

INSTALLATION MANUAL

Water-Cooled Centrifugal Chiller

Please read this installation manual completely for safety before installing the product. The purpose of this manual is to keep the user safe and to prevent any property damage. After reading this installation manual, please retain it for future reference thoroughly. Installation work must be performed in accordance with this installation manual by authorized personnel only.

Model : RCWF***P(200~3000RT)
RCWFH Series (200 ~ 3000RT)
RCWFM Series (250 ~ 2000RT)



P/NO : MFL68928603 (Rev 0)

www.lge.com

For your records

Staple your receipt to this page in case you need it to prove the date of purchase or for warranty purposes. Write the model number and the serial number here:

Model number : _____

Serial number : _____

You can find them on a label on the side of each unit.

Dealer's name : _____

Date of purchase : _____

1. CAUTIONS FOR SAFETY _ WARNING/CAUTION

It can be dangerous when moving, installing and placing the system by the pressure of the system, electric units or limited space when lifting the system. (roof, being lifted structure). Please read carefully the warnings and cautions on the labels attached on each unit when moving and installing the system and conform the instructions.

Please follow these instructions to prevent any injury of the user and others and property damages.

- Injury or damage may result of the instructions in this manual are not followed.
The seriousness of the result can be classified as described in the following.
- Please note that any failure of the system resulting from the user's careless maintenance, natural disaster or the failure of the electricity cord shall not be warranted by LG regardless of the warranty period.
- Please note that any part of this manual can be revised without prior notice for product enhancement.


WARNING

This indicates the possibility of death or serious injury.

CAUTION

Failure to comply with the instructions under this sign may result in minor physical injuries or product damage.

The meanings of display used in this manual are as shown in the following.

 Be sure not to do.

 Be sure to follow the instruction.

1-1. WARNING

- Have all electric work done by a licensed electrician according to "Electric Facility Engineering Standard" and "Interior Wire Regulations" and the instructions given in this manual and always use a special circuit.
 - If the power source capacity is inadequate or electric work is performed improperly, electric shock or fire may result.
- Ask the dealer or an authorized technician to install the chiller unit.
 - Improper installation by the user may result in water leakage, electric shock, or fire.
- For re-installation of the installed product, always contact a dealer or an Authorized Service Center.
 - There is risk of fire, electric shock, explosion, or injury.
- Make sure to equip the circuit breaker and fuse.
 - Improper wiring or installation may cause fire or electric shock.
- Do not disassemble, repair or reconfigure the unit.
 - LG Electronics is not responsible for the any damage or loss from the arbitrary disassembly, repair or reconfiguration of the unit.
- Make sure to ground the unit properly.
 - There is risk of fire or electric shock.

- Do not store or use flammable gas or combustibles near the chiller unit
 - There is risk of fire or failure of product.
- Do not reconstruct to change the settings of the protection devices.
 - If the pressure switch, thermal switch, or other protection device is shorted and operated forcibly, or parts other than those specified by LGE are used, fire or explosion may result.
- Install the unit on a foundation where the heavy weight can be supported.
 - Insufficient strength of the foundation to support the chiller operation may cause the unit failure or injury.
- Installing the product in small space requires separate measures to keep the leakage of the refrigerant within the safety limits in case of any leakage.
 - Consult the authorized dealer for appropriate measures to prevent the refrigerant leakage from exceeding the safety limits. The leakage of refrigerant exceeding the safety limit may result in dangerous situations due to the lack of oxygen level in the room.
- Securely install the cover of control box and the panel.
 - If the cover and panel are not installed securely, dust or water may enter the unit and fire or electric shock may result.
- Do not operate the unit arbitrarily.
 - Incorrect operation of the unit may cause dangerous situations such as unit defects, leakage or electric shock. Always consult the authorized dealer.
- Do not use damaged circuit breaker or fuse works correctly all the time.
 - It may cause fire, electric shock or injury.
- Keep the control panel from any water getting in. Do not wash the control panel with water.
 - It can cause electric shock or defects.
- When the product is soaked (flooded or submerged), contact an Authorized Service Center.
 - There is risk of fire or electric shock.
- Use a dedicated outlet for this unit.
 - There is risk of fire or electric shock.
- Make sure to charge only the exclusive refrigerant R134a when installing or moving to other place.
 - If a different refrigerant or air is mixed with the original refrigerant, the refrigerant cycle may malfunction and the unit may be damaged.
- Do not touch the power switch with wet hands.
 - There is risk of fire, electric shock, explosion, or injury.
- Ventilate before operating the chiller unit when gas leaked out.
 - Do not use a phone or operate the power switch at this time. It may cause fire or explosion.
- Do not put any heavy object on the top of the unit or climb on the unit.
 - It may cause defects or injury.
- Be careful with the rotating part.
 - Do not put your finger or a stick in the rotating part. It may cause injury.
- Use fuse and leakage breaker of rated capacity.
 - It may cause fire and defects.
- Redesigning the control box is prohibited.
 - Lock the control box with possible locking device and if you need to open the control box inevitably, turn off the main power first.
- Do not touch the wiring or a parts inside the panel.
 - It may cause electric shock, fire or defects.

PRECAUTIONS BEFORE INSTALLATION

- Follow the permitted pressure level
 - Follow the regulated pressure for cold water, cooling water, refrigerant etc.
- Do not change the set values.

- Do not change the set values of the controller and safety devices. Operating with inappropriate setting can cause damages. When changing the setting values, please consult with the specialist.
- Be careful of fire, earthquake and lightening.
 - In case of any natural disaster such as fire, earthquake or lightening, immediately stop operating the unit. If you continue to operate the unit, it can cause a fire or electronic shock.
- Follow all safety code.
 - When operate the chiller, follow the precautions on the manual, tag, sticker and label.
- Use of undesignated refrigerant and oil is prohibited.
 - Do not use undesignated refrigerant, freezer oil and brine. It may cause serious effect to the compressor and parts defect.
- During the installation and service, shut down the power supply.
 - Electric shock can cause injury and death. Mark and check all switches so that the power is not recovered until the work is completed.
- Wear safety equipment
 - Wear safety glasses and work gloves. Be careful when installing or operating the chiller and operating the electrical components.
- Always run fluid through heat exchangers when adding or removing refrigerant charge.
 - Potential damage of the tube within the heat exchanger can be prevented. Use Appropriate brine solution in cooler fluid loops to prevent the freezing of heat exchangers when equipment is exposed to temperature below 0°C.
- Do not vent refrigerant relief valves within a building.
 - Outlet from relief valves must be vented outdoors in accordance with the latest edition of ANSI/ASHRAE(American National Standards Institute/American Society of Heating, Refrigeration and Air Conditioning Engineers) 15 (Safety Code for Mechanical Refrigeration). The accumulation of refrigerant in an enclosed space can displace oxygen and cause asphyxiation. Provide adequate ventilation in enclosed or low overhead areas. Inhalation of high concentrations of refrigerant gas is harmful and may cause heart irregularities, unconsciousness or death. Misuse can be critical. Refrigerant gas is heavier than air and reduces the level of oxygen. It can cause irritation to eyes and skin.
- Be careful of water leakage.
 - In case of any water leakage in the pump or pipe, immediately stop operating the unit. It may cause electric shock, electricity leakage or defects.
- Be careful of electric shock.
 - Always ground the chiller during installation. It may cause electric shock.
- Do not leave refrigerant system open to air any longer than necessary.
 - If the repair cannot be completed, seal the circuits to prevent any contamination or rust within the product, and charge dry nitrogen.
- Do not reuse compressor oil.
 - It can damage the product.

1-2. CAUTION

- Always check for gas(refrigerant) leakage after installation or repair of product.
 - Low refrigerant levels may cause failure of product.
- Do not install the unit where combustible gas may leak.
 - There is risk of fire or failure of product
- Keep level even when installing the product.
 - Unleveled refrigerant can cause problems to the product.
- Do not use the product for special usage or location such as preserving animal/plant, precision machine, artifact, etc.
 - It may cause property damage.

- Use exclusive wire for the product. Use power cables of sufficient current carrying capacity and rating.
 - It may cause fire and electric shock.
- When installing the unit in a hospital, communication station, or similar place, provide sufficient protection against noise.
 - The inverter equipment, private power generator, high-frequency medical equipment, or radio communication equipment may cause the chiller to operate erroneously, or fail to operate. On the other hand, the chiller may affect such equipment by creating noise that disturbs medical treatment or image broadcasting.
- To protect the product from corrosion, do not install the product where it is exposed to sea wind(salt spray) directly. If necessary, please install shield.
 - It may cause product deformation and defects.
- Make the connections securely so that the outside force of the cable may not be applied to the terminals.
 - Inadequate connection and fastening may generate heat and cause fire. If the power cable got damaged, do not directly replace it, but call the service center for replacement first.
- Do not use the product in special environments.
 - Oil, steam and sulfuric steam can deteriorate the product performance or cause damage to the parts.
- Be careful when transporting the product.
 - When carrying the chiller, always consult with the specialized expert.
- When transporting the chiller, always follow the methods described in the manual.
 - If not, it can cause overturn, fall etc.
- Be sure the installation area does not deteriorate with age
 - If the base collapses, the chiller could fall with it, causing property damage, product failure, or personal injury.
- Be sure to dispose the packing materials safely.
 - Packing materials, such as nails and other metal or wooden parts, may cause stabs or other injuries. Tear apart and throw away plastic packing bags so that children may not play with them. If children play with a plastic bag which was not torn apart, they face the risk of suffocation.
- Do not touch any of the refrigerant piping during and after operation.
 - Pipe during and after the operation can be hot or cold depending on the condition of the refrigerant flowing through the refrigerant pipe, compressor and refrigerant cycle parts. Touching the pipes at this time can cause burns or frostbites.
- Turn on the main power 12 hours before starting to operate the product.
 - If you operate the product immediately after turning on the main power, it can severely damage the internal parts. Keep the main power on while operating.
- Do not immediately turn off the main power after the product stops operating.
 - Wait at least 5 minutes before turning off the main power. If not, it may cause water leakage or other problems.
- Do not operate the product with the panel or safety devices removed.
 - Rotating parts or high temperature/pressure parts can cause safety accidents.
- Be careful when disposing the product.
 - When disposing the chiller, request to the specialized expert.
- Use a firm stool or ladder when cleaning or maintaining the chiller.
 - It may cause an injury.
- Be careful of high temperature.
 - Be careful not to make body contact to the parts of the chiller in high temperature. It may cause a burn.
- Be careful of high voltage.
 - Install separate wiring for the power and always install and use dedicated power supply and circuit breaker. It can cause electric shock and fire.
- Be careful of chiller installation.
 - Keep enough clearance around the product for service and especially for air cooling type, install the product at well ventilated location where there is no obstacle.
- Harsh chemical, household bleach or acid cleaner should not used to clean outdoor or indoor coils of any kind.

- These cleaners can be very difficult to rinse out of the coil and can accelerate corrosion at the fin/tube interface where dissimilar materials are in contact. Use environment friendly cleaner.
- Be careful when restarting the product.
 - When a safety device is triggered, remove the cause and then restart the product. Repeating the operation arbitrarily can cause fire and defect.
- Use appropriate tools.
 - Use tools appropriate for the repair work and calibrate the measuring devices accurately before using. Using inappropriate tools can cause an accident.
- Be careful of sound and odor.
 - If you hear a weird sound or smell an odor, immediately stop operating the system and contact the service center. It may cause fire, explosion or injury.
- Be careful of injury.
 - Check the safety label of the safety device. Follow the above precautions and the contents in the label. It may cause fire and injury. To prevent the formation of the condensed water, the pipe connected to the evaporator as well as the evaporator itself should be well insulated.
- Check.
 - Perform periodic checks. If any problem occurs, stop the operation and contact the service center. Insufficient check may cause fire, explosion or error.
- Do not attempt to bypass or alter any of the factory wiring.
 - Any compressor operation in the reverse direction will result in a compressor failure that will require compressor replacement.
- Do not use jumpers or other tools to short out components, or bypass the parts differently from recommended procedures.
 - Short-circuiting the control board ground line with other wires can damage the electric module or electric components.
- Water must be within design flow limits, and should be treated cleanly.
 - This make it possible to ensure proper machine performance and reduce the potential of tubing damage due to corrosion, scaling, erosion and algae. LG Electronics is not responsible for any damage caused by cooling water not treated or improperly treated.
- Consult a water treatment specialist for proper treatment procedures.
 - Hard scale may require chemical treatment for its prevention or remove.
- Do not overcharge refrigerant to the system.
 - Refrigerant overcharging results in higher discharge pressure with higher cooling fluid consumption. Also it can damage the compressor and increase the power consumption. Also it can damage the compressor and increase the power consumption.
- Do not add different type of oil.
 - It may cause abnormal operation of chiller.
- Turn controller power off before service work.
 - It secures safety and prevents damage to the controller.
- Maintain the compressor oil pressure to normal level.
 - Use proper safety precautions when relieving pressure.
- Welding the evaporator head or nozzle part is not recommended.
 - If the part requires welding, remove the chilled water flow switch and entering/leaving fluid thermistors before welding. After the welding is completed, reinstall the flow switch and thermistors. Failure to remove these devices may cause component damage.

Thank you for purchasing the Water Cooled Centrifugal Chiller of LG Electronics.

Installation as instructed after reading this manual will ensure the safety, convenience and long lifetime of the unit.

- Please read this manual carefully for the correct installation and proper operation of the Centrifugal Chiller unit.
- Once the installation completed, please run the commissioning and inspect according to the operating & maintenance manual.

✱ This manual describes safety cautions for installation, general information, carrying and installation and wiring information of the Water Cooled Centrifugal Chiller.

TABLE OF CONTENTS

3	1. CAUTIONS FOR SAFETY _ WARNING/CAUTION	18	3-3-1. Minimum space required for installation of single stage Centrifugal Chiller RCWF***P Series
3	1-1. WARNING	19	3-3-2. Minimum space required for installation of two stage Centrifugal Chiller RCWFH Series
5	1-2. CAUTION	20	3-3-3. Minimum space required for installation of two-stage Centrifugal Chiller RCWFM Series
10	2. INTRODUCTION	21	3-4. Long term storage and proper place
10	2-1. General Information	21	3-4-1. Condition for storage place
10	2-2. System structure	21	3-4-2. Check points when storing Centrifugal chiller long term
10	2-2-1. Single stage Centrifugal Chiller RCWF***P Series	21	3-4-3. Check after long term storage
11	2-2-2. Two stage Centrifugal Chiller RCWFH Series	22	4. PRODUCT RECEIPT
12	2-2-3. Two-stage Centrifugal Chiller RCWFM Series	22	4-1. Check item list and product condition
13	2-3. Nomenclature	22	4-2. Product inspection
13	2-3-1. Single stage Centrifugal Chiller RCWF***P Series	22	4-3. Product protection
14	2-3-2. Two stage Centrifugal Chiller RCWFH Series	23	5. TRANSPORTATION
15	2-3-3. Two-stage Centrifugal Chiller RCWFM Series	23	5-1. Considerations for carrying in the product
16	2-4. Name plate	23	5-1-1. Single stage Centrifugal Chiller RCWF***P Series
17	3. PREPARATION FOR INSTALLATION	25	5-1-2. Two stage Centrifugal Chiller RCWFH Series
17	3-1. Checking of the site information	27	5-1-3. Two-stage Centrifugal Chiller RCWFM Series
17	3-2. The environmental condition of installation site	29	5-2. Transportation method
18	3-3. Securing Service Space at installation	29	5-2-1. Moving by crane
		31	5-2-2. Moving using roller

32 6. INSTALLATION

- 32 6-1. Requirements
- 32 6-1-1. Base dimension (Standard model) of single stage Centrifugal Chiller RCWF***P Series
- 33 6-1-2. Base dimension (Standard model) of two stage Centrifugal Chiller RCWFH Series
- 34 6-1-3. Base dimension (Standard model) of of two-stage Centrifugal Chiller RCWFM Series
- 35 6-2. Unit Leveling
- 35 6-3. Unit Isolation
- 35 6-3-1. Standard Isolation Pad (Isolation Pad)
- 36 6-4. Cautions for the unit charged with refrigerant
- 36 6-4-1. Things to check before moving and installation
- 36 6-4-2. Cautions during moving and installation
- 36 6-4-3. Cautions after installation
- 36 6-4-4. Actions for refrigerant leakage

37 7. PIPING

- 37 7-1. Considerations on connecting water pipes
- 38 7-2. Chilled water/Cooling water pipe locations and size
- 38 7-2-1. Single stage Centrifugal Chiller RCWF***P Series
- 39 7-2-2. Two stage Centrifugal Chiller RCWFH Series
- 41 7-2-3. Two-stage Centrifugal Chiller RCWFM Series
- 42 7-3. Bolt-Tightening Sequence for Water Piping Connection
- 43 7-4. Installing relief valve and refrigerant vent line

- 43 7-4-1. Installation based on High Pressure Gas Safety Control Act(varies by region/country law)

- 43 7-4-2. Cautions in connection the refrigerant vent line

- 44 7-5. Water treatment

45 8. THERMAL INSULATION

48 9. ELECTRIC WIRING

- 53 9-1. Installation precautions by options

- 53 9-1-1. Power factor compensation condenser

- 54 9-2-1. Field wiring diagram for LG starter panel

- 64 9-2-2. Precautions on other company's starter panel field wiring diagram

- 65 9-3. Power supply connection

- 66 9-4. Field wiring diagram for control panel

- 67 9-5. Motor protection

2. INTRODUCTION

2-1. General Information

This manual describes the installation Single stage Centrifugal Chiller RCWF***P Series, Two stage Centrifugal Chiller RCWFH Series, Two-stage Centrifugal Chiller RCWFM Series using R-134a refrigerant and applied X30 controller.

