(Vane starter, valve, handle etc.) with the insulation material or touch the insulation material.
- 2) Set up the insulation so that the insulation material can be removed at the part where the bolts are tightened in the water box so that the water box can be opened when cleaning the tube of the heat exchanger.  
Also, consider keeping the cover of the water box easy to separate.(Also, install the flange for the water pipe so that it is easy to separate.)
- 3) For the part where the compressor and main pipe bolts are located, set up the insulation so that it is easy to remove the insulation material during overhaul or check.
- 4) Be careful not to block the liquid level gauge and window with the insulation material.
- 5) Set up the insulation so that it is easy to separate and replace the temperature sensor etc.
- 6) For the insulation material, use product with thermal conductivity and quality or higher than specified in the specification provided LG Electronics.
- 7) Install the insulation material firmly using adhesive and completely close the gap between insulation material and the insulating part so that air does not go in.
- 8) For the thickness and specification of the insulation material, follow the construction drawing of insulation approved by LG Electronics and the standard design condition is as follows.
  - Dry bulb temperature
  - Relative humidity
- 9) After the insulation, be careful not to expose to excessive sunlight or cause any damage while working.  
Deformed or damaged part causes dew drops to form and must be reworked.



No	Item	Insulation material
1	Compressor motor (Suction side)	Acrylonitrile-Butadiene Rubber (NBR)- Thickness : 19mm↑
2	Compressor suction refrigerant pipe	
3	Evaporator	
4	Water box	

No	Item	Insulation material
5	Chilled inlet/out nozzle	Acrylonitrile-Butadiene Rubber (NBR)- Thickness : 19mm↑
6	Low pressure liquid refrigerant pipe	
7	Low pressure liquid refrigerant pipe	
8	Refrigerant charging pipe	



# Guide specification

Water Cooled Screw Chiller  
RCWW C Series

## Contents

1. Range of application
2. Equipment features
3. Equipment specifications
4. Scope of construction
5. Supply range
6. The warranty and service
7. General details
8. Caution details

## 1. Range of application

This specification applies to all the models of Water-cooled SCREW RCWW(C) conducting and selling at LG Electronics.

## 2. Equipment features

- 1) To improve the performance of heat exchange, the gas/liquid refrigerant separator is installed inside falling film type evaporator, and the structure of being able to drip the separated liquid refrigerant uniformly on tube bundle.
- 2) Cyclone type oil separator with structure that separates oil and refrigerant using vortex and gravity shall be installed.
- 3) To keep oil concentration inside evaporator at the below standard, oil reclaim system shall be applied.
- 4) Limit control is implemented to prevent unit stop due to abnormal condition. A control algorithm should be applied to minimize manual reset and restart.
- 5) This items shall be applied
  - Evaporator pressure transmitter
  - Condenser pressure transmitter
  - High pressure switch
  - Chilled water inlet/outlet temperature sensor
  - Cooling water inlet/outlet temperature sensor
  - Compressor discharge temperature sensor
- 6) It is designed to be able to check and set the data with 7 inches touch screen controller.
- 7) An oil level switch should be applied to prevent damage to the compressor in case of insufficient oil.

## 3. Equipment specifications

### 3.1. System composition

- 1) The chiller uses the Semi-hermetic, rotary twin Screw type compressor, to compressing the refrigerant for cooling, and chilled water outlet temperature is PID controlled by microprocessor controller.
- 2) Steel plate and pipe are performed the surface treatment to prevent corrosion.
- 3) Before shipping and start-up commissioning, the nitrogen gas shall be charged with a pressure of 0.3~0.5kg/cm<sup>2</sup>G to check whether the product is leaked and prevent the air inflow.
- 4) Water-cooled screw chiller is all-in-one and produced for convenient installation, operation and maintenance management and compactly to minimize the area of installation and space.
- 5) The customer supplies each power wire for each compressor, depending on the compressor quantity.

- 6) The open wiring method is applied for wiring between the chiller main body and the control panel.