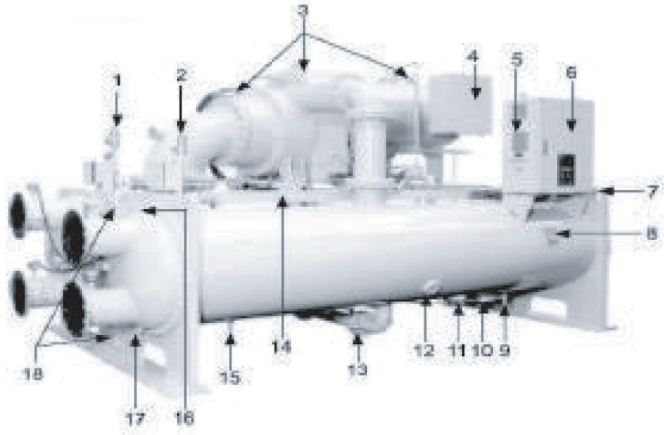
2-2. System structure

2-2-1. Single stage Centrifugal Chiller RCWF***P Series

Figure 1. shows the general parts location and components of the Single stage Centrifugal Chiller.

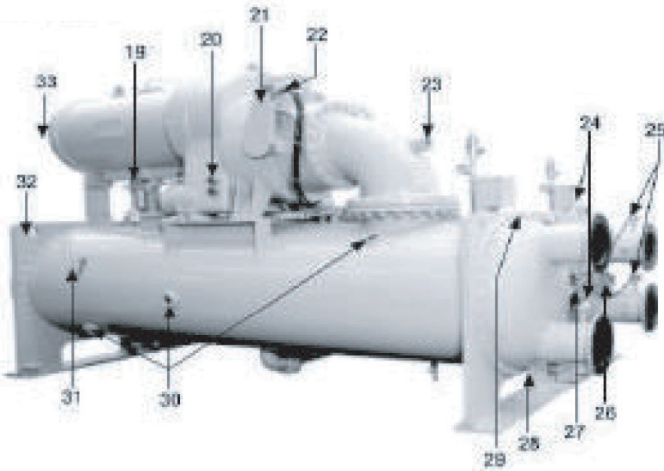
The location of control panel, type of water box, direction of inlet/outlet of the chilled/cooling water and some of the pipes may vary by model or the customer specifications. Please confirm with the approved drawings for the site.

Front view



1. Evaporator relief valve
2. Condenser relief valve
3. Lifting hole (Compressor)
4. Terminal box for compressor motor
5. Main name plate
6. Control panel
7. Lifting hole (Condenser)
8. Condenser name plate
9. Service valve
10. Filter dryer
11. Sight glass
12. Condenser sight glass
13. Refrigerant return line (Orifice + Butterfly valve)
14. Wire tray (optional)
15. Service valve
16. Air vent (for Cooling water)
17. Drain (for Cooling water)
18. Bracket for combining Heat exchanger

Rear view



19. Oil filter
20. Oil tank sight glass
21. Chain cover
22. Actuator (Guide vane)
23. Sight glass (Compressor inlet)
24. Chilled water temperature sensor
25. Cooling water temperature sensor
26. Cooling water differential pressure switch
27. Chilled water differential pressure switch
28. Drain (for Chilled water)
29. Air vent (for Chilled water)
30. Evaporator sight glass
31. Evaporator name plate
32. Lifting hole (Evaporator)
33. Sight glass (Motor)

Figure 1. Components of Single stage Centrifugal Chiller

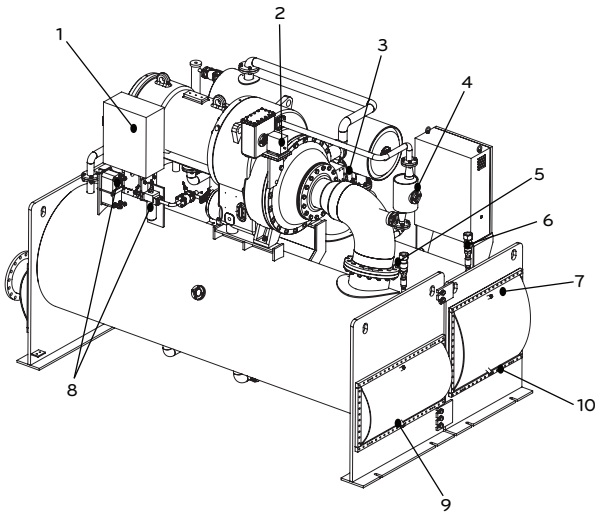
2-2-2. Two stage Centrifugal Chiller RCWFH Series

Figure 2 shows the general structure and parts of the two stage Centrifugal Chiller.

Location of control panel, type of water box, direction of chilled water/cooling water inlet/outlet and some parts may vary by model and customer specification, and for detailed information prepare and check the approved drawing that fits applicable to the site..

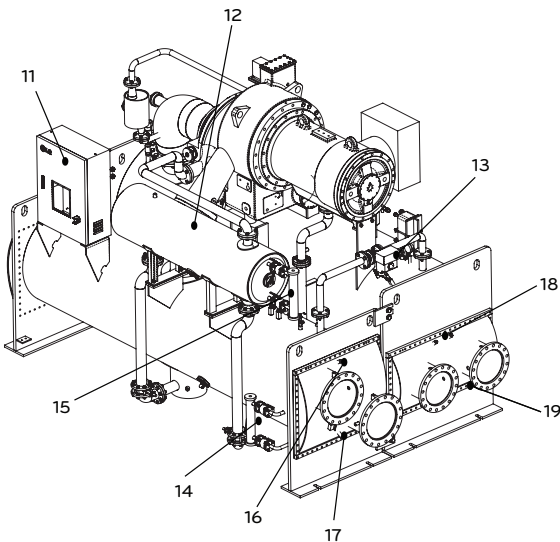
Location of control panel, type of water box, direction of chilled water/cooling water inlet/outlet and some parts may vary by model and customer specification, and for detailed information prepare and check the approved drawing that fits applicable to the site.

Front view



1. Terminal box for compressor motor
2. Actuator (Inlet guide vane) Variable diffuser)
3. Actuator (Vane motor)
4. Oil separator
5. Relief valve (Evaporator)
6. Relief valve (Condenser)
7. Air Vent (For Cooling water)
8. Oil cooler/oil filter
9. Drain (For chilled water)
10. Drain (For cooling water)

Rear view



11. Control panel
12. Economizer
13. Hot gas bypass (option)
14. Condenser level sensor
15. Economizer level sensor
16. Air Vent (For cooling water)
17. Drain (For cooling water)
18. Air Vent (For chilled water)
19. Drain (For chilled water)

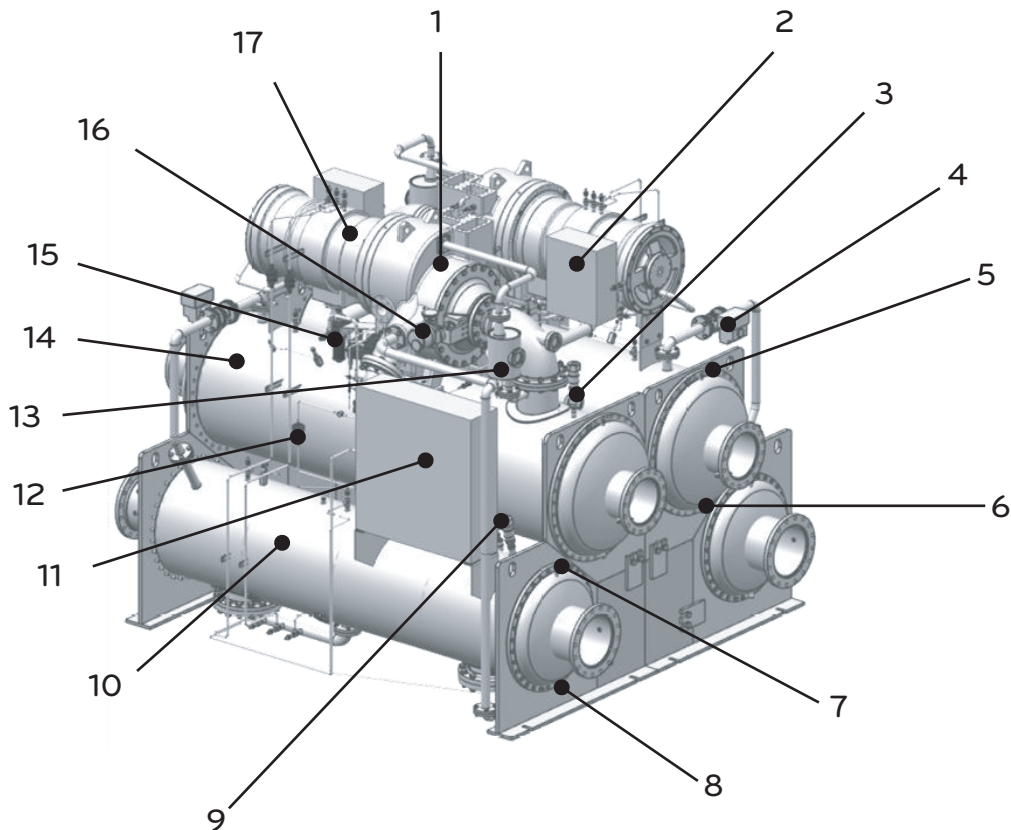
Figure 2. Components of 2 step Centrifugal Chiller

2-2-3. Two-stage Centrifugal Chiller RCWFM Series

Figure 3 represents the general structure and part composition of the two-stage module Centrifugal Chiller.

As the location of the control board, the water box, direction of inlet/outlet of the cold water/coolant and some piping differ based on models and customer specifications, check the approved drawing matching with the site for the details.

As the location of the control board, the water box, direction of inlet/outlet of the cold water/coolant and some piping differ based on models and customer specifications, check the approved drawing matching with the site for the details.



- | | |
|--|---------------------------|
| 1. Compressor | 10. Condenser |
| 2. Terminal box for the compressor motor | 11. Control panel |
| 3. Evaporator safety valve | 12. Drier filter |
| 4. Hot gas bypass (option) | 13. Oil Separator |
| 5. Port for the air vent (chilled water) | 14. Evaporator |
| 6. Drain port & plug (chilled water) | 15. Oil filter |
| 7. Port for the air vent (cooling water) | 16. Actuator (Vane motor) |
| 8. Drain port & plug (cooling water) | 17. Compressor motor |
| 9. Condenser safety valve | |

Figure 3. Components of 2-stage modular centrifugal chiller

2-3. Nomenclature

2-3-1 Single stage Centrifugal Chiller RCWF***P Series

The nomenclature of the Centrifugal Chiller is as shown in the figure 5..

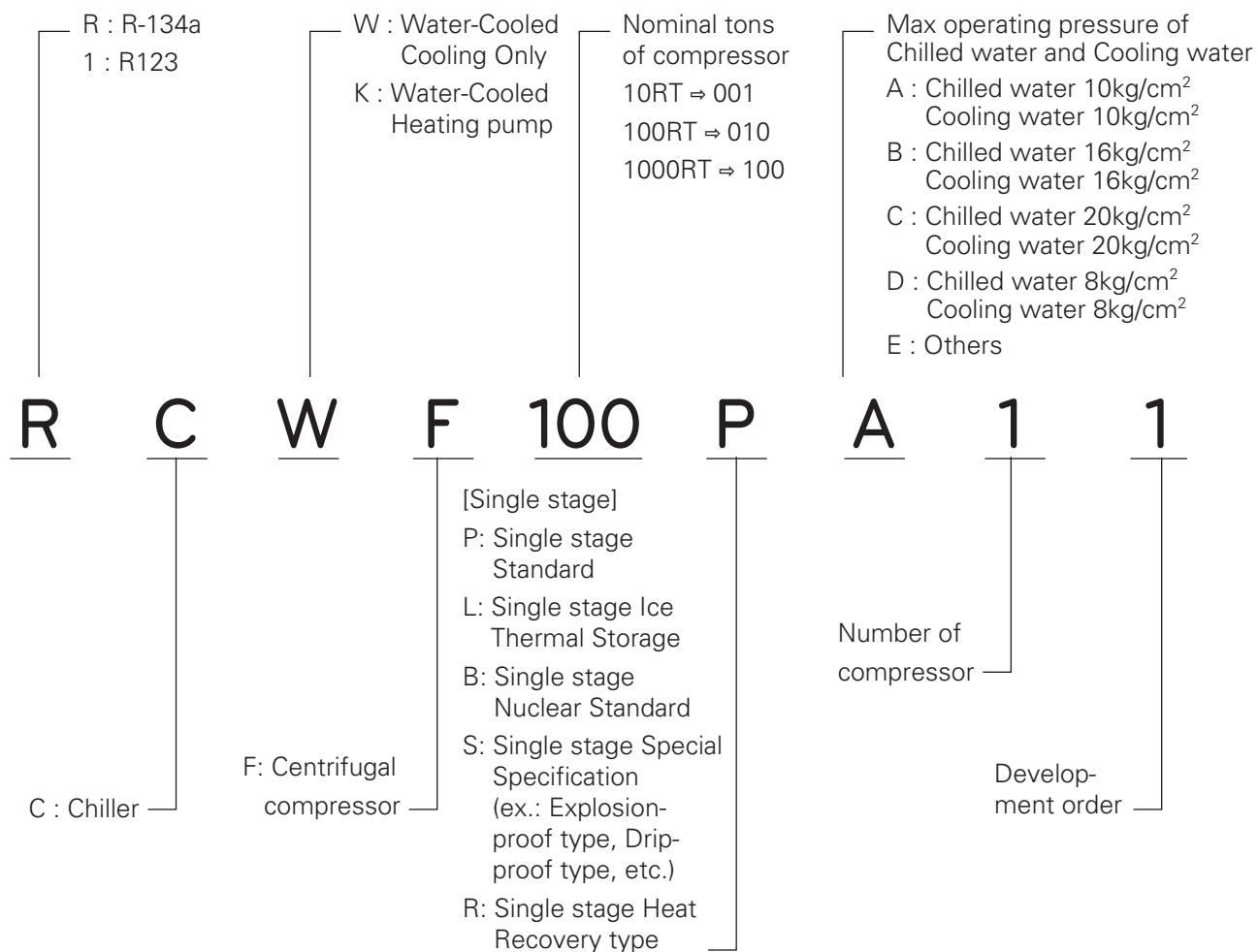


Figure 4. Nomenclature

2-3-2. Two stage Centrifugal Chiller RCWFH Series

The nomenclature of the Centrifugal Chiller is as shown in the figure 5.

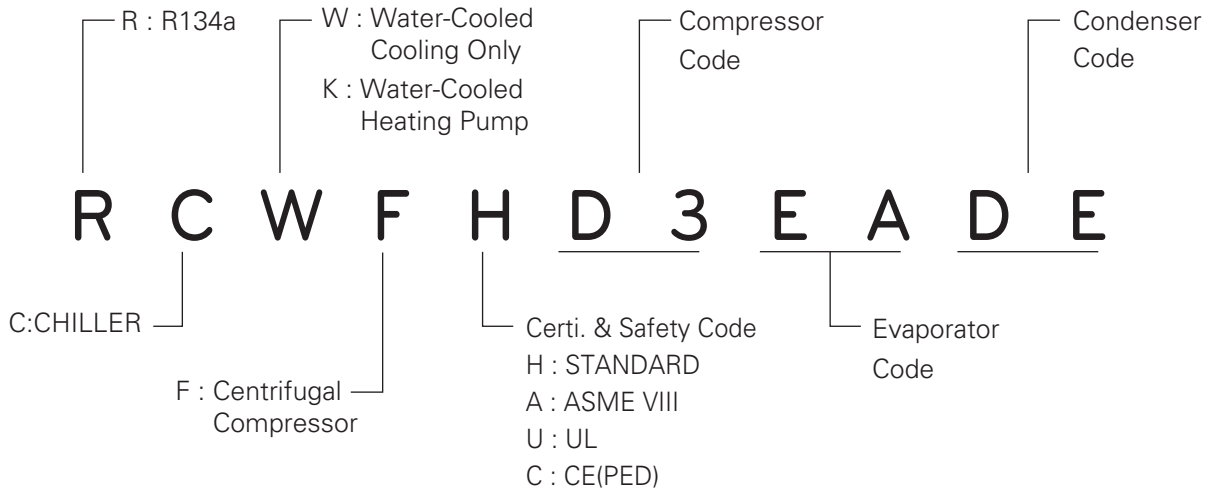


Figure 5. Nomenclature

Combination Table

CAPACITY		Comp. code	Evap. code	Cond. code	Power consumption (kW)	Shipping weight (kg)	Operating weight (kg)	Refrigerant weight (kg)
RT	kW							
200 ~ 400	700 ~ 1406	A	AA~CC	AA~CC	~280	7,000 ~ 8,300	8,350 ~ 9,450	400
350 ~ 570	1230 ~ 2005	B	AA~CC	AA~CC	~350	7,900 ~ 9,500	8,850 ~ 11,100	600
480 ~ 785	1690 ~ 2760	C	BA~DC	BA~DC	~500	8,600 ~ 12,000	9,850 ~ 14,100	600 ~ 800
715 ~ 1114	2515 ~ 3920	D	CA~EC	CA~EC	~700	11,000 ~ 15,000	12,800 ~ 17,900	800 ~ 1,400
940 ~ 1635	3300 ~ 5750	E	DA~GC	DA~GC	~1000	12,500 ~ 26,200	14,850 ~ 30,600	1,100 ~ 1,700
1320 ~ 2200	4640 ~ 7740	F	DF~GG	DF~GG	~1350	19,000 ~ 33,000	22,450 ~ 38,900	1,700 ~ 2,200
2050 ~ 3000	7200 ~ 10548	G	GA~FC	GA~FC	~2100	30,000 ~ 38,500	35,000 ~ 45,000	2,200 ~ 2,300

Table 1. Combination Table

2-3-3. Two-stage Centrifugal Chiller RCWFM Series

The nomenclature for the Fig. 7 centrifugal chiller is as follows.