### 3.2. Performance and quality

- 1) The refrigerant, R-134a, environmental refrigerant with Ozone Depleting Potential(ODP) of zero, shall be applied.
- 2) The pressure vessel should be designed, produced, tested, complying with KGS Code, and certified in the authorized institute.

### 3.3. Equipment specification

#### 3.3.1. Equipment composition

- 1) Screw compressor
- 2) Evaporator
- 3) Condenser
- 4) External oil separator
- 5) Oil reclaim system
- 6) Ref. piping
- 7) Safety devices
- 8) Control panel
- 9) Starter panel : The stater panel is supplied by the manufacturer with the chiller.  
The starter panel is attached and installed to the chiller unit.

#### 3.3.1. Equipment composition

- 1) The heat exchanger is manufactured in Shell & Tube type.
- 2) To improve the performance of heat exchanging, the gas/liquid refrigerant separator is installed inside falling film type evaporator, and the structure of being able to drip the separated liquid refrigerant uniformly on tube bundle.
- 3) The high-efficiency heat-transfer tubes with seamless phosphorus deoxidized Copper shall be used, and the steel plate or steel pipe are used for Shell.
- 4) The tubes shall be combined with mechanical expansion on the tube sheet so that it can be replaced.
- 5) The flow detection switch is installed to prevent the chilled water from freezing on the chilled water side.
- 6) Install oil reclaim tube from evaporator to compressor, to keep oil concentration inside evaporator at a below standard.
- 7) The heat-transfer tubes shall be machined to improve heat transfer performance inside and outside the tube and parts in contact with tube sheets and tube support plates shall not be machined. The tube support plates for heat-transfer tubes shall be designed for stable support of heat-transfer tubes in accordance with TEMA and ASME standards.

- 8) On the top of evaporator, the safety valve should be installed according to KGS Code.
- 9) The design pressure of the evaporator water box is  $10\text{kg}/\text{cm}^2(150\text{ psig})$ .
- 10) It should be a structure available to do air vent on top of the water box and drain at the bottom of the water box.
- 11) The nozzle inlet/outlet of the evaporator is installed on the right side.

### 3.3.4. Condenser

- 1) The heat exchanger is manufactured in Shell & Tube type.
- 2) The high-efficiency heat-transfer tubes with seamless phosphorus deoxidized Copper tube shall be used, and the steel plate or steel pipe are used for Shell.
- 3) The tubes shall be combined with mechanical expansion on the tube sheet so that it can be replaced.
- 4) The condenser must have an anti-collision plate installed at the gas inlet, and the anti-collision plate must have a structure that allows noise reduction and stable diffusion of flow paths. In order to ensure the subcooling, built-in subcooler installed inside condenser.
- 5) The heat-transfer tubes shall be machined to improve heat transfer performance inside and outside the tube and parts in contact with tube sheets and tube support plates shall not be machined. The tube support plates for heat-transfer tubes shall be designed for stable support of heat-transfer tubes in accordance with TEMA and ASME standards.
- 6) On the top of condenser, the safety valve should be installed according to KGS Code.
- 7) The design pressure of the condenser water box is  $10\text{kg}/\text{cm}^2(150\text{ psig})$ .
- 8) It should be a structure available to do air vent on top of the water box and drain at the bottom of the water box.
- 9) The nozzle inlet/outlet of the condenser is installed on the right side.
- 10) It is installed the flow detection switch to prevent the cooling water from freezing on the cooling water side.

### 3.3.5. External oil separator

- 1) A vertical type of pressure vessel shall be manufactured.
- 2) The material of shell shall be steel pipe.
- 3) Cyclone type oil separator with structure that separates oil and refrigerant using vortex and gravity shall be installed.

### 3.3.6. Oil reclaim system

- 1) To reclaim oil mixed with the refrigerant from the

evaporator to compressor, it should be installed the ejector(Spray ejector) available of oil return without consuming the additional energy.