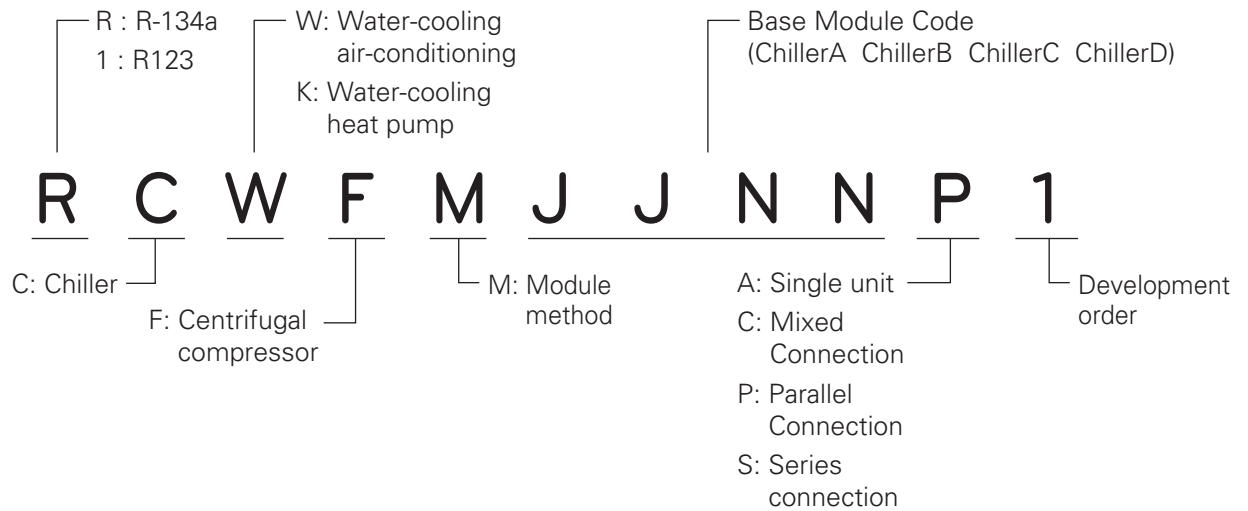


Figure 6. Naming Convention of a Model

Base Module

Module Code	compressor	Evaporator	Condenser	Product Weight [kg]	Operating Weight [kg]	Oil Weight [kg]	Refrigerant Weight [kg]
A	A1	AA	AA	5,900	7,100	40	300
B	A1	AC	AC	6,100	7,350	40	350
D	A3	AC	AC	6,100	7,350	40	350
E	A3	AC	AM	6,250	7,500	40	400
F	A3	AT	AM	6,400	7,650	40	400
G	B1	BA	BA	7,300	8,800	40	450
H	B2	BB	BB	7,600	9,150	40	500
J	B3	BC	BC	8,000	9,600	40	550
K	B3	BD	BD	8,400	10,000	40	650
N	None						

Combination of 2


Capacity		Chiller A	Chiller B	Chiller C	Chiller D
RT	kW				
600	2110	D	D	N	N
700	2461	F	F	N	N
800	2813	G	G	N	N
900	3164	H	H	N	N
1000	3516	J	J	N	N
1200	4219	K	K	N	N

Combination of 4

Capacity		Chiller A	Chiller B	Chiller C	Chiller D
RT	kW				
1400	4922	F	F	F	F
1600	5626	G	G	G	G
1800	6329	H	H	H	H
2000	7032	J	J	J	J
2400	8438	K	K	K	K

2-4. Name plate

The name plate is attached on the right side of the control panel. Basic information of the product can be checked on the plate and the information within the basic information on in the plate can be easily checked for quicker service for product history.

CENTRIFUGAL CHILLER	
①	M O D E L
②	R E F R I G E R A N T
③	COOLING CAPACITY usRT
④	MOTOR POWER & CURRENT kW A
⑤	MANUFACTURE NO.
⑥	TEST PRESSURE kg/cm ²
⑦	MAX. WORKING PRESSURE kg/cm ²
⑧	VOLUME OF EVAPORATOR Liter
⑨	VOLUME OF CONDENSER Liter
⑩	POWER ELEC. 3φ V Hz
⑪	CONTROL ELEC. 3φ V
⑫	CHILLED WATER TEMP. INLET : °C OUTLET : °C
⑬	COOLING WATER TEMP. INLET : °C OUTLET : °C
⑭	WORKING PRESSURE OF WATER CHILLED : kg/cm ² COOLING : kg/cm ²
MADE IN KOREA	
	

- ① Model name
- ② Refrigerant
- ③ Cooling capacity
- ④ Power and current required for motor
- ⑤ Manufacture's serial number
- ⑥ Internal pressure test pressure
- ⑦ Maximum working pressure (Design pressure)
- ⑧ Volume of Evaporator
- ⑨ Volume of Condenser
- ⑩ Power electricity
- ⑪ Control electricity
- ⑫ Temperatures of Chilled water inlet/outlet
- ⑬ Temperatures of Cooling water inlet/outlet
- ⑭ Maximum pressure of chilled water and cooling water

Figure 7. Name plate

3. PREPARATION FOR INSTALLATION

3-1. Checking of the site information

- Before starting installation, check the site, review the necessary details and coordinate the followings with the site personnel for a safe and accurate installation.
 - 1) Work scope and unit data: Check the site installation work scope and document approved.
 - 2) Installation location: Check the environmental condition to install according to the article 3-2.
 - 3) Check receipt dock: Check the access door (width, length and height) to the site, and plan ahead to avoid any problems in moving. Check and review the detail method and order for moving the unit.

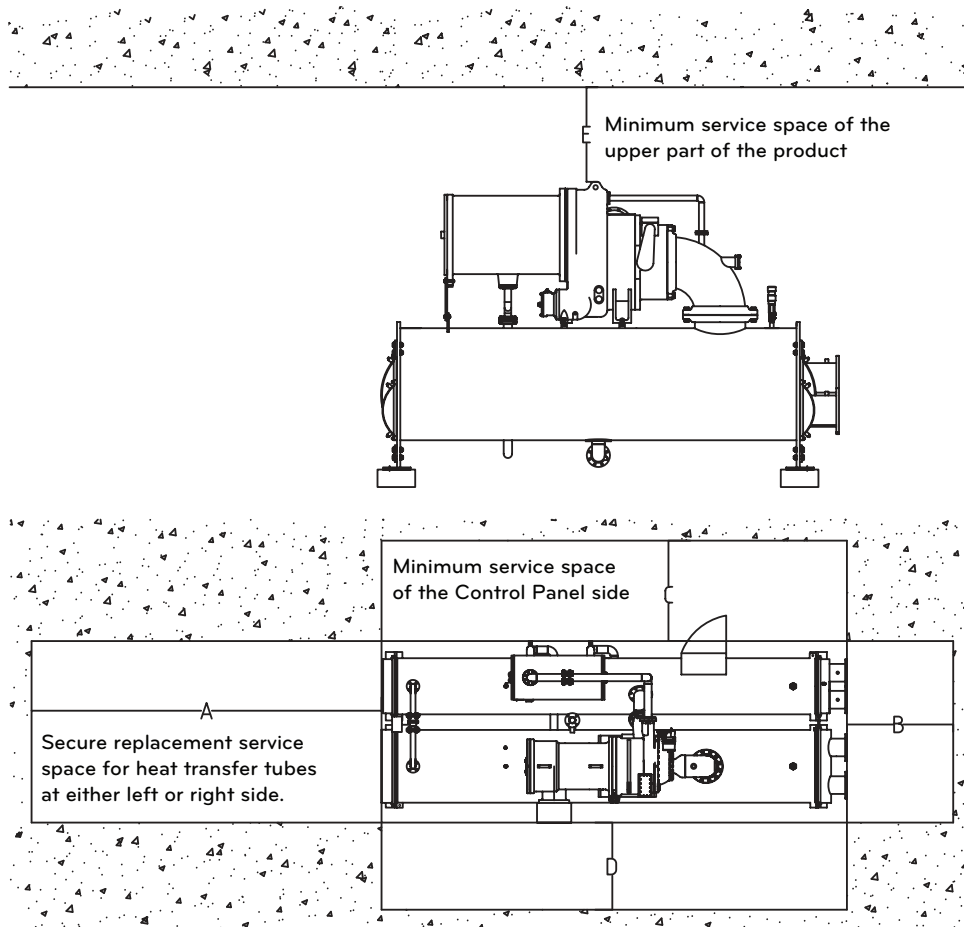
3-2. The environmental condition of installation site

- Aside from securing the space for the installation of the Centrifugal chiller, it must be installed and stored considering the environment as follows.
 - 1) Be careful not to damage pipes, insulation materials or wires of the chiller unit when storing and installing. The site should have ventilation measures against the refrigerant leak of the Centrifugal chiller.
 - 2) Select a site to store where in low temperature at 40°C or below all the time with good ventilation. If the unit is to be stored for the long term, exercise a special care for the temperature to maintain at 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 is operated and discharges the refrigerant gas resulting in the loss of refrigerant gas and the potential loss of lives.
If the machine room temperature is over 40°C, check the set pressure value for the relief valve operation, and maintain the room temperature below the set temperature of the valve operation after consulting the authorized service engineer of LG.
 - 3) Store the Centrifugal chiller in a dry and safe location without any vibration.
 - 4) Secure the floor surface in order to install the unit wherein it is flat and of sufficient strength and mass to support the chiller operating weight.
 - 5) Avoid places where any fire or flammable materials are nearby. When installed in parallel to the heating object, such as boilers, sufficient care for the radiation heat will be required.
 - 6) Be careful with high humidity as it causes electric failure and the corrosion of the chiller unit.
 - 7) Select a site with the least amount of dust. Dust causes electric failure.
 - 8) Provide enough space around the unit to allow access to all service points such as replacing heat transfer tubes and opening the water box and other maintenance.
(Please refer to the section 3-3 for the items to consider to secure the service area.)
 - 9) Secure maximum or safe height to fit the crane for easy lifting and lowering the chiller unit.
 - 10) Secure good drainage from the installing room.
 - 11) Secure sufficient lighting and sunlight 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 from dust and rain using a vinyl cover.
 - 14) When installing the chiller unit, plan appropriately in accordance with the installation of High Pressure Gas Safety Management Code. (Based on local standard)

3-3. Securing Service Space at installation

- 1) Before the installation of the Centrifugal chiller, provide enough space for service as indicated in the basic drawings. This is the minimum required space for the maintenance.
- 2) The surface to install the chiller unit should be of sufficient strength and mass to support the chiller operating weight based on the specification indicated on the basic drawing.
- 3) Provide a good drainage path to drain out the water when cleaning the heat transfer tubes, and the chilled water and cooling water out before shutting down.
- 4) To ensure the stable operation of the chiller, level the chiller by adjusting the levelling plates during the installation. (Maintain within 0.5 mm for 1 m)
- 5) Floor foundation construction is out of scope of LG. Please work according to the approved basic drawings. LG Electronics is not responsible for any unit failure caused by an inappropriate design or work for the foundation.

3-3-1. Minimum space required for installation of single stage Centrifugal Chiller RCWF***P Series

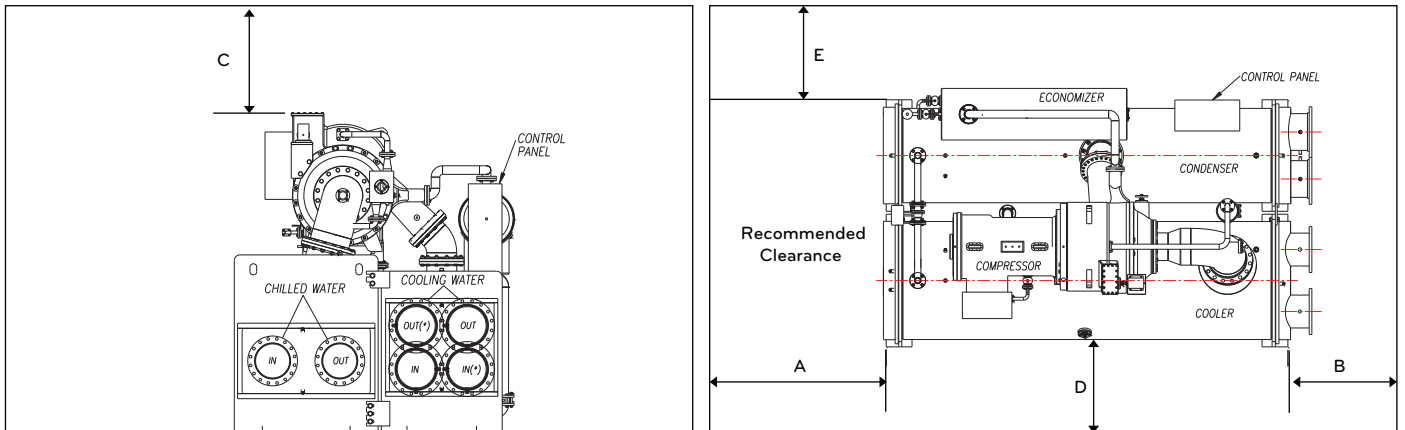


(Unit : mm)

Model(12°C → 7°C)	Model(10°C → 5°C)	A	B	C	D	E
RCWF025P ~ RCWF040P	RCWF025P ~ RCWF040P	3,700	1,500	1,500	1,500	1,000
RCWF050P ~ RCWF060P	RCWF050P ~ RCWF060P	3,700	1,500	1,500	1,500	1,000
RCWF065P ~ RCWF085P	RCWF065P ~ RCWF085P	3,700	1,500	1,500	1,500	1,000
RCWF090P ~ RCWF130P	RCWF090P ~ RCWF130P	3,700	1,500	1,500	1,500	1,000
RCWF140P ~ RCWF200P	RCWF140P ~ RCWF200P	4,500	1,500	1,500	1,500	1,500

Fig 8. Minimum space required for installation of single stage Centrifugal Chiller RCWF***P Series

3-3-2. Minimum space required for installation of two stage Centrifugal Chiller RCWFH Series



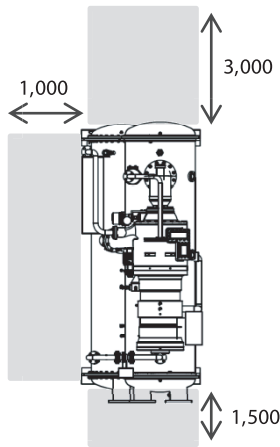
(Unit : mm)

Model	A	B	C	D	E
RCWFHA1AAAA	3,000	1,500	1,500	1,500	1,000
RCWFHB3BCBC	3,000	1,500	1,500	1,500	1,000
RCWFHC1BDBD	3,000	1,500	1,500	1,500	1,000
RCWFHC3CBCB	3,000	1,500	1,500	1,500	1,000
RCWFHD1CFCF	3,700	1,500	1,500	1,500	1,000
RCWFHD3DBDB	3,700	1,500	1,500	1,500	1,000
RCWFHE1DHDH	3,700	1,500	1,500	1,500	1,000
RCWFHE3EBEB	4,000	1,500	1,500	1,500	1,000
RCWFHF3GBEK	4,000	1,500	1,500	1,500	1,000
RCWFHG3FCFC	5,500	2,000	2,000	2,000	1,500

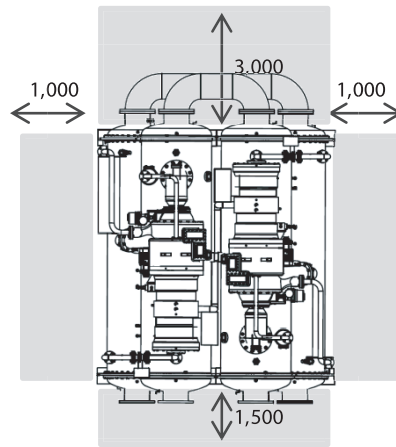
Figure 9. Minimum space required for installation of two stage Centrifugal Chiller RCWFH Series

3-3-3. Minimum space required for installation of two-stage Centrifugal Chiller RCWFM Series

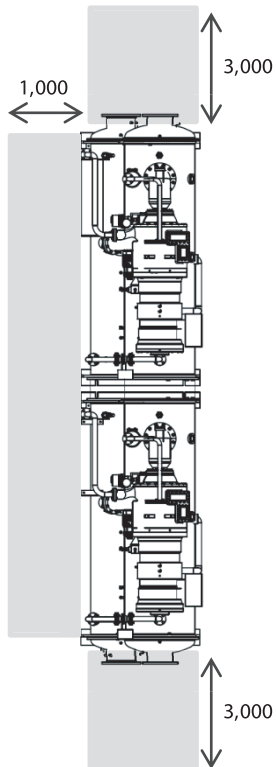
Independent installation



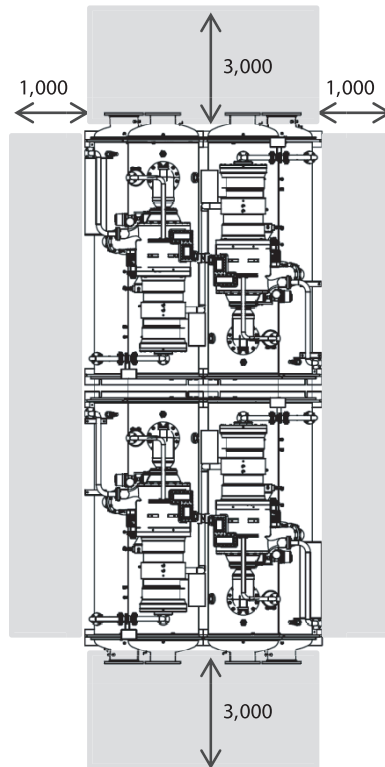
Combination of 2 – parallel



Combination of 2 – series



Combination of 4 – mixed



Clearance for height : 1,500

Figure 10. Minimum space required for installation of two-stage Centrifugal Chiller RCWFM Series(Unit : mm)

3-4. Long term storage and proper place

If the unit has to be stored for the long term, store and maintain in the following conditions regardless of the installation, before or after.

3-4-1. Condition for storage place

For long-term storage, store in an environmental condition as explained in 3-2. Once water flew through the pipes at the state of water pipes were connected, the unit should be kept after draining the chilled water and cooling water completely and after measures to ensure that no water is left inside by an additional air purging.

The remained water in the heat transfer tube may cause frozen damage by the refrigerant evaporation when outdoor temperature is below 0 °C or at the environmental condition of rapid temperature changes in the outside air.

If the heat transfer tubes are damaged by the frozen residual water inside, LG Electronics is not responsible.

Cover the electric driving parts such as the control panel and vane operation tightly by protective covers, and keep them in a safe and dry place without any vibration or exposure to sunlight.

3-4-2. Check points when storing Centrifugal chiller long term

Checking items	Checking timing	Details for checking
Checking the Chiller status	Upon site arrival	Check whether any damage and any refrigerant leakage occurred by checking the appearance of the chiller. Particularly make sure that there are no leaks in the joint parts of the pipe.
Packaging electrical system	Upon site arrival	Control panels, security relay, motor control, etc., should be kept covering the whole with vinyl and put desiccants (silica gel, etc.) inside. Other electrical systems should be covered with vinyl to prevent dust from sticking.
Periodic inspection	Once a week	Please inspect visually any damage and leakage on the pipe joint parts. By checking the pressure gauge installed in the condenser, please maintain the recording of the pressure change amount. If refrigerant leakage occurs, please follow the installation manual action. For the products that are not filled with refrigerant, it must be filled by nitrogen at the vacuum state, and check the pressure daily.

Table 3. Items to check when storing a Centrifugal chiller long term

3-4-3. Check after long term storage

- 1) When operating after the long-term storage of the unit, check the oil condition through the site glass along with any mechanical and electrical problem before operation. If any problem exists, have an LG engineer check the problem. If the unit has been stored long term, it is recommended to have the chiller unit checked by a specialized service company. LG Electronics shall not be responsible for any issue that occurs after a check by a service company other than LG Electronics or LG authorized service company (engineer).
- 2) If the unit has been left with no nitrogen pressure or no refrigerant for a long period, operate after the inspection by LG or a specialized service engineer. LG Electronics shall not be responsible for any issue that occurs after a check by a service company other than LG Electronics or LG authorized service company (engineer).
- 3) Checking electric system
Check for any defects on the parts and wiring connection part, and measure the resistance value of the motor insulation. About the checking procedure and judgment criteria, proceed according to the procedures in the operations & maintenance manual.
- 4) Checking water system
After the long-term shutdown of the unit, the inside of the chilled and cooling water system is expected to be contaminated by dust and inflow of external particles. Clean the water system and check the filter.
Cooling water system needs special care because it is generally an open type piping system.
- 5) Perform commissioning according to the operations & maintenance manual.

4. PRODUCT RECEIPT

4-1. Check item list and product condition

- Depending on the condition of the installation site, the chiller is shipped out as a single unit or as separated units, and as charged with refrigerant or with nitrogen. If shipped as separated units, contact an authorized LG dealers or LG.
 - 1) Shipment as single or separated units

For single unit type, the unit is delivered to the site as preassembled. For separated unit type, it is delivered as 2 or 3 separated main pieces according to the filed condition.

If the unit was delivered as a separate unit type, verify and record that all the parts are shipped properly according to the packing list.
 - 2) Delivery after refrigerant filling or nitrogen filling

For an single unit type, the unit is shipped after the factory charging of either refrigerant or nitrogen per the customer's request.

If charged with refrigerant, the refrigerant quantity for the unit is sealed inside the unit. For the refrigerant, it needs special attention for its high pressured state since the saturated refrigerant pressure is decided by the external air temperature. (Oil is packed separately and charged during commissioning.)

If charged with nitrogen, the unit is charged at a pressure of 0.5 kg/cm² from the factory. If the pressure is "0", please record the condition and check for any leaks.

4-2. Product inspection

- 1) Check if all the components that were shipped match the packing list.
- 2) Check the information on the product name plate with the project information.
Refer to article 2-4 for reading the name plate in detail.
- 3) Inspect all exterior components for visible damage or leaks.

Any apparent damage is found, first check whether the damaged part affect to safety such as refrigerant leak. Take photos of the damage and notify the LG service engineer for service.

4-3. Product protection

- When receiving the chiller unit, check and record the following pre-commissioning checklist to protect the unit.
 - 1) Before shipment from the factory, the chiller unit is charged with refrigerant or nitrogen to prevent corrosion from moisture penetration.

Be careful not to open or operate the valves and connectors attached on the unit arbitrarily.

If refrigerant is charged, it can be leaked resulting in injury or death.

If the water box is sealed with the flange cover, the nitrogen factory charged at a pressure of 0.5 kg/cm² should be purged out first before opening the flange cover.

Caution) Never open the service valve if nitrogen or refrigerant are charged.

If the nitrogen is lost by opening the valve, the chiller unit can be damaged.
 - 2) When receiving the unit, inspect and record the exterior components and pipes condition for any leak by damage or loosen the bolts.
 - 3) For the unit factory charged with refrigerant, it is delivered without charging in order to prevent oil becoming vapor due to the refrigerant dissolution during the transportation or storage.
 - 4) For any loss, damage or failure of parts during the inspection raise the problems with the delivery personnel and contact an LG Electronics representative. Do not install the unit that is damaged without an approval from LG Electronics.
 - 5) After the product acceptance or after the installation/commissioning, the responsibility for the storage and management is to the customer, and LG Electronics does not guarantee the product quality if problems occur after the acceptance. Please manage to avoid damage to the LG's products during construction management and other tasks.



CAUTION

Before unloading the chiller unit from the vehicle upon delivery to the site, check the exterior components of the unit for any damage during the transportation.

5. TRANSPORTATION

5-1. Considerations for carrying in the product

Before importing the unit to the site to install, check the size and weight of the chiller unit regarding the opening to the site is large enough. After checking the environmental condition of the site, prepare the moving device and method appropriate for the size and weight.

Secure the minimum required size of receiving dock to the site, and be careful not to damage the unit when moving. The dimensions in the Table 4. are only a reference for the standard LG model. Check the approved drawings for the actual dimension, and proceed to the installation after consulting the site condition with LG Electronics or experts authorized by LG Electronics.

! WARNING

If the disassembly import and re-assembly is required, the disassembly import and reassembly of the chiller unit must be performed under the supervision of the LG Electronics or experts authorized by LG Electronics. If not, LG Electronics is not responsible for any issues that occur thereafter.

5-1-1. Single stage Centrifugal Chiller RCWF***P Series

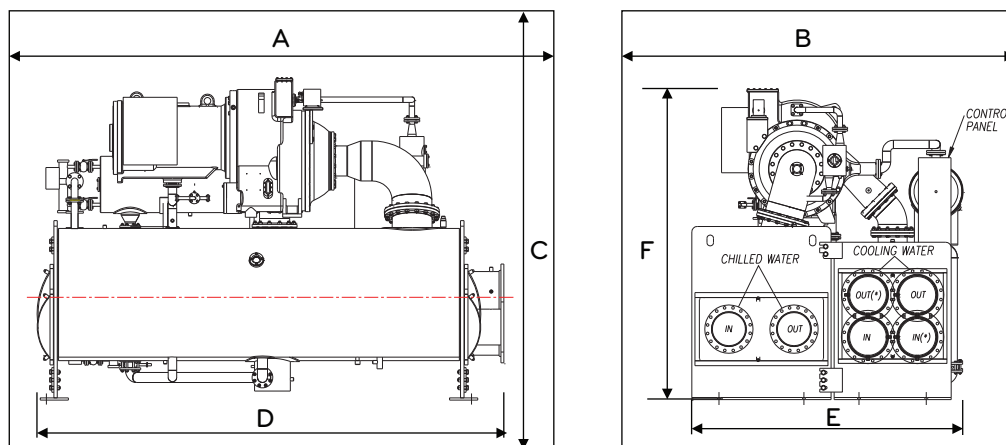


Figure 11. Recommended Clearances

(Unit : mm)

Model (A)	Model (B)	A	B	C	D	E	F
RCWF025P ~ RCWF040P	RCWF025P ~ RCWF040P	4,750	4,000	2,480	4,150	1,620	2,030
RCWF050P ~ RCWF060P	RCWF050P ~ RCWF060P	4,750	4,000	2,470	4,150	1,880	2,220
RCWF065P ~ RCWF085P	RCWF065P ~ RCWF085P	4,750	4,600	3,060	4,150	2,120	2,610
RCWF090P ~ RCWF130P	RCWF090P ~ RCWF130P	4,760	4,600	3,310	4,160	2,390	2,860
RCWF140P ~ RCWF200P	RCWF140P ~ RCWF200P	5,770	5,600	3,970	5,170	3,020	3,520

Note) Model (A): Standard model _ Chilled water inlet/outlet temperature 12°C/7°C, Cooling water inlet/outlet temperature 32/37°C

Model (B): Standard model _ Chilled water inlet/outlet temperature 10°C/5°C, Cooling water inlet/outlet temperature 32/37°C

Table 4. Minimum entrance(door) dimensions of single stage Centrifugal Chiller RCWF***P Series

General product weight

The following weight data are those of standard products from LG Electronics. The actual weight of the unit can be different per site condition. Please refer to the weight and size of the chiller unit on the drawings approved.

Table 5. Product weight of Single stage Centrifugal Chiller RCWF***P Series

(Unit : kg)

Model (A)	Model (B)	Product Weight	Operating weight
RCWF025P	RCWF025P	5,200	6,200
RCWF030P	RCWF030P	6,100	7,100
RCWF035P	RCWF035P	6,900	8,000
RCWF040P	RCWF040P	7,700	8,300
RCWF050P	RCWF050P	8,500	9,900
RCWF055P	RCWF055P	9,200	10,700
RCWF060P	RCWF060P	9,700	11,700
RCWF065P	RCWF065P	10,100	12,200
RCWF070P	RCWF070P	10,500	12,600
RCWF075P	RCWF075P	10,700	12,900
RCWF080P	RCWF080P	11,300	13,500
RCWF085P	RCWF085P	11,700	14,100
RCWF090P	RCWF090P	12,700	15,500
RCWF100P	RCWF100P	12,800	15,700
RCWF110P	RCWF110P	13,100	16,000
RCWF120P	RCWF120P	13,600	16,600
RCWF130P	RCWF130P	14,000	17,000
RCWF140P	RCWF140P	23,700	28,900
RCWF150P	RCWF150P	24,000	29,300
RCWF160P	RCWF160P	24,300	29,800
RCWF170P	RCWF170P	24,600	30,200
RCWF180P	RCWF180P	24,900	30,600
RCWF190P	RCWF190P	25,200	31,000
RCWF200P	RCWF200P	25,500	31,200

Note) Model (A): Standard model _ Chilled water inlet/outlet temperature 12°C/7°C, Cooling water inlet/outlet temperature 32/37°C
 Model (B): Standard model _ Chilled water inlet/outlet temperature 10°C/5°C, Cooling water inlet/outlet temperature 32/37°C

Table 6. Compressor weight of single stage Centrifugal Chiller RCWF***P Series

(Unit : kg)

Model (A)	Model (B)	Motor	Comp.	Total
RCWF025P ~ RCWF040P	RCWF025P ~ RCWF040P	1,250	1,150	2,400
RCWF050P ~ RCWF060P	RCWF050P ~ RCWF060P	1,300	1,250	2,550
RCWF065P ~ RCWF085P	RCWF065P ~ RCWF085P	2,300	2,450	4,750
RCWF090P ~ RCWF130P	RCWF090P ~ RCWF130P	2,650	2,550	5,200
RCWF140P ~ RCWF200P	RCWF140P ~ RCWF200P	2,850	3,900	6,750

Note) Model (A): Standard model _ Chilled water inlet/outlet temperature 12°C/7°C, Cooling water inlet/outlet temperature 32/37°C
 Model (B): Standard model _ Chilled water inlet/outlet temperature 10°C/5°C, Cooling water inlet/outlet temperature 32/37°C

5-1-2. Two stage Centrifugal Chiller RCWFH Series

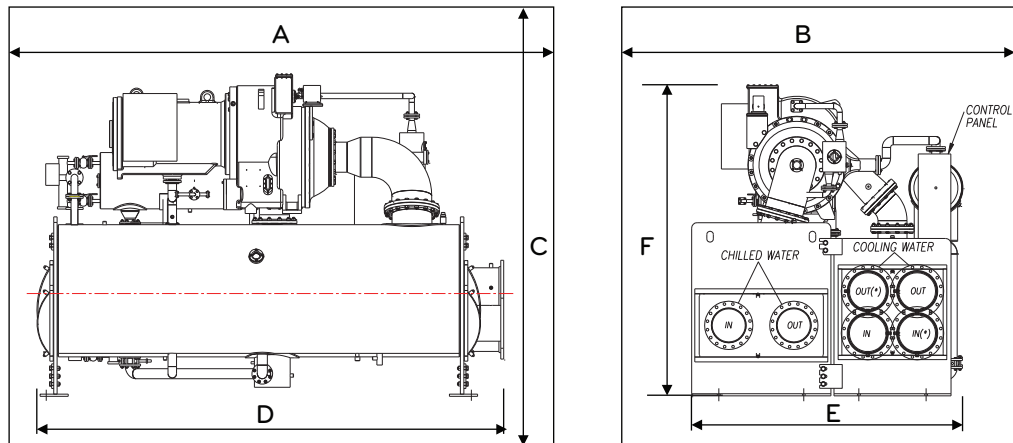


Figure 12. Recommended Clearances

(Unit : mm)

Model	A	B	C	D	E	F
RCWFHA1AAAA	4,000	3,300	2,600	3,500	1,650	2,000
RCWFHB3BCBC	4,000	4,220	2,900	3,500	2,110	2,300
RCWFHC1BDBD	4,000	4,220	2,930	3,500	2,110	2,330
RCWFHC3CBCB	4,000	4,720	3,250	3,500	2,360	2,650
RCWFHD1CFCF	4,650	4,720	3,250	4,150	2,360	2,650
RCWFHD3DBDB	4,650	5,020	3,460	4,150	2,510	2,860
RCWFHE1DHDH	4,650	5,200	3,700	4,150	2,600	3,100
RCWFHE3EBEB	5,200	6,240	3,950	4,700	3,120	3,350
RCWFHF3GBEK	5,200	6,500	4,050	4,700	3,250	3,450
RCWFHG3FCFC	6,910	7,000	4,400	6,410	3,500	3,800

Table 7. Minimum entrance(door) dimensions of two stage Centrifugal Chiller RCWFH Series

General product weight

Following product weight is for standard product from LG Electronics and may vary by the site condition. Check the weight and size of the product from the drawing approved for the site.

Table 8. Product weight of two stage Centrifugal Chiller RCWFH Series

(Unit : kg)

Model	Rigging weight	Operating Weight
RCWFHA0ADAD	6,800	7,650
RCWFHA1AAAA	7,500	8,350
RCWFHA2ABAB	7,700	8,600
RCWFHA3ACAC	7,900	8,850
RCWFHB1BABA	8,300	9,450
RCWFHB2BBBB	8,600	9,850
RCWFHB3BCBC	9,000	10,300
RCWFHC1BDBD	9,500	11,100
RCWFHC2CACA	10,500	12,200
RCWFHC3CBCB	11,000	12,800
RCWFHD1CFCF	12,000	14,100
RCWFHD2DADA	12,500	14,850
RCWFHD3DBDB	13,000	15,550
RCWFHE1DFDF	15,000	17,900
RCWFHE2EAEA	19,000	22,450
RCWFHE3EBEB	24,200	28,000
RCWFHF1EFEF	26,200	30,600
RCWFHF2GAEJ	28,500	33,200
RCWFHF3GBEK	30,000	35,000
RCWFHG1GFEM	33,000	38,900
RCWFHG2GGEN	36,000	42,500
RCWFHG3GHEO	38,500	45,000

Table 9. Compressor weight of two stage Centrifugal Chiller RCWFH Series

(Unit : kg)

Model	Motor	Compressor	Total
RCWFHA1AAAA	1,200	1,100	2,300
RCWFHB3BCBC	1,350	1,300	2,650
RCWFHC1BDBD	1,380	1,500	2,880
RCWFHC3CBCB	1,400	1,500	2,900
RCWFHD1CFCF	1,700	1,800	3,500
RCWFHD3DBDB	1,750	1,800	3,550
RCWFHE1DHDH	1,800	2,200	4,000
RCWFHE3EBEB	2,500	2,700	5,200
RCWFHF3GBEK	4,500	4,100	8,600
RCWFHG3FCFC	5,000	5,100	10,100

5-1-3. Two-stage Centrifugal Chiller RCWFM Series

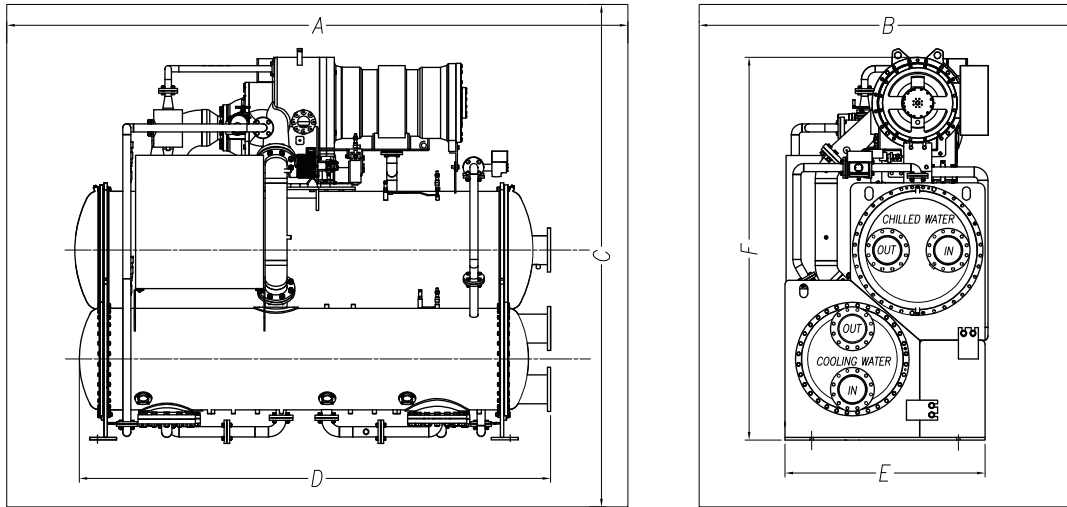


Figure 13. Minimum entrance(door) dimensions of two-stage Centrifugal Chiller RCWFM Series

Base Module Code	A	B	C	D	E	F
A	4,000	2,000	3,500	3,500	1,000	2,870
B	4,000	2,000	3,500	3,500	1,000	2,870
D	4,000	2,000	3,500	3,500	1,000	2,870
E	4,000	2,000	3,500	3,500	1,000	2,870
F	4,000	2,000	3,500	3,500	1,000	2,870
G	4,000	3,000	3,500	3,500	1,500	2,870
H	4,000	3,000	3,500	3,500	1,500	2,870
J	4,000	3,000	3,500	3,500	1,500	2,870
K	4,000	3,000	3,500	3,500	1,500	2,870
N	None					

General product weight

As the product weight shown below is about the standard product of LG Electronics, the product weight may change depending on conditions of the site. Check the weight and size in the approved drawings for the site.