### 3.3.7. Refrigerant pipe

- 1) The refrigerant pipes are installed for refrigerant flow between each composition to be smooth, using the carbon steel pipe(KSD 3562, SPPS38E) for pressure pipe and seamless phosphorus deoxidized copper pipe of more than 99.9% purity.
- 2) Check valve should be installed in the compressor discharge so that discharged refrigerant flow cannot flow backward.
- 3) By installing the filter dryer at the pipe, It should be absorbed the moisture in the internal pipe and filtered the foreign substance.
- 4) From the expansion valve to the evaporator, pipe should be applied insulation to prevent the moisture of the pipe surface from condensing and the occurring of flash gas of refrigerant liquid at the same time.
- 5) After production and run a leak test, vacuuming should be done completely not to have any moisture inside.

### 3.3.8. Automatic control panel

- 1) Control device
  - a. The composition of control panel

The protection grade of control panel is IP41. The control panel consists of microprocessor controller(Main controller and Display), power supply system to supply the stable power, breaker to perform the other control or secure the safety, magnetic contactor, and control relay, and a primary feature of each module is as below.
  - b. Main controller

It is implemented the control feature optimized to the mechanical device by applying the high-performance microprocessor. The high resolution A/D convertor(Analogue/Digital) shall be applied to display on screen or control by measuring each kind of temperature sensor value in real time. Also, it makes the customer's building automation ease response because the RS-485 communication port to support the customer's remote surveillance control is embedded in a standard. It consists of the digital input part to check each kind of operation state of the switch and the digital output part to control the operation of chiller. Also, the input/output port has a photocoupler blocking each kind of noise.

Since all data is transmitted and received with the main module Guide specification through communication, it secures high reliability by-

preventing the malfunction caused by electromagnetic wave to happen when transmitting and receiving the data of general cable.

c. Display

The machine run/stop state important for operation, abnormal state, operation data can be checked on the display, and input setting needed to equipment operating.

Also, it made the operator's operation convenience by choosing and displaying the operation state(Tem-perature, run/stop and save of the peripheral device) into Korean, Chinese and English on the display part.

2) The feature of control device

a. The convenient operating data management

It makes much operation information checked on one screen simultaneously by applying the 7 inches color graphic liquid crystal display. In addition, It also makes analog data(ex: temperature data) used when recording drive operation reports and managing the maintenance by saving 300 cases for each channel in the time interval set by the customer. Also, it makes the trend of temperature change easily identified by displaying the chilled water outlet temperature on a graph in real-time.

b. The safety control algorism

It implement the preventive operation without an abnormal stop in advance by detecting the high/low-pressure sensor, discharge temperature sensor, current sensor, which are the safety device of digital output. It is possible to continuous operate without chiller stop because the algorism that removing the inconvenience of manual reset work to restart by minimizing the number of abnormality occurring is implemented.

c. Self-diagnosis and save of abnormality history

Micom makes monitor the chiller state during chiller stop or running, making a notice to operator using a message or buzzer making an auto-saving of failure data and occurring time which can be utilized in repairing conveniently.

Especially, as there is help function on the on the abnormality history, it is possible to respond and make an action promptly because the content about cause of occurrence, inspection and how to react are displayed. In addition, it is also possible to check the operation/abnormality history on the control device because the history is saved up to 300 in order.

d. Optimized AI type control algorism

Soft start

It makes the input current gradually control to

prevent machinery shock caused by sudden increase in load when starting.

- Advanced digital PID control

When starting or changing the operating mode from manual to automation, by perceiving the optimized PID control point automatically and reflecting it in the control equation, compared with the conventional analog control, the digital PID control that combined with soft start makes unnecessary machinery stop minimize and makes more stable and precised temperature control.

\* The digital transmitter for evaporator pressure/condenser pressure monitoring.

\* The Digital Transmitter for current display/monitoring.

\* Installation of PT 100 Sensor for chilled water/cooling water temperature

- Scheduled operating function(Reserved operation)

It makes the convenience on chiller operation by applying the schedule operation function available to choose the run/stop and control temperature setting for each day, particular holiday, or 11 times a day.

e. Strong customer support function

- Communication function for building automation and remote monitoring control

It is equipped with the Modbus communication function available to conveniently connected with the customer's monitoring system.

The zero voltage input/output shall be provided to run/stop in the remote or to monitor the run state of the machine using the simple electric wiring.

- Help function

If the breakdown occurs, it promote the operator's convenience by recording failure details, and showing clarification of how to respond if the operator selects the type of failure from the menu.

- Available for support of three languages

It is supported that the function to select/use Korean, Chinese, and English in the operation menu.

f. To operate at partial load condition, the step compressor capacity control method is applied.

### 3.3.9. Starter panel

1) The protection grade of starter panel is IP41.

2) The Starter panel power cable is supplied from the top of panel.

### 3.3.10. Safety devices

1) The complete compressor protective function from



external electric shock shall be provided by embedding the dual protective device about reverse phase/phase loss/overcurrent.

- 2) Safety device for chilled water and cooling water
  - a. Chilled water pump interlock point of contact
  - b. Cooling water pump interlock point of contact
  - c. The chilled water/cooling water flow differential pressure switch.
  - d. Chilled water temperature(low):the below 2.9°C of chilled water outlet temperature
  - ※ The run/stop signal and interlock point of contact for the chilled/cooling water pump is the important safety device for protecting chilled water freezing and safety accidents, so chiller, chilled water pump and cooling waterpump should be linked in operation by wiring connection.
  - ※ Also, when several cooling water pipes are connected in parallel, automatic shut-off valve must be installed to prevent water from flowing into the cooling water pipe of the corresponding chiller, and then the automatic shut-off valve must be opened and closed by interlocking with the control device. The interlocking method of the automatic shutoff valve should open and close in synchronization with the cooling water pump run/stop signal provided by the LG Electronics control panel.
  - e. For the details, it should be discussed with LG Electronics in advance.
- 3) The chiller protective device
  - a. [The low-pressure sensor] for protection of the chiller in case of abnormal low pressure of evaporator.
  - b. [The high-pressure sensor] for protection of the chiller in case of abnormal high pressure of condenser.
  - c. [The oil differential pressure switch] for protection of the compressor in case of abnormal oil differential pressure.
  - d. [The oil level switch] for protection of the compressor in case of abnormal oil level.
  - e. [The chilled water flow differential pressure switch] for protection of the chiller in case of abnormal chilled water flow.
  - f. [The cooling water flow differential pressure switch] for protection of the chiller in case of abnormal cooling water flow.
  - g. [The temperature sensor of chilled water inlet/outlet] to protect the chiller in case of abnormal temperature of chilled water inlet/outlet.
  - h. [The temperature sensor of cooling water inlet/outlet] to protect the chiller in case of abnormal temperature of cooling water inlet/outlet.
  - i. [The temperature sensor of compressor discharge] to protect the overheat of the chiller in case of

abnormal high discharge temperature.

- j. [The protective relay] to protect the overcurrent.
  - k. [Safety valve] to protect the chiller In case of abnormal high pressure in the evaporator.
  - l. [Safety valve] to protect the chiller In case of abnormal high pressure in the condenser.
- 4) Motor/compressor protective device
    - a. Reverse phase/phase loss protective relay
    - b. Temperature switch for monitoring of motor winding temperature
    - c. Temperature sensor for monitoring of compressor discharge temperature

## 4. Scope of construction

Item	Supplied by	Note
Painting	LG Electronics	Main body : Dawn gray
Transportation and installation	Starter panel, Control panel : Warm Gray	Oil separator cartridge
Leaking test, Insulation test	LG Electronics	Transportation installation of installation place or basis
Put the refrigerant	LG Electronics	The work doing before start-up commissioning at the installation place
External piping	Consumer	Mean the external pipe construction such as chilled water, cooling water and drain
Building and basis	Consumer	Prepare the basis construction for chiller installation before its installation.
Chiller horizontality work	LG Electronics	The work at the time of chiller installation
Start-up commissioning and operating guidance	LG Electronics	Conduct 1 time a day (8 hours) (Supply the necessary electricity, chilled water, cooling water)
Interlock wiring work for chilled water, cooling water pump	Consumer	Wiring between control panel and pump control panel
Nitrogen gas filling up	Consumer	The gas filling up for local keep (if chiller won't be operated for a long time after start-up commissioning)