Table 10. Product Weight of two-stage Centrifugal Chiller RCWFM Series

(Unit : kg)

Base Module Code	Rigging weight	Operating Weight
A	5,900	7,100
B	6,100	7,350
D	6,100	7,350
E	6,250	7,500
F	6,400	7,650
G	7,300	8,800
H	7,600	9,150
J	8,000	9,600
K	8,400	10,000
N	None	

Table 11. Compressor Weight Weight of two-stage Centrifugal Chiller RCWFM Series

(Unit : kg)

Base Module Code	Motor	Compressor	Total
A	1,200	1,100	2,300
B	1,200	1,100	2,300
D	1,200	1,100	2,300
E	1,200	1,100	2,300
F	1,200	1,100	2,300
G	1,350	1,300	2,650
H	1,350	1,300	2,650
J	1,350	1,300	2,650
K	1,350	1,300	2,650
N	None		

5-2. Transportation method

5-2-1. Moving by crane

When the chiller unit should be moved by lifting, hang the hooks on the designated holes and wire cables to the hooks so that the load of the unit to be centered and even leveled.

And, be careful not to damage any electric wires, main unit and attached parts of the chiller unit by the lifting cables. To lift the chiller unit, use the rigging lug on the 4 lifting holes of the chiller unit as shown in the following figure. Be aware and follow the next warnings and cautions.

! WARNING

- Lift the chiller unit while balancing the weight. Secure the minimum length of the cables. First lift up approx. 0.5 m for testing and check the leveling of the unit.
- The cables should be capable of supporting the entire weight of the unit. Lifting and moving the unit tilted to a side will cause serious damage to the unit. The unlevelled unit may fall down resulting in death or serious injury.

! CAUTION

- If the product is charged with refrigerant, ensure that the unit does not suffer any impacts during the rigging. Especially be careful with any impact on the pipes that can cause leaks on the connecting parts.
- If the compressor is tilted more than 15° lengthwise, remove the oil from the oil tank before moving the unit. When moving the unit while tilted more than 15°, the oil from the compressor may flow to other parts of the unit.
- Please ensure sufficient height for the spreader made of iron material to prevent damage to the compressor, the power, the control panel and other parts of the product.

Table 12. Minimum chain length for the products lifting- Single stage Centrifugal Chiller RCWF***P Series

Model name	Max. Weight (kg)	Pressure vessel length (mm)	Minimum chain length (mm)
RCWF025P~040P	7,700	3,650	3,700
RCWF050P~060P	9,700	3,650	3,700
RCWF065P~085P	11,700	3,650	3,700
RCWF090P~130P	14,000	3,650	3,700
RCWF140P~200P	25,500	4,480	4,500

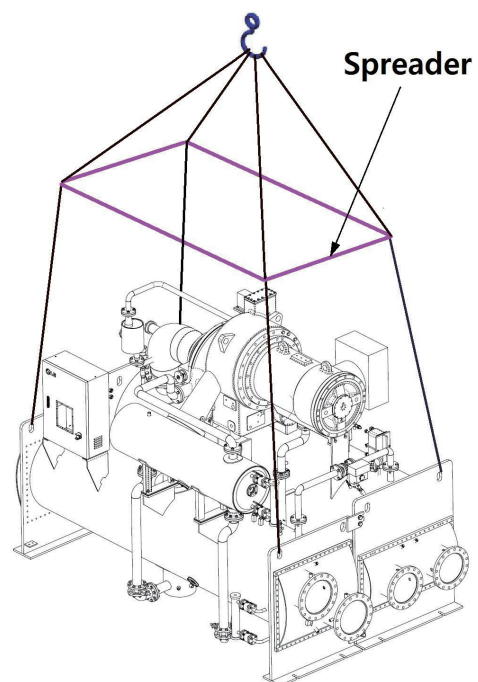


Figure 14. Lifting with crane

Table 13. Minimum chain length for the products lifting - Two stage Centrifugal Chiller RCWFH Series

Model	Maximum Weight (kg)	Condenser length (mm)	Minimum Chain length (mm)
RCWFHA1AAAA	7,500	3,000	3,100
RCWFHB3BCBC	9,000	3,000	3,100
RCWFHC1BDBD	9,500	3,000	3,100
RCWFHC3CBCB	11,000	3,000	3,100
RCWFHD1CFCF	12,000	3,650	3,700
RCWFHD3DBDB	13,000	3,650	3,700
RCWFHE1DHDH	15,000	3,650	3,700
RCWFHE3EBEB	24,200	4,000	4,100
RCWFHF3GBEK	30,000	4,000	4,100
RCWFHG3FCFC	38,500	5,500	5,600

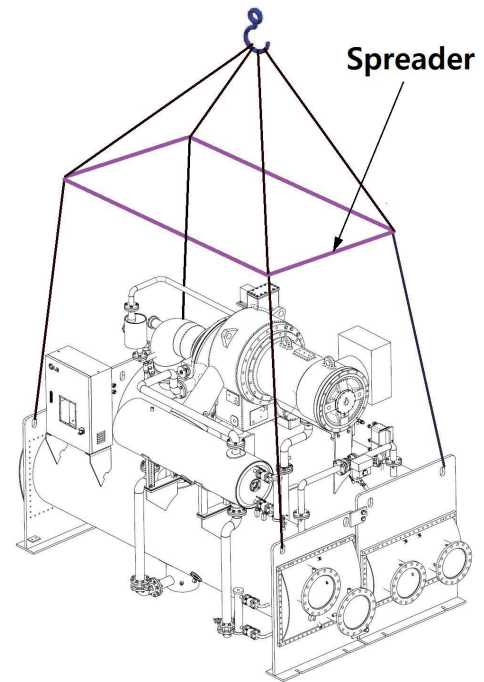


Figure 15. Rigging diagram with crane

Table 14. Minimum chain length for the products lifting - Two-stage Centrifugal Chiller RCWFM Series

Base Module Code	Maximum Weight (kg)	Condenser length (mm)	Minimum Chain length (mm)
A	7,350	3,000	3,100
B	7,500	3,000	3,100
D	7,500	3,000	3,100
E	7,650	3,000	3,100
F	8,000	3,000	3,100
G	9,150	3,000	3,100
H	9,600	3,000	3,100
J	10,000	3,000	3,100
K	10,700	3,000	3,100
N		None	

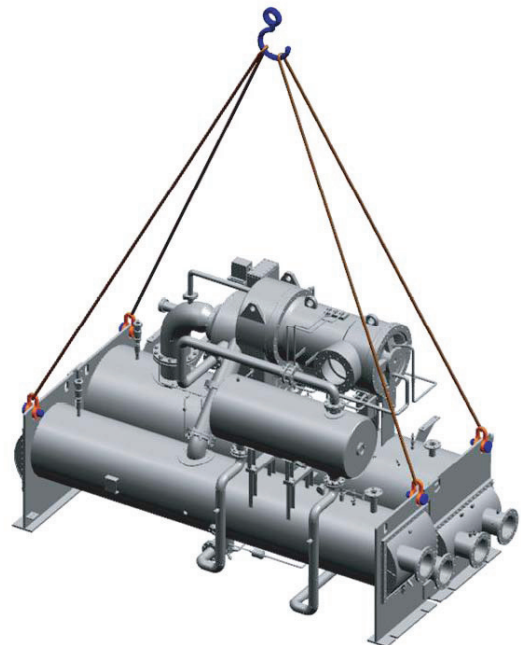


Figure 16. Lifting up by a Crane

5-2-2. Moving using roller

Make sure the receiving dock entrance has additional clearance of each of 300mm or more from the maximum width and height of the product.

The following figure shows how to receive the product using roller.

Make sure not to apply any impact on the Centrifugal Chiller. If damaged, repair may not be easy.

When receiving the product using the roller, the required roller and the strut are outside the scope of receipt. Considering the weight and size of the product, the installer must prepare the parts accordingly.

Be especially careful for safety when transporting the product.

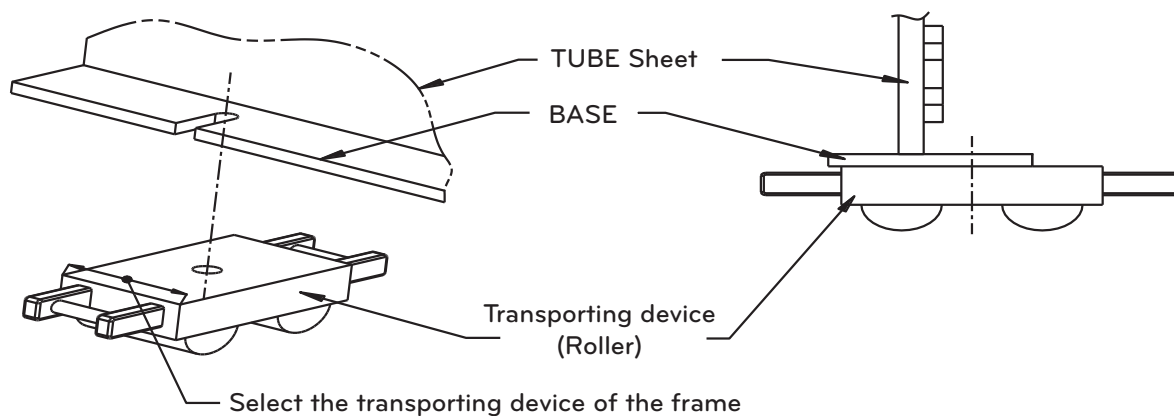


Figure 17. How to transport the product using the transporting device (Roller)

6. INSTALLATION

6-1. Requirements

- 1) Considering the place for the Centrifugal chiller, provide enough clearance around the unit to allow the installation of the attached device, wiring, piping and maintenance access.
Check the level and strength of the foundation surface. For the part to lift the chiller, weight and operating weight, refer to the specification, dimension and foundation drawing of the unit.
- 2) Service clearance for a chiller differs for the model. Secure sufficient space to provide service to the chiller.
Refer to 3-3.
- 3) When installing multiple chillers in the same site, secure appropriate service space.
- 4) The following base dimensions are based on the standard model. Prepare concrete foundation base to fit the model to install after checking the drawing approved.

6-1-1. Base dimension (Standard model) of single stage Centrifugal Chiller RCWF***P Series

Table 15. Base dimension (standard)

(Unit : mm)

Model (12°C → 7°C)	Model (10°C → 5°C)	A	B	C
RCWF025P ~ RCWF040P	RCWF025P ~ RCWF040P	4,100	1,800	420
RCWF050P ~ RCWF060P	RCWF050P ~ RCWF060P	4,100	2,100	420
RCWF065P ~ RCWF085P	RCWF065P ~ RCWF085P </td <td>4,100</td> <td>2,400</td> <td>450</td>	4,100	2,400	450
RCWF090P ~ RCWF130P	RCWF090P ~ RCWF130P	4,100	2,700	450
RCWF140P ~ RCWF200P	RCWF140P ~ RCWF200P	5,000	3,400	620

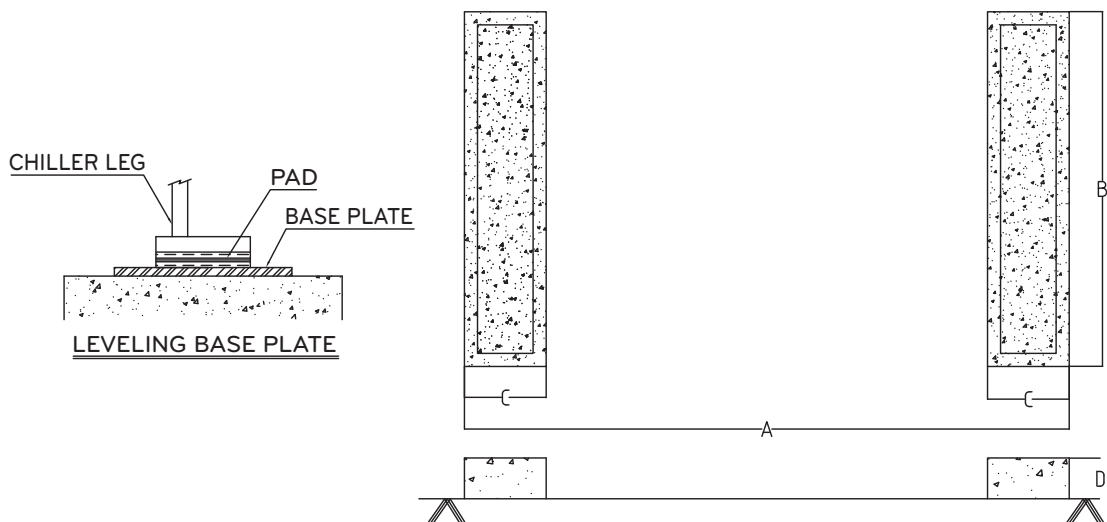


Figure 18. Base dimension (Standard model)

6-1-2. Base dimension (Standard model) of two stage Centrifugal Chiller RCWFH Series

Table 16. Base dimension (Standard)

(Unit : mm)

Model	A	B	C	D
RCWFHA1AAAA	3,500	1,700	420	100
RCWFHB3BCBC	3,500	2,000	420	100
RCWFHC1BDBD	3,500	2,000	420	100
RCWFHC3CBCB	3,500	2,400	420	100
RCWFHD1CFCF	4,100	2,700	420	100
RCWFHD3DBDB	4,100	2,700	420	100
RCWFHE1DHDH	4,100	2,700	420	100
RCWFHE3EBEB	4,500	3,400	450	100
RCWFHF3GBEK	5,500	3,400	480	100
RCWFHG3FCFC	5,900	3,400 </td <td>480</td> <td>100</td>	480	100

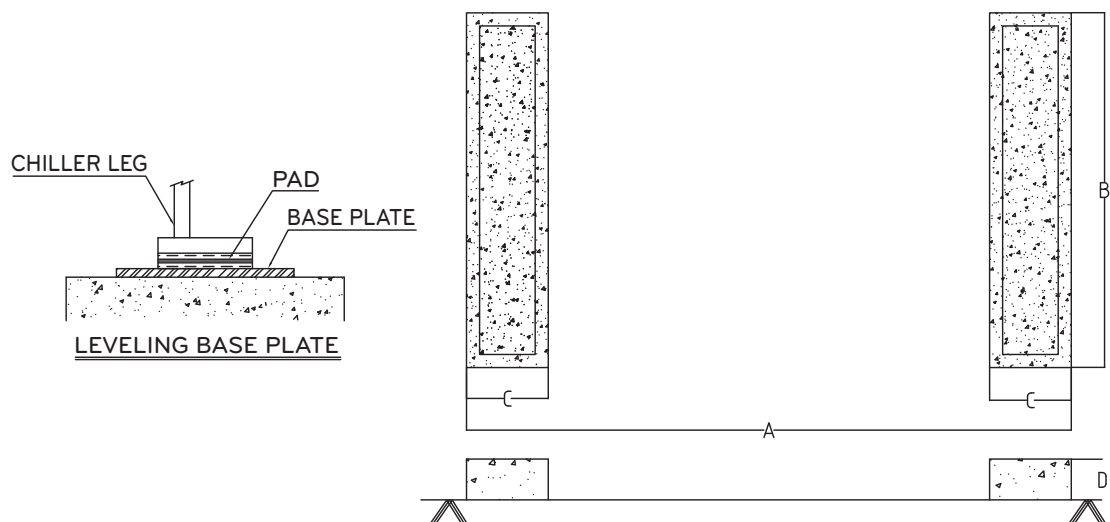


Figure 19. Base dimension (Standard model)

6-1-3. Base dimension (Standard model) of of two-stage Centrifugal Chiller RCWFM Series

Table 17. Basic Size (standard)

(Unit : mm)

Base Module Code	A	B	C	D
A	3,500	1,200	420	100
B	3,500	1,200	420	100
D	3,500	1,200	420	100
E	3,500	1,200	420	100
F	3,500	1,200	420	100
G	3,500	1,700	420	100
H	3,500	1,700	420	100
J	3,500	1,700	420	100
K	3,500	1,700	420	100
N	None			

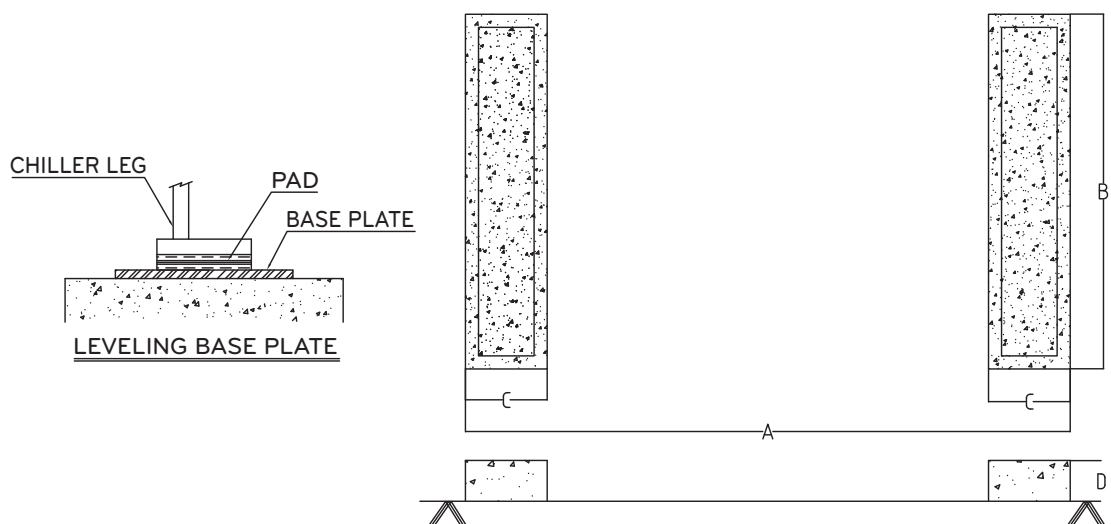


Figure 20. Basic Size (Standard Model)

! WARNING

- Make sure to install the Centrifugal Chiller in a place with strength to bear the product weight. Not enough strength may cause the Centrifugal Chiller to drop and also damage of the product and human life.
- Install the product in a way to protect from an earthquake. Defect in installation may cause the Centrifugal Chiller to drop and cause injury. Be cautious about support strength of a floor surface, drainage treatment (drain trench construction, treatment of water from the Centrifugal Chiller while operating), piping and wiring especially when making the foundation plane.