## 5. Supply range

Item	Whether if supply or not	Note
Chiller body	LG Electronics	Refer to the body components
Refrigerant (R-134a)	LG Electronics	Separate delivery
The chiller instruction manual	LG Electronics	Installation and operation manual
Starter panel	LG Electronics	Starter system of compressor motor.
Vibration proof pad	LG Electronics	The pad for vibrational absorption.
Packing	LG Electronics	Shrink film

## 6. The warranty and service

- 6.1. Standard warranty period is 12 Months from date of commissioning or 18 Months from the date of shipment(STD) from factory whichever comes first. It's valid only if start up & commissioning work is carried out by certified LG Electronics service. Also, warranty shall not apply, if the Products have been subjected to misuse, abuse, negligence, improper installation, improper maintenance, improper transportation, accident, alteration or design change by anyone other than LGE.
- 6.2. Failure, caused by a defect in the parts, material, or operation during the warranty period, will be inspected by LG ELECTRONICS and fixed free of charge if it is agreed that it is defective.
- 6.3. For the following, LG ELECTRONICS don't fix free of charge.
- 1) If a failure occurs after the product is repaired at the shop that is not designated by LG ELECTRONICS.
  - 2) If the failure is caused by user's mistakes in using and handling the equipment.
  - 3) The monopoly or handover to other places during the warranty period.
  - 4) If a failure is caused by a fire or a natural disaster.

## 7. General details

- 7.1. Before producing the chillers, getting the approval is required by submitting all the details about production to the customer and the production should be implemented after getting a permit in the negotiation with the customer, as for the details not included marked in these specifications
- 7.2. Before the disposal of the product, if you monopoly

or hand it over to others, you should inform LG electronics.

## 8. Caution details

- 8.1. In case of drain work is progressed after completing the hydraulic pressure test or the circulation test of chilled/cooling water before the start-up and commissioning of the chiller, the chiller should be kept with opening each drain valve of pipe because the freeze and burst can occur by remaining water under the environmental condition of below 0°C outdoor temperature.(Until filling up the make-up water)

# Guide specification

Water Cooled Screw Chiller  
MCWW C Series

## Contents

1. Range of application
2. Equipment features
3. Equipment specifications
4. Scope of construction
5. Supply range
6. The warranty and service
7. General details
8. Caution details

## 1. Range of application

This specification applies to all the models of Water-cooled SCREW MCWW conducting and selling at LG Electronics.

## 2. Equipment features

- 1) The evaporator is Shell & Tube, flooded type and is installed distributor that has the perforated sheet type to supply the refrigerant distribution uniformly in the inlet of liquid refrigerant.
- 2) To keep oil concentration inside evaporator at the below standard, oil reclaim system shall be applied.
- 3) Limit control is implemented to prevent unit stop due to abnormal condition. A control algorithm should be applied to minimize manual reset and restart.
- 4) Digital transmitter for indicate and monitor of Evaporator pressure/ condenser pressure is applied. And oil differential pressure switch is applied.
  - Evaporator pressure transmitter
  - Condenser pressure transmitter
  - Chilled water inlet/outlet temperature sensor
  - Cooling water inlet/outlet temperature sensor
  - Compressor discharge temperature sensor
- 5) It is designed to be able to check and set the data with 7 inches touch screen controller.
- 6) An oil level switch should be applied to prevent damage to the compressor in case of insufficient oil.

## 3. Equipment specifications

### 3.1. System composition

- 1) The chiller uses the Semi-hermetic, rotary twin Screw type compressor, to compressing the refrigerant for cooling, and chilled water outlet temperature is PID controlled by microprocessor controller.
- 2) Steel plate and pipe are performed the surface treatment to prevent corrosion.
- 3) Before shipping and start-up commissioning, the nitrogen gas shall be charged with a pressure of 0.3~0.5kg/cm<sup>2</sup>G to check whether the product is leaked and prevent the air inflow.
- 4) Water-cooled screw chiller is all-in-one and produced for convenient installation, operation and maintenance management and compactly to minimize the area of installation and space.
- 5) The customer supplies each power wire for each compressor, depending on the compressor quantity.
- 6) The Open Wiring method is applied for wiring between the chiller main body and the control panel.

### 3.2. Performance and quality

- 1) The refrigerant, R-134a, environmental refrigerant with Ozone Depleting Potential(ODP) of zero, shall be applied.

### 3.3. Equipment specification

#### 3.3.1. Equipment composition

- 1) Screw compressor
- 2) Evaporator
- 3) Condenser
- 4) Oil reclaim system
- 5) Ref. piping
- 6) Safety devices
- 7) Control panel
- 8) Starter panel : The stater panel is supplied by the manufacturer with the chiller. The starter panel is attached and installed to the chiller unit.

#### 3.3.2. Screw compressor

- 1) The twin rotor/semi-hermetic type compressor and refrigerant-cooled motor shall be used.
- 2) A differential pressure type oil lubrication and embedded type filter shall be applied.
- 3) The compressor embedded type oil separator shall be used and the check valve to prevent the refrigerant from flowing backward on the discharge side shall be installed.
- 4) By using the slide valve for control the capacity, chiller is used 3~4 Step Type controllable for 25(35)%-100%.
- 5) Attaches the Discharge/Suction Shut Off V/V.
- 6) Install the oil differential pressure switch(for Filter)
- 7) Install the oil level switch(For oil)
- 8) The power specifications of the motor for compressor is three-phase, 380V, 50Hz.
- 9) The starter type of compressor motor is Y-D.

#### 3.3.3. Evaporator

- 1) The heat exchanger is manufactured in Shell & Tube type.
- 2) The high-efficiency heat-transfer tubes with seamless phosphorus deoxidized Copper shall be used, and the steel plate or steel pipe are used for Shell.
- 3) The tubes shall be combined with mechanical expansion on the tube sheet so that it can be replaced.
- 4) The flow detection switch is installed to prevent the chilled water from freezing on the chilled water side.
- 5) Install oil reclaim tube from evaporator to compressor, to keep oil concentration inside evaporator at a below standard.
- 6) The heat-transfer tubes shall be machined to improve heat transfer performance inside and outside the tube and parts in contact with tube sheets and tube support plates shall not be machined. The tube support plates for heat-transfer tubes shall be designed for stable support of heat-transfer tubes in accordance with GB standards.
- 7) The design pressure of the evaporator water box is 10kg/cm<sup>2</sup>(150 psig).
- 8) The nozzle inlet/outlet of the evaporator is installed on the left side.

### 3.3.4. Condenser

- 1) The heat exchanger is manufactured in Shell & Tube type.
- 2) The high-efficiency heat-transfer tubes with seamless phosphorus deoxidized Copper tube shall be used, and the steel plate or steel pipe are used for Shell.
- 3) The tubes shall be combined with mechanical expansion on the tube sheet so that it can be replaced.
- 4) It is manufactured the all- in-one structure embedding the oil separator inside of shell.
- 5) The heat-transfer tubes shall be machined to improve heat transfer performance inside and outside the tube and parts in contact with tube sheets and tube support plates shall not be machined. The tube support plates for heat-transfer tubes shall be designed for stable support of heat-transfer tubes in accordance with GB standards.
- 6) The design pressure of the condenser water box is 10kg/cm<sup>2</sup>(150 psig).
- 7) It should be a structure available to do air vent on top of the water box and drain at the bottom of the water box.
- 8) The nozzle inlet/outlet of the condenser is installed on the left side.
- 9) It is installed the flow switch to prevent the cooling water from freezing on the cooling water side.

### 3.3.5. Oil reclaim system

- 1) To reclaim oil mixed with the refrigerant from the evaporator to compressor, it should be installed the ejector(Spray ejector) available of oil return without consuming the additional energy.