6-2. Unit Leveling

To make sure the refrigerant is leveled and to ensure the reliability and stability of the Centrifugal Chiller during operation, always make sure to level the product during the installation. (Keep within 0.5mm deviation for 1m). When leveling the product, consider all directions including front/back/left/right, length and width direction.

** How to ensure the product is leveled

- 1) Use the level
 - : For the length direction, use the level in the shell length direction or compressor base surface to level the product. For the width direction, use the base surface of the Centrifugal Chiller to level the product.
- 2) Use the water head difference (Use transparent vinyl hose)
 - : Use transparent vinyl hose and mark at the same location from the base on the pipe plate from both sides in the length direction of the product and fixate the vinyl hose. Add water and level the product by aligning the water levels. Width direction can be done in the same way.

6-3. Unit Isolation

To minimize the transfer of noise and vibration through the building structure, install isolation pad or spring isolator (option) under the base surface of the product.

6-3-1. The installation work of Standard Isolation(isolation pad) and Anchor Bolts

- 1) Please install the basic anti-vibration devices to the base of the product in accordance with the working order of isolation pads and the Set Anchor bolts as the figure 21. below.
- 2) If other Anchor application is necessary besides the Set Anchor bolt please contact LG Electronics.

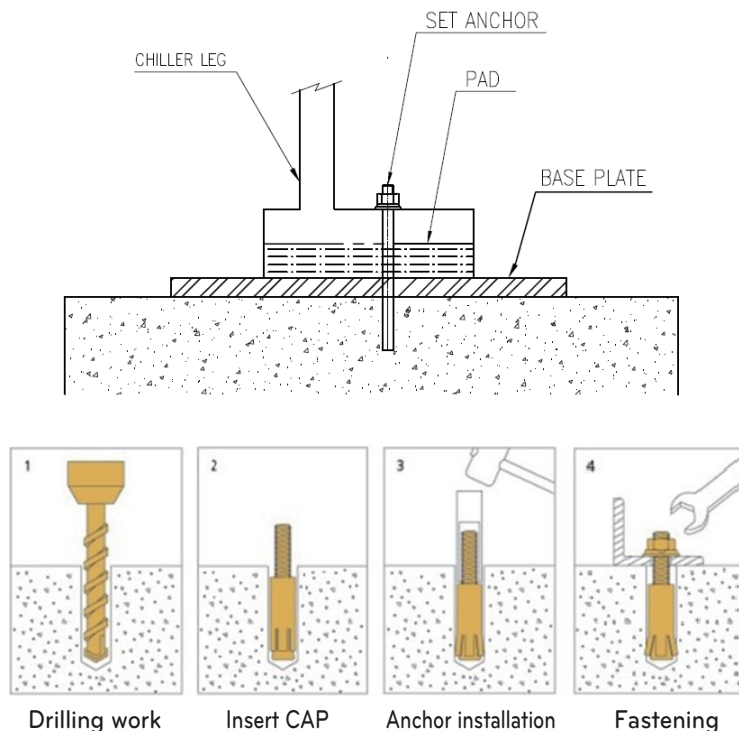


Figure 21. The installation work of isolation pads and Anchor Bolts

- 3) Options (installation of isolation springs)
 - When installing the isolation springs as an option, please contact LG Electronics about the specifications and installation instructions of isolation springs.



CAUTION

Adjustment of the spring isolator should be done after the pipe is filled up with refrigerant and water.

6-4. Cautions for the unit charged with refrigerant

For the machine delivered with the refrigerant charged, be especially careful for the following details and follow the precautions below for the any refrigerant leakage accident while carrying, during and after installation.

LG Electronics is not responsible for any problems that occur from not following the precautions.

6-4-1. Things to check before moving and installation

- 1) Check whether the machine room where the Centrifugal Chiller is installed has a ventilation system. Place without a ventilation system when the refrigerant leaks has the danger of suffocation.

6-4-2. Cautions during moving and installation

- 1) Transport the Centrifugal Chiller after it is sufficiently balanced. Any impact to the Centrifugal Chiller or tilting the Centrifugal Chiller may cause the refrigerant to leak and damage the Centrifugal Chiller. Therefore a special care is required.
- 2) When lifting the Centrifugal Chiller, be careful so that the wire does not get hooked on the valve, pipe, etc. of the Centrifugal Chiller.
- 3) When lifting up or lowering the Centrifugal Chiller, be careful so that pipe or valve do not hit any column or obstacle.
- 4) Receipt weight includes the weight of the charged refrigerant and oil on top of the weight of the Centrifugal Chiller. Always take into consideration the extra weight.

6-4-3. Cautions after installation

- 1) When connecting the water pipe, connecting safety valve discharge pipe and thermal insulation, be careful not to damage the valve and pipe of the Centrifugal Chiller.
- 2) After the water pipe construction, be careful not to let hot water pass to the chiller.
- 3) For long term storage, please consult with the service agent.
- 4) Always operate the ventilation system. If the refrigerant leaks, it may cause shortage of oxygen.

6-4-4. Actions for refrigerant leakage

- 1) If the leaking part is clearly identified and can be handled without any risk, close the joints and valves before resolving the leakage.
- 2) If the leakage does not stop from the Centrifugal Chiller and the Centrifugal Chiller can be moved, move to open danger free location discharge the refrigerant. If it is impossible to move the Centrifugal Chiller, open the machine and adequately ventilate the room.
- 3) If the amount of the leakage is big, evacuate the area and limit the access to the area by putting ropes around the leaked location. Always wear the oxygen breathing apparatus.
- 4) If the refrigerant got in the eye, wash the eye immediately with clean flowing water for more than 15 minutes and then promptly consult the doctor.
- 5) If the refrigerant contacts the skin, take off any wet clothes, shoes, and socks to avoid any chance of frostbite. After taking emergency measures, promptly consult the doctor.
- 6) When highly dense gas is inhaled, immediately move to area with fresh air and cover with blanket and take emergency measures. And then promptly consult the doctor.

7. PIPING

7-1. Considerations on connecting water pipes

Install the water pipes to the chiller unit considering the following details.
Water piping is not included in the scope of LG's standard installation work.
When installing the chiller, check whether the considerations are appropriately applied.c

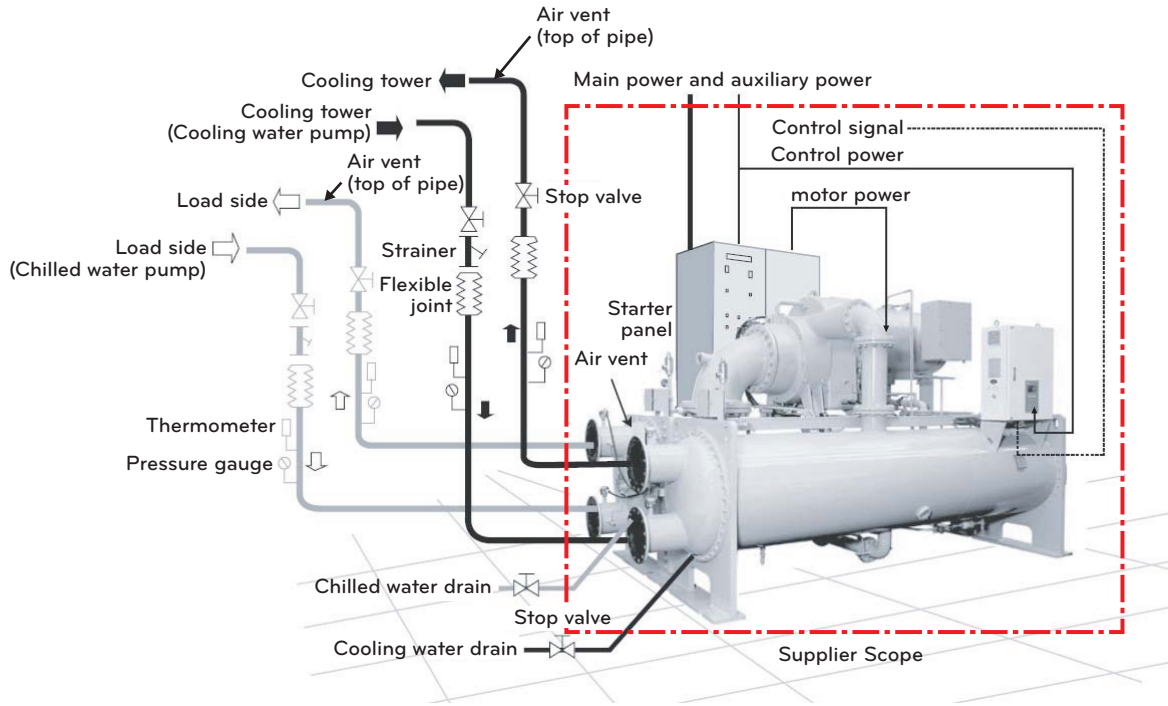


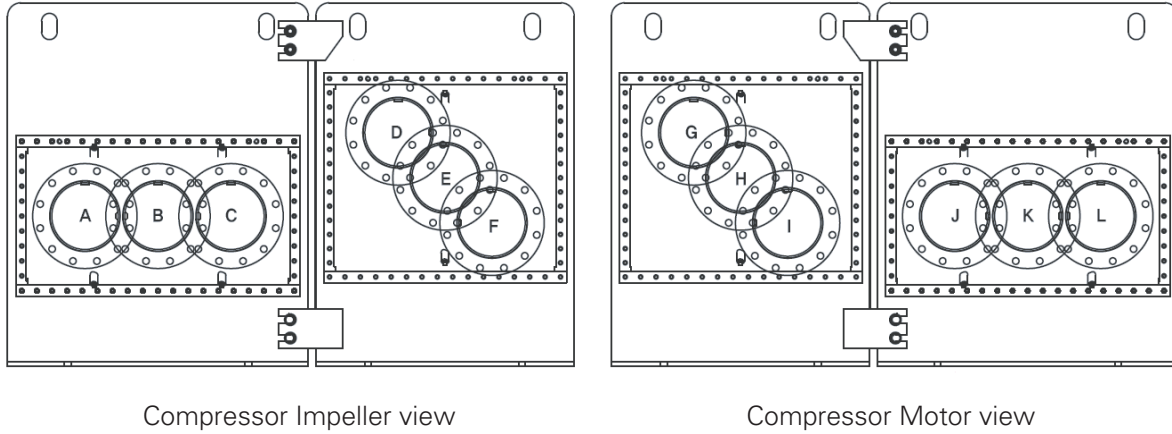
Figure 22. Piping system connected to the chiller (User installation scope)

- 1) Based on the exterior diagram (Installation drawing), install the inlet/outlet piping of the chilled water/cooling water. Always check the direction of the inlet/outlet, the specification of connecting flanges and the pressure applied.
- 2) Separate support should be installed aside from that of the chiller so that the load and the vibration of the pipes of the chilled water and cooling water are not transferred to the evaporator and condenser. Also provide ample space for repair.
- 3) Install a strainer of 10 mesh or higher on the front side of the inlet pipe of the chilled water and cooling water, so that the heat transfer tube of the heat exchanger not to be blocked by sludge which cause pipe damage (Freezing or damage).
- 4) Provide a device on the outlets of the chiller to control the flow amount of the chilled water and cooling water.
- 5) Provide a device to prevent pressure hunting which may cause a malfunction to the flow switch of the chilled water and cooling water.
- 6) The water box cover should be easy to open to clean the heat transfer tubes of the heat exchanger. Install the pipe connectors so as to be separated easily without interfering with other pipes when extracting heat transfer tubes.
- 7) Please avoid using a pump with 3,600 rpm for chilled water and cooling water, since it is the rpm of the chiller motor which can possibly result in resonance.
If unavoidable, install a vibration isolation device.
- 8) Install an accurate thermometer and pressure gauge on the pipe to check and maintain the status of the chilled water and cooling water to the chiller.
- 9) Install an air vent valve, drain valve and pipe in the chilled water and cooling water box.
Also install an automatic air vent valve on the pipe.
- 10) Use of inappropriate water can cause sediments, corrosion and scaling which damaging the chiller. Therefore, check and manage the water quality as the standard of Table 22.
LG Electronics is not responsible for any results from the use of water outside of the guaranteed quality.
- 11) Install the discharge pipe for the relief valve in accordance with the high pressure gas management safety management law.

7-2. Chilled water/Cooling water pipe locations and size

Refer to below Figure for information related to the water box when designing the piping and planning for the water supply. This shows the Nozzle In Head type for the standard product. For the non-standard specification such as Marine Type, please consult LG Electronics.

7-2-1. Single stage Centrifugal Chiller RCWF***P Series



Number of pass		Evaporator	
		Inlet	Outlet
1	Comp. End	B	K
	Motor End	K	B
2	Comp. End	A	C
	Motor End	L	J
3	Comp. End	A	J
	Motor End	L	C

Number of pass		Evaporator	
		Inlet	Outlet
1	Comp. End	E	H
	Motor End	H	E
2	Comp. End	F	D
	Motor End	I	G
3	Comp. End	F	G
	Motor End	I	D

Figure 23. Location of the standard water pipe

(Unit:mm)

Model (A)	Chilled water		Cooling water		Model (A)	Chilled water		Cooling water	
	Pass	Flange Size	Pass	Flange Size		Pass	Flange Size	Pass	Flange Size
RCWF025P	2	150	2	150	RCWF090P	2	300	2	350
RCWF030P	2	200	2	200	RCWF100P	2	300	2	350
RCWF035P	2	200	2	200	RCWF110P	2	300	2	350
RCWF040P	2	200	2	200	RCWF120P	2	300	2	350
RCWF050P	2	200	2	200	RCWF130P	2	300	2	350
RCWF055P	2	200	2	200	RCWF140P	2	350	2	400
RCWF060P	2	200	2	200	RCWF150P	2	350	2	400
RCWF065P	2	250	2	250	RCWF160P	2	350	2	400
RCWF070P	2	250	2	250	RCWF170P	2	400	2	400
RCWF075P	2	250	2	250	RCWF180P	2	400	2	400
RCWF080P	2	250	2	250	RCWF190P	2	400	2	400
RCWF085P	2	250	2	250	RCWF200P	2	400	2	400

Table 18. Water box Nozzle Size

7-2-2. Two stage Centrifugal Chiller RCWFH Series

Nozzle Table (Evaporator)

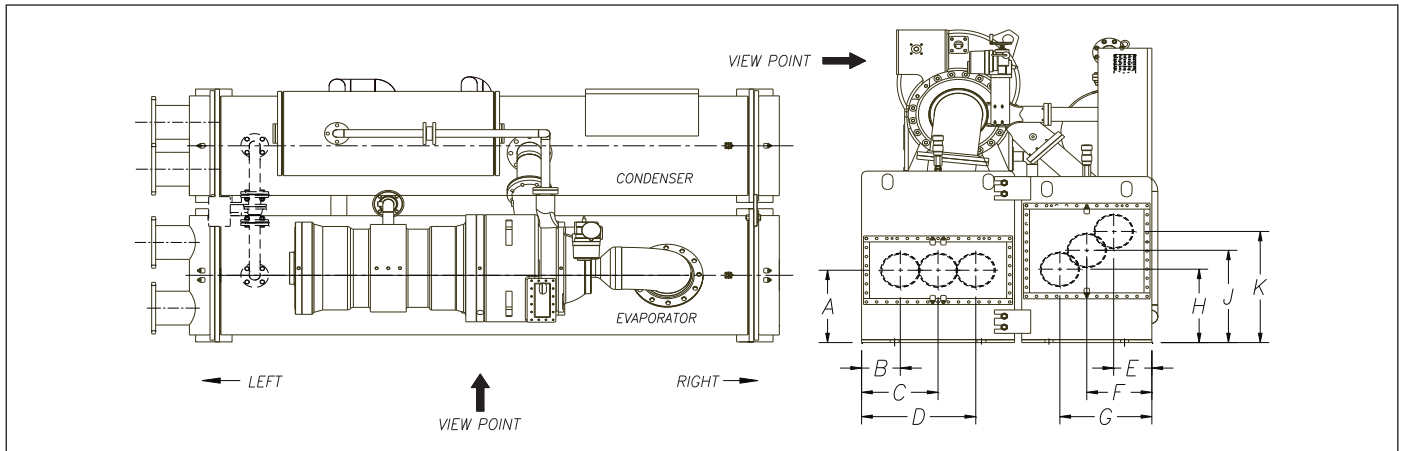


Figure 24. Location of the standard water pipe

(Unit:mm)

COM-PRES-SOR CODE	HEAT EX-CHANG ER CODE	Flange Size			1 Pass		2 Pass			3 Pass		
		1 Pass	2 Pass	3 Pass	C	A	B	D	A	B	D	A
					LEFT & RIGHT	HEIGHT	NOZZLE INLET	NOZZLE OUTLET	HEIGHT	NOZZLE INLET	NOZZLE OUTLET	HEIGHT
A	A	250	150	150	426	463	216	636	463	216	636	463
	B	250	150	150	505	481	215	675	481	215	675	481
	C	250	200	150	505	481	215	675	481	215	675	481
B	A	300	200	150	426	463	216	636	463	216	636	463
	B	300	200	150	505	481	215	675	481	215	675	481
	C	300	200	200	505	481	215	675	481	215	675	481
C	B	350	200	200	505	481	215	675	481	215	675	481
	C	350	200	200	505	481	215	675	481	215	675	481
	D	350	250	200	571	538	230	770	538	230	770	538
D	C	400	250	200	505	481	215	675	481	215	675	481
	D	400	300	250	571	538	230	770	538	230	770	538
	E	400	300	250	576	574	296	856	574	296	856	574
E	D	400	300	250	571	538	230	770	538	230	770	538
	E	450	300	250	576	574	296	856	574	296	856	574
	F	500	350	300	642	649	342	942	649	342	942	649
	G	500	350	300	642	649	342	942	649	342	942	649
F	E	550	400	350	576	574	296	856	574	296	856	574
	F	600	400	350	642	649	342	942	649	342	942	649
	G	450	350	300	642	649	342	942	649	342	942	649
	H	450	350	300	742	709	409	1075	709	409	1075	709
J	J	600	450	350	842	696	442	1242	696	442	1242	696
	K	450	400	350	772	1225	-	-	-	-	-	-

Table 19. Water box Nozzle Size

Nozzle Table (Condenser)

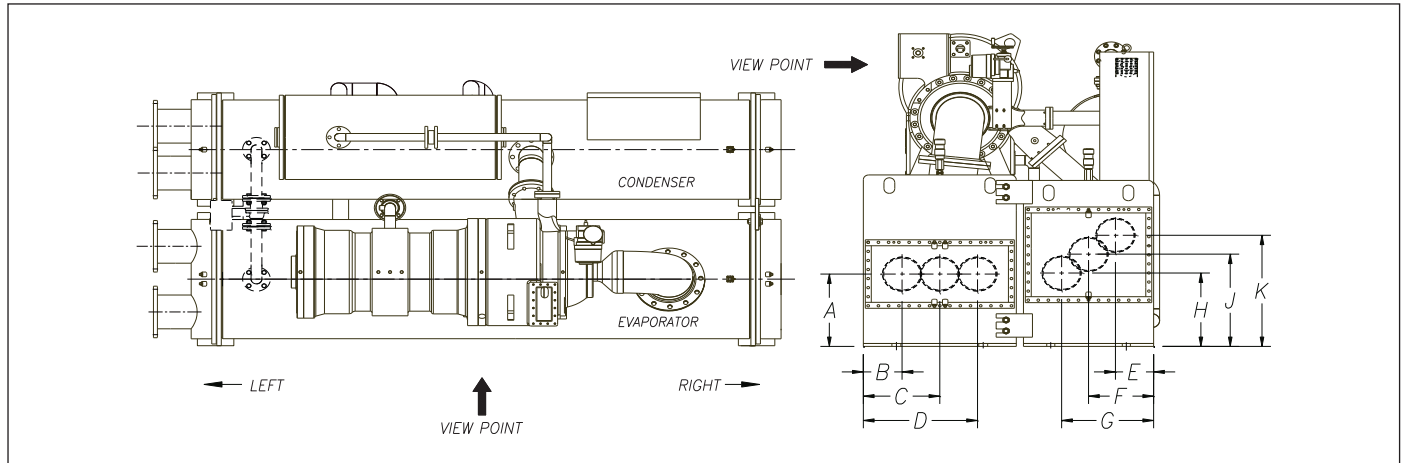


Figure 25. Location of the standard water pipe

(Unit:mm)

COM- PRES- SOR CODE	HEAT EX- CHAN- GER CODE	Flange Size			1 Pass		2 Pass				3 Pass			
		1 Pass	2 Pass	3 Pass	F	J	E	G	K	H	E	G	K	H
					LEFT & RIGHT	HEIGHT	NOZZLE INLET	NOZZLE OUTLET	INLET HEIGHT	OUTLET HEIGHT	NOZZLE INLET	NOZZLE OUTLET	INLET HEIGHT	OUTLET HEIGHT
A	A	250	150	150	363	587	213	513	463	711	213	513	463	711
	B	250	150	150	417	679	252	582	559	799	252	582	559	799
	C	250	200	150	417	679	252	582	559	799	252	582	559	799
B	A	300	200	150	363	587	213	513	463	711	213	513	463	711
	B	300	200	150	417	679	252	582	559	799	252	582	559	799
	C	350	200	200	417	679	252	582	559	799	252	582	559	799
C	B	350	200	200	417	679	252	582	559	799	252	582	559	799
	C	350	200	200	417	679	252	582	559	799	252	582	559	799
	D	400	250	200	444	641	264	624	486	796	264	624	486	796
D	C	400	250	200	417	679	252	582	559	799	252	582	559	799
	D	400	300	250	444	641	264	624	486	796	264	624	486	796
	E	450	350	250	495	720	315	675	548	892	315	675	548	892
E	D	450	350	250	444	641	264	624	486	796	264	624	486	796
	E	500	350	300	495	720	315	675	548	892	315	675	548	892
	F	550	400	350	540.5	770	313	768	576	964	313	768	576	964
F	G	550	400	350	568.5	770	341	796	576	964	341	796	576	964
	E	600	400	350	495	720	315	675	548	892	315	675	548	892
	F	650	450	400	540.5	770	313	768	576	964	313	768	576	964
G	G	500	400	350	568.5	770	341	796	576	964	341	796	576	964
	H	500	400	300	642	897	352	932	677	1117	352	932	677	1117
	J	650	450	350	642	908	352	932	688	1128	352	932	688	1128
G	K	500	450	400	712	1225	-	-	-	-	-	-	-	-

Table 20. Water box Nozzle Size

7-2-3. Two-stage Centrifugal Chiller RCWFM Series

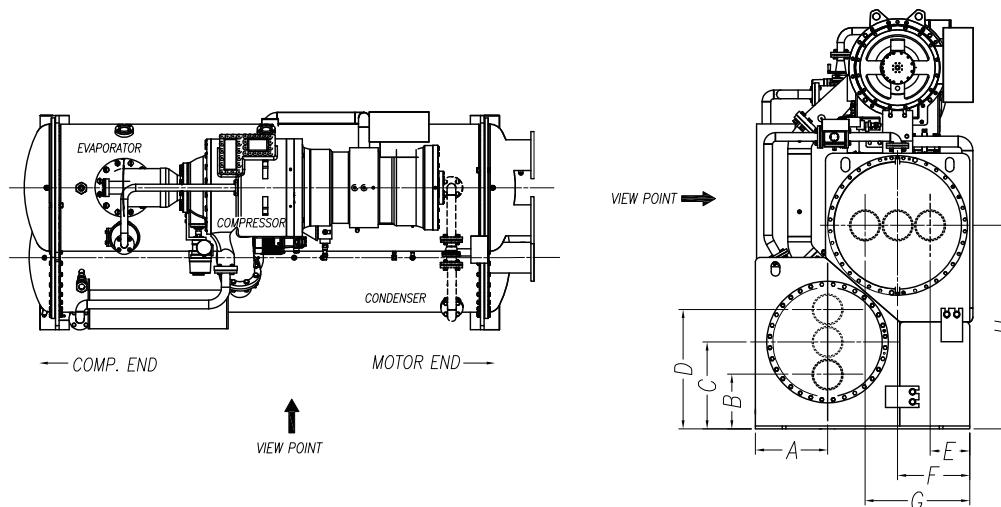


Figure 26. Standard Water Piping Location

Nozzle Table (Evaporator)

(Unit:mm)

COMPRES- SOR CODE	1 Pass		2 Pass			3 Pass		
	F	H	E	G	H	E	G	H
	LEFT & RIGHT	HEIGHT	NOZZLE INLET	NOZZLE OUTLET	HEIGHT	NOZZLE INLET	NOZZLE OUTLET	HEIGHT
A ~ F	450	1,513	260	640	1,513	260	640	1,513
G ~ K	505	1,424	277	733	1,436	277	733	1,424

Nozzle Table (Condenser)

(Unit:mm)

COMPRES- SOR CODE	1 Pass		2 Pass			3 Pass		
	A	C	A	B	D	A	B	D
	LEFT & RIGHT	HEIGHT	NOZZLE INLET	NOZZLE OUTLET	HEIGHT	NOZZLE INLET	NOZZLE OUTLET	HEIGHT
A ~ F	413	560	413	370	750	413	370	750
G ~ K	505	607	505	390	846	505	390	846

Table 21. Waterbox Nozzle Size

7-3. Bolt-Tightening Sequence for Water Piping Connection

The order of bolt tightening on a flange using a flat gasket or O-ring is by a diagonal line and then moves 90° along a diagonal line again as shown in the following figure.

If the flange connector is not tightened appropriately, it can cause refrigerant and water leakage.

1) Pipe flange bolt assembly

: Refer to Figure 27. Tighten the bolts in the order of flange assembly at the appropriate torque.
Apply final force to fit the bolt and repeat for the others.

2) Water box flange bolt assembly

: Refer to Figure 27. First tighten the 12 bolts in the set order at the appropriate torque.
Then, tighten the next 12 bolts in order for the final torque.
And then apply final torque to the first 12 bolts and the other bolts that have not yet been tightened.
Start from bolt number "1" and rotate clockwise around the flange and tighten in order.

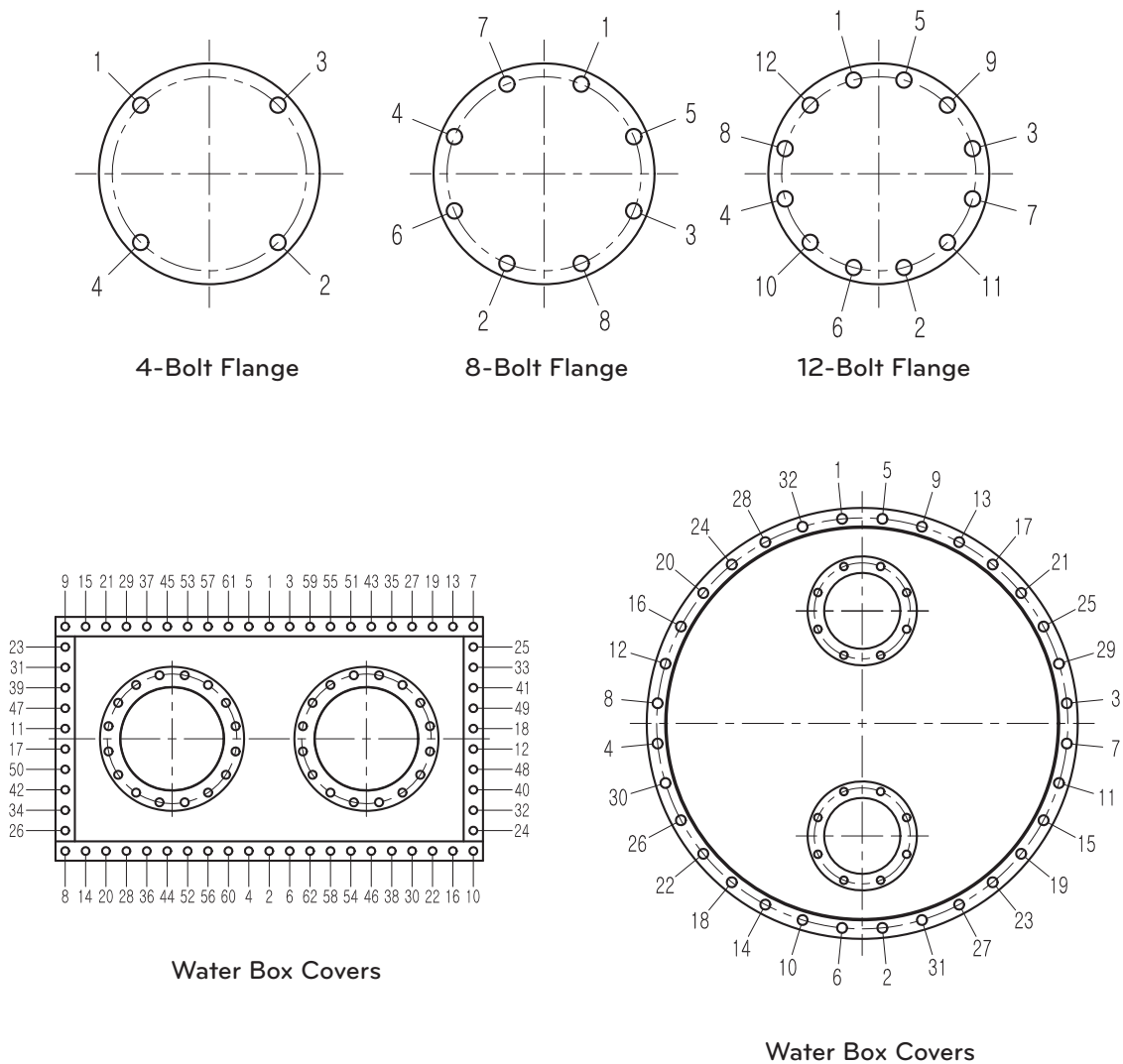


Figure 27. Flange bolt assembly sequence

7-4. Installing relief value and refrigerant vent line

The relief valve is a device to prevent the product from being damaged by increased pressure from abnormal temperature (fire, etc.) within the machine room, and if the pressure inside the Centrifugal Chiller rises, it discharges the refrigerant gas outdoors. Install the refrigerant gas discharge pipe from the relief valve discharge outlet to outdoors.

7-4-1. Installation based on High Pressure Gas Safety Control Act (varies by region/country law)

- 1) When installing the Centrifugal Chiller, the safety valve installed on each Centrifugal Chiller must be guided to discharge the gas outdoor based on the regulation provided in "Freezer Manufacturing Facility Standard and Technical Standard" pertain to Article 8 of High Pressure Gas Safety Control Code Ordinance as shown in Figure 28.
- 2) R-134a refrigerant applied in this product is non-flammable and non-toxic Freon gas, and discharge pipe of the relief valve should be installed at a safe location on outdoor side of the building based on the "Freezer Manufacturing Facility Standard and Technical Standard".

7-4-2. Cautions in connection the refrigerant vent line

- 1) When connecting the discharge pipe to the relief valve, do not apply excessive force so that the force is not transferred to the connecting part of the relief valve. Fixate the screws of the relief valve side using tools and tighten the screws on the other side. Otherwise, it may cause problems to the Centrifugal Chiller due to leakage of refrigerant.
- 2) When connecting the discharge pipe, use the flange or union as shown in Figure 28. so that it is easy to replace the relief valve and set up the connecting pipe in perpendicular way.

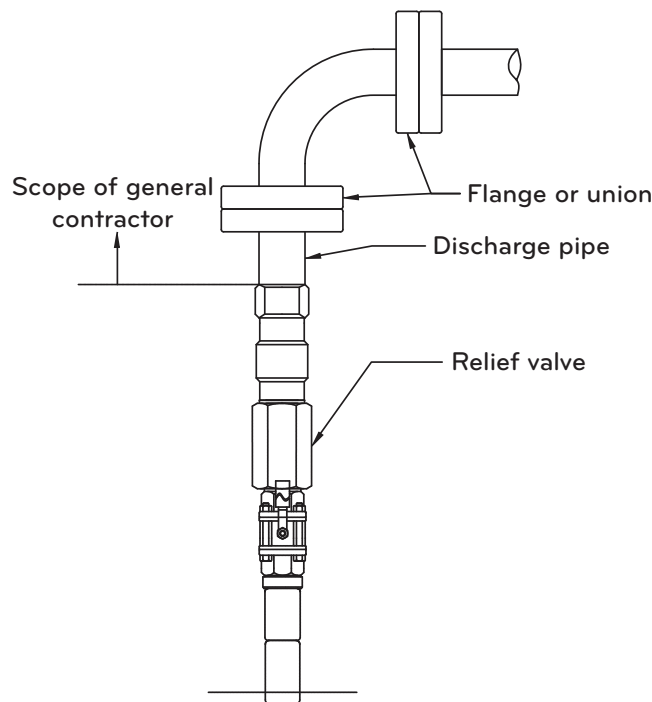


Figure 28. How to install the outdoor discharge pipe of the safety valve

7-5. Water treatment

- If the chilled water/cooling water is not managed well, not only is the performance of the heat exchanger is deteriorated from the scaling, the tube can be damaged from by rusting and pitting corrosion. Also water can get inside the Centrifugal Chiller to lead to major accidents such as rusting, insulation damage and deterioration, etc. which require high cost and long time for recovery.



CAUTION

Corrosion accidents are mostly affected by external factors and LG Electronics is not responsible for any issues caused by corrosion from the poor management of the water quality.

- Prevent any potential accident through adequate management. Scaling and corrosion have many causes and there is no single solution. Because this Centrifugal Chiller is designed with the water quality condition defined in the chilled water/cooling water quality management standard in the Korean Industrial Standard, always manage the water quality adequately to keep in this water quality standard. Refer to the operation and maintenance/management manual for details on how to manage the water quality.

	Item	Cooling water system			Chilled water system		Trend	
		Circulation type		Once through type	Circulating water (Below 20°C)	Supplied water	Corrosion	Scaling
		Circulating water	Supplied water	Once through water				
Standard item	pH(25°C)	6.5~8.2	6.0~8.0	6.8~8.0	6.8~8.0	6.8~8.0	○	○
	Electric conductivity (Ma/m)(25°C) (μS/cm) (25°C)	below 80 below 800	below 30 below 300	below 40 below 400	below 40 below 400	below 30 below 300	○	○
	Chloride ion (mgCl ⁻ /L)	below 200	below 50	below 50	below 50	below 50	○	
	Sulfuric ion (mgSO ₄ ²⁻ /L)	below 200	below 50	below 50	below 50	below 50	○	
	Acid consumption (pH4.8) (mgCaCO ₃ /L)	below 100	below 50	below 50	below 50	below 50		○
	Total hardness (mgCaCO ₃ /L)	below 200	below 70	below 70	below 70	below 70		○
	Calcium hardness (mgCaCO ₃ /L)	below 150	below 50	below 50	below 50	below 50		○
	Ion silica (mgSiO ₂ /L)	below 50	below 30	below 30	below 30	below 30		○
Reference item	Iron (mgFe/L)	below 1.0	below 0.3	below 1.0	below 1.0	below 0.3	○	
	Copper (mgCu/L)	below 0.3	below 0.1	below 1.0	below 1.0	below 0.1	○	○
	Sulfide ion (mgSO ₄ ²⁻ /L)	Not detected	Not detected	Not detected	Not detected	Not detected	○	
	Ammonium ion (mgNH ₄ ⁺ /L)	below 1.0	below 0.1	below 1.0	below 1.0	below 0.1	○	
	Residual chlorine (mgCl/L)	below 0.3	below 0.3	below 0.3	below 0.3	below 0.3	○	
	Free carbon dioxide (mgCO ₂ /L)	below 4.0	below 4.0	below 4.0	below 4.0	below 4.0	○	
	Stability index	5.0~7.0	—	—	—	—	○	○

Note)

- (1) Name and unit of the items are based on KS MD100.
- (2) O sign within the table refers to the factor related to the corrosion or scaling trend.
- (3) Unit and value within the parenthesis show data based on the previous unit, for reference.
- (4) If the temperature is high (40°C or above), generally the corrosion rate becomes high especially for steel that directly contacts water without any protective coating. It is recommended to have an effective plan for the water such as adding anti-corrosive additive or air removal process, etc.

Table 22. Water quality management standard for chilled water/cooling

8. THERMAL INSULATION

LG Electronics does not work thermal insulation the product when delivering the product. Perform thermal Insulate the product before commissioning after the leakage test on the site. Perform the thermal insulation work based on the standard thermal insulation guideline.

Cautions for thermal insulation work

- 1) Be careful not to cover the operating part (Vane driving device, valve, handle, etc.) with the thermal insulation material or touch the thermal insulation material.
- 2) Set up the insulation so that the thermal 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 of the heat exchanger tube. Also consider keeping the cover of the water box easy to be separated. (Also install the flange for the water pipe so that it is easy to be separated.)
- 3) For the part where the compressor and main pipe bolts are located, set up the thermal insulation so that it is easy to remove the thermal insulation material during overhaul or check.
- 4) Be careful not to block the liquid level gauge and window by the thermal insulation material.
- 5) When working thermal insulation, consider that the temperature sensor and others may have to be removed for replacement.
- 6) Please apply the insulation material that has thermal conductivity and quality with the equivalent or above the specifications below.

Items	Specifications	Items	Specifications
Material	NBR, Flame retardant rubber foam insulation	Density	40kg/m ³
Color	Black	Thermal conductivity	Below 0.035W/m.k
Thickness	19mm or above (In case of Ice thermal storage system, 30mm or above)	Application temperature	-200 °C~105 °C

- 7) Install the thermal insulation material firmly using adhesive and completely close the gap between thermal insulation material and the thermal insulating part so that air does not get into.
- 8) For thickness and specifications of the thermal insulation material, follow the construction drawing of thermal insulation approved by LG Electronics. The standard design condition is as follows.
 - Dry bulb temperature: 29.4°C (85°F)
 - Relative humidity : 75%
- 9) After the thermal insulation work, be careful not to expose to excessive sunlight or cause any damage while working. Deformed or damaged part causes dew condensation to form, and should be reworked.

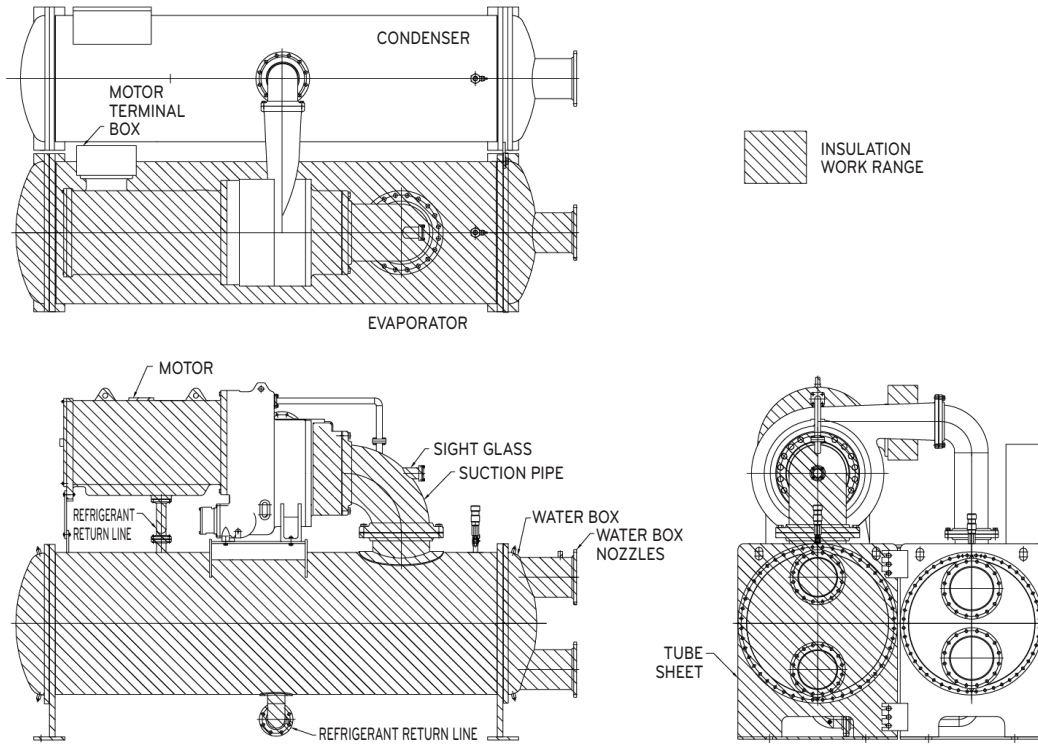


Figure 29. Locations requiring thermal insulation - Single stage Centrifugal Chiller RCWF***P Series

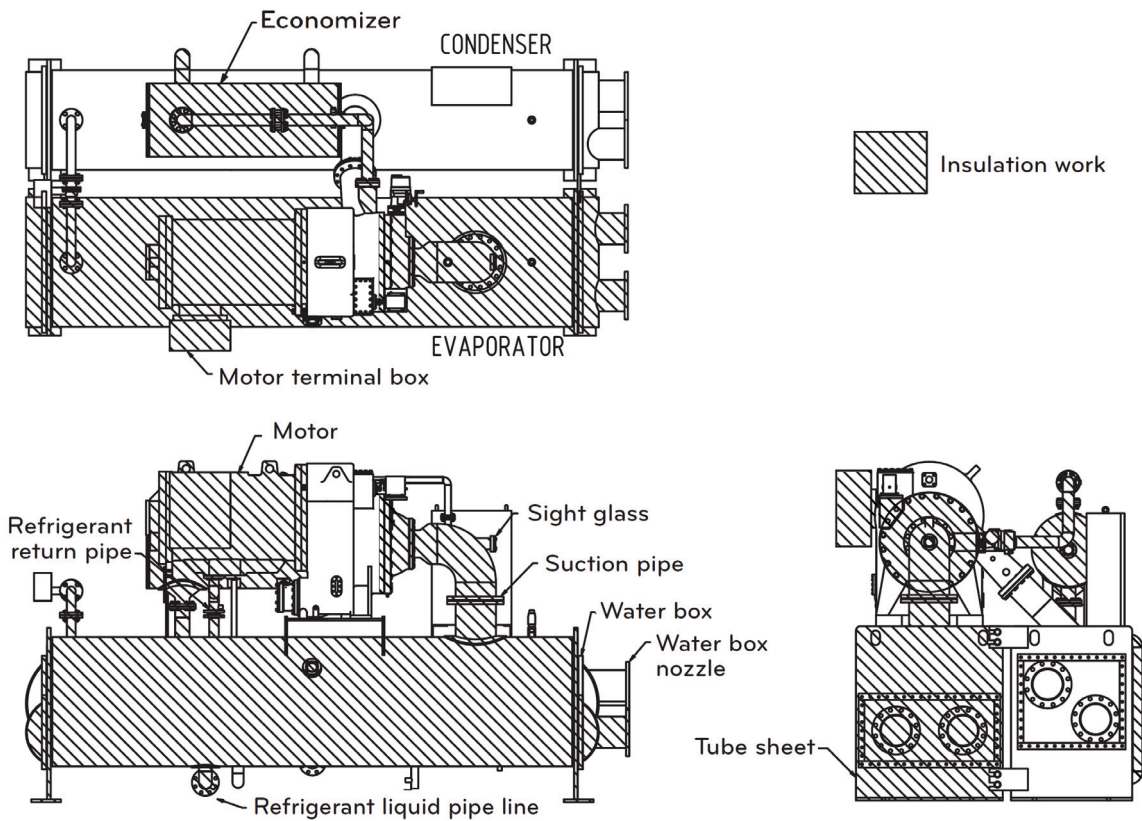


Figure 30. Locations requiring thermal insulation - Two stage Centrifugal Chiller RCWFH Series

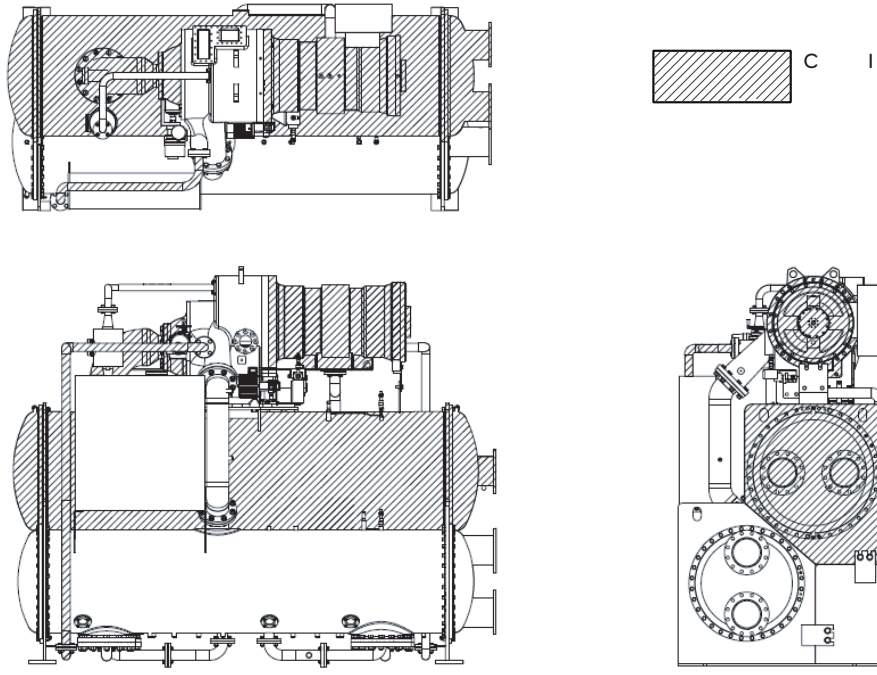


Figure 31. Locations requiring thermal insulation - Two-stage Centrifugal Chiller RCWFM Series

9. ELECTRIC WIRING

Cautions for electric installation



WARNING

- Provide specified grounding before connecting the power during the installation and remove the grounding wire last when removing the product.
Otherwise, it may cause electric shock and fire.
- For measurements, use appropriate measuring devices.
Otherwise, it may cause injury and electric shock.
- Remove any alien objects (Working tools, wires, bolts, washers) after installation, inspection or repair work.
They may cause injury, fire and damage.



CAUTION

- Only personnel familiar with operation and maintenance/management manual should operate the control panel and starter panel.
Otherwise, it may cause injury, fire, malfunction or damage.
- Do not weld around the cables connected to the main unit.
It may cause fire and damage.
- Do not keep objects such as nuts and bolts within the control panel and starter panel.
It may cause malfunction and damage.
- Use the cable that fits the rate.
Otherwise, it may cause fire and damage.
- Install the machine, control panel and starter panel in areas free of flammable substance.
It may cause a fire.
- Do not let the supply voltage exceed the range described in the manual or pertain material.
Otherwise, it may cause damage or malfunction.
- Connect the wires to be connected to the controller according to the circuit diagram.
Otherwise, it may cause damage or malfunction.
- Do not store the product in frequent flooding area or humid area.
It may cause damage or malfunction.
- Do not use the indoor control panel and starter panel outdoors.
It may cause fire, damage and malfunction.
- Tighten the bolts and screws at the regulated torque.
Otherwise, they may cause fire, damage or malfunction.
- Do not arbitrarily change the machine or controller.
It may cause fire, damage or malfunction.

Transportation (Starter panel)

- Caution for handling
 - Starter panel should not be tilted.
 - Be careful not to apply any impact to the contents of the starter panel as they are fragile.
 - Never let devices within the starter panel be wet by water and oil.
 - Always keep the starter panel indoors. (For indoor type)
 - Do not pile objects on top of the starter panel.
 - Do not let any moisture build up within the starter panel.
 - Keep in dry location.
- Keep in dry location.
 - Procedure for unloading. Firmly hang the wire rope.
 - Hang the wire rope within 60 degrees.
 - Adjust the Crane Hook at the center of the starter panel so that the starter panel can be lifted in horizontal level.
 - Slowly lift up the starter panel.
 - Use firm wire rope and normally twisted wire rope.
 - Also use wire rope that can sufficiently withstand the weight of the packaging. Always use 2 lifting hooks.
 - While unloading, never pile up or transport 2 or more starter panel, as it is very dangerous.
 - Be very careful when pushing or pulling the starter panel.
- Transportation by vehicle, etc.
 - 1) Loading method
 - Firmly fixate and stabilize the starter panel when loading on the vehicle so that it does not fall off while moving.
 - Do not pile up starter panel or any other object on top of the starter panel.
 - Use the rope to fixate the starter panel so that it does not move or vibrate.
 - Apply sufficient force to the rope and fixate the product so that it is not loosened from any impact or vibration while moving.
- Transportation using roller
 - Avoid transporting the product using roller if possible. If unavoidable, carefully move the starter panel using the roller without applying any impact.
- Transportation using forklift
 - To move the starter panel by forklift, lumber with height of 60mm or higher must should be prepared.
 - When using forklift, be careful of the following details.
 - Never move while piling layer on top of a layer.
 - Always balance the starter panel.
 - Move the forklift at the speed of less than 4km/hr (Speed of human walking).
 - If the size of the starter panel interferes with the driving of the forklift, use a different transportation method.
 - Set the length of the fork to be longer than the width (depth) of the starter panel.
 - Always use the forklift that fits the weight of the starter panel.

Storage (Starter panel)

- Storage location
 - Starter panel should be stored indoors where it is dry and dust free. If it should be stored outdoors, do not keep it outdoor for more than 2 weeks and keep the followings in mind.
 - Protect the product with cover or set up a roof to protect the product from rain or water.
 - Store the product where it is well drained and dry.
- Storage method
 - Check for any damage from transportation before storing the product.
 - Be careful not to lose the product and accessories for the installation.
 - Keep the starter panel at least 60~120mm height from the ground so that it does not touch the floor directly.
 - Do not pile up the starter panel.
 - When storing for a long period of time, put a separate protective cover to protect against changes in the surrounding environment.
 - Also supply the power and operate the space heater.
 - If it is stored near a vehicle path or work area, limit the access to the area.
 - When storing in a narrow closed warehouse, make sure it is well ventilated.
 - If the surrounding environment is abnormal (High temperature or humidity) while storing the product with the cover, make some holes for ventilation.

Check

Check whether the part or controller attached on the product is damaged through transportation and moving.
Check if the reserved part or separately packaged part is ok.

Environment condition

Check whether the installation condition and environment are the same as shown in the following Table 23.

Item	Specifications	Remarks
Motor power	380Vac, 440Vac, 3300Vac, 6600Vac, 11,000Vac	User option Possible to change according to user's power receiving equipment
Power frequency	50/60Hz	User option
Power constant	3Phase	User option
Control power	220/380/440Vac,3Ph	User option Hydroelectricity equipment → Power distribution system
Controller power	20Vac,1PH,50/60Hz	
Storage temperature	-10 °C ~ 60 °C	
Operation temperature	5 °C ~ 40 °C	
Operation humidity	25 °C, 20% ~80%RH, No condensa- tion	
Surrounding environment	No corrosive gas, flammable gas, oil residue or dust	
Altitude/Vibration	1000m above sea level 1000m or less 5.9m/sec ² (=0.6g) or less	
Controller contact point Output capacity	250Vac,3A or less load, 30Vdc, Can connect load of 1A or less	- Non-voltage "A" contact point output
Controller contact point Input capacity	Non-voltage contact point input	- Power is connected from controller (20Vdc, 10mA) - Do not connect power externally
Instant power outage compensation	Controller: 100mS or less	

Table 23. Centrifugal Chiller Installation Conditions and Environment

- Installation (Starter panel)
 - Installation location
Check the layout drawing for floor, column, wall and the starter panel.
 - Floor condition
Check the base drawing and create a skid to research the levelling of the installation surface to sand any uneven parts. Then, clean the installation surface.
 - Installation of starter panel
When installing the starter panel, be careful not to damage the chiller and all the projected parts including operating switch, display gauge, meter, etc.
After the installation, also make sure to clean the starter panel and check for any damaged parts.
 - Installation of base bolt
Completely tighten the prepared base bolts on the base bolt holes of the channel base.
Make sure to level the unit before tightening the base bolt.

- Electric connection
 - Connection of the main power cable and grounding cable
To connect the main power cable and the ground cable of the starter panel, refer to the circuit diagram and the interconnection wiring diagram.
The terminal required to connect the main power cable is attached on the front side of the circuit breaker or disconnecting switch. Use the bolts and nuts that fit to the holes on the terminal, and tighten them referring to Appendix 4 for the torque required for the connection.

- Connection of control power (Applies to when using high voltage 3300 V/6600 V)
 - Connect the control power to the input terminal of the terminal block or the input terminal of the transformer for control which is attached inside the panel.

- Other cautions

Have a qualified licensed technician by LG Electronics handle controllers and tools.

Do not carry the controller to the front side.

Shutdown all the power before connecting the power cable and control signal cables.

Be aware of the safety devices and their functions on this manual and keep the safety requirements.

Be aware of the operation method, features and setting values of the system.

Make sure not to leave any tools or parts on top or inside the control panel and the starter panel during the operation.

Maintain the control panel and starter panel clean always.

Do not open the protect cover of the control panel and the starter panel once power is on or system started.

Do not to touch a hot surface like a heater.

Do the periodic check on the signal connection parts, protective devices and structures.

Consult an expert for any suspicious part or problems.

Keep