### 3.3.6. Refrigerant pipe

- 1) The refrigerant pipes are installed for refrigerant flow between each composition to be smooth, using the carbon steel pipe for pressure pipe and seamless phosphorus deoxidized copper pipe of more than 99.9% purity.
- 2) Check valve should be installed in the compressor discharge so that discharged refrigerant flow cannot flow backward.
- 3) From the expansion valve to the evaporator, pipe should be applied insulation to prevent the moisture of the pipe surface from condensing and the occurring of flash gas of refrigerant liquid at the same time.
- 4) After production and run a leak test, vacuuming should be done completely not to have any moisture inside.

### 3.3.7. Automatic control panel

- 1) Control device
  - a. The composition of control panel

The protection grade of control panel is IP41.  
The control panel consists of microprocessor con-troller(Main controller and Display), power

supply system to supply the stable power, breaker to perform the other control or secure the safety, magnetic contactor, and control relay, and a primary feature of each module is as below.

#### b. Main controller

It is implemented the control feature optimized to the mechanical device by applying the high-performance microprocessor. the high resolution A/D convertor(Analogue/Digital) shall be applied to display on screen or control by measuring each kind of temperature sensor value in real time.

Also, it makes the customer's building automation ease response because the RS-485 communication port to support the customer's remote surveillance control is embedded in a standard.

It consists of the digital input part to check each kind of operation state of the switch and the digital output part to control the operation of chiller.

Also, the input/output port has a photocoupler blocking each kind of noise. Since all data is transmitted and received with the main module through communication, it secures high reliability by preventing the malfunction caused by electromagnetic wave to happen when transmitting and receiving the data of general cable.

#### c. Display

The machine run/stop state important for operation, abnormal state, operation data can be checked on the display, and input setting needed to equipment operating. Also, it made the operator's operation convenience by choosing and displaying the operation state(Temperature, run/stop and save of the peripheral device) into Korean, Chinese and English on the display part.

#### 2) The feature of control device

##### a. The convenient operating data management.

It makes much operation information checked on one screen simultaneously by applying the 7 inches color graphic liquid crystal display. In addition, It also makes analog data(ex: temperature data) used when recording drive operation reports and managing the maintenance by saving 300 cases for each channel in the time interval set by the customer. Also, it makes the trend of temperature change easily identified by displaying the chilled water outlet temperature on a graph in real-time.

##### b. The safety control algorism

It implement the preventive operation without an abnormal stop in advance by detecting the high/ low-pressure sensor, discharge temperature sensor, current sensor, which are the safety device of digital output. It is possible to continuous operate without chiller stop because the algorism that removing the

inconvenience of manual reset work to restart by minimizing the number of abnormality occurring is implemented.

c. Self-diagnosis and save of abnormality history

Micom makes monitor the chiller state during chiller stop or running, making a notice to operator using a message or buzzer making an auto-saving of failure data and occurring time which can be utilized in repairing conveniently. Especially, as there is help function on the on the abnormality history, it is possible to respond and make an action promptly because the content about cause of occurrence, inspection and how to react are displayed. In addition, it is also possible to check the operation / abnormality history on the control device because the history is saved up to 300 in order.

d. Optimized AI type control algorism

Soft start

It makes the input current gradually control to prevent machinery shock caused by sudden increase in load when starting.

- Advanced digital PID control

When starting or changing the operating mode from manual to automation, by perceiving the optimized PID control point automatically and reflecting it in the control equation, compared with the conventional analog control, the digital PID control that combined with soft start makes unnecessary machinery stop minimize and makes more stable and precised temperature control.

\* The digital transmitter for evaporator pressure/ condenser pressure monitoring.

\* The Digital Transmitter for current display/monitoring.

\* Installation of PT 100 Sensor for chilled water/cooling water temperature.

- Scheduled operating function(Reserved operation)

It makes the convenience on chiller operation by applying the schedule operation function available to choose the run/stop and control temperature setting for each day, particular holiday, or 11 times a day.

e. Strong customer support function

- Communication function for building automation and remote monitoring control

It is equipped with the Modbus communication function available to conveniently connected with the customer's monitoring system.

The zero voltage input/output shall be provided to run/stop in the remote or to monitor the run state of the machine using the simple electric wiring.

- Help function

If the breakdown occurs, it promote the operator's convenience by recording failure details, and show-

ing clarification of how to respond if the operator selects the type of failure from the menu.

- Available for support of three languages

It is supported that the function to select/use Korean, Chinese, and English in the operation menu.

f. To operate at partial load condition, the step compressor capacity control method is applied.

### 3.3.8. Starter panel

1) The complete compressor protective function from external electric shock shall be provided by embedding the dual protective device about reverse phase/phase loss/overcurrent.

2) Safety device for chilled water and cooling water

a. Chilled water pump Interlock point of contact

b. Cooling water pump interlock point of contact

c. The chilled water/cooling water flow differential pressure switch.

d. Chilled water temperature(low) : the below 2.9°C of chilled water outlet temperature

※ The run/stop signal and interlock point of contact for the chilled/cooling water pump is the important safety device for protecting chilled water freezing and safety accidents, so chiller, chilled water pump and cooling water pump should be linked in operation by wiring connection.

※ Also, when several cooling water pipes are connected in parallel, automatic shut-off valve must be installed to prevent water from flowing into the cooling water pipe of the corresponding chiller, and then the automatic shut-off valve must be opened and closed by interlocking with the control device. The interlocking method of the automatic shutoff valve should open and close in synchronization with the cooling water pump run/stop signal provided by the LG Electronics control panel.

e. For the details, it should be discussed with LG Electronics in advance.

3) The chiller protective device

a. [The low-pressure sensor] for protection of the chiller in case of abnormal low pressure of evaporator.

b. [The high-pressure sensor] for protection of the chiller in case of abnormal high pressure of condenser.

c. [The oil differential pressure switch] for protection of the compressor in case of abnormal oil differential pressure.

d. [The oil level switch] for protection of the compressor in case of abnormal oil level.

e. [The chilled water flow differential pressure switch] for protection of the chiller in case of abnormal chilled water flow.

f. [The cooling water flow differential pressure switch] for protection of the chiller in case of abnormal cool-



ing water flow.

- g. [The temperature sensor of chilled water inlet/outlet] to protect the chiller in case of abnormal temperature of chilled water inlet/outlet.
- h. [The temperature sensor of cooling water inlet/outlet] to protect the chiller in case of abnormal temperature of cooling water inlet/outlet.
- i. [The temperature sensor of compressor discharge] to protect the overheat of the chiller in case of abnormal high discharge temperature.
- j. [The protective relay] to protect the overcurrent.
- k. [Safety valve] to protect the chiller in case of abnormal high pressure in the evaporator.
- l. [Safety valve] to protect the chiller in case of abnormal high pressure in the condenser.

#### 4) Motor/compressor protective device

- a. Reverse phase/phase loss protective relay
- b. Temperature switch for monitoring of motor winding temperature
- c. Temperature sensor for monitoring of compressor discharge temperature

#### 3.3.10. Isolator

- 1) The vibration proof pad for vibration isolator device is supplied.

## 4. Scope of construction

Item	Supplied by	Note
Painting	LG Electronics	Main body : Dawn gray Starter panel, Control panel : Warm gray
Transportation and installation	LG Electronics	Transportation installation of installation place or basis
Leaking test, Insulation test, Put the refrigerant	LG Electronics	The work doing before start-up commissioning at the installation place
External piping	Consumer	Mean the external pipe construction such as chilled water, cooling water and drain
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Interlock wiring work for chilled water, cooling water pump	Consumer	Wiring between control panel and pump control panel
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## 5. Supply range

Item	Whether if supply or not	Note
Chiller body	LG Electronics	Refer to the body components
Refrigerant (R-134a)	LG Electronics	Separate delivery
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Vibration proof pad	LG Electronics	The pad for vibrational absorption.
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6.1. Standard warranty period is 12 Months from date of commissioning or 18 Months from the date of shipment(STD) from factory whichever comes first. It's valid only if start up & commissioning work is carried out by certified LG Electronics service. Also, warranty shall not apply, if the Products have been subjected to misuse, abuse, negligence, improper installation, improper maintenance, improper transportation, accident, alteration or design change by anyone other than LGE.

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- 2022 LG Electronics. Printed in Korea. Oct. 2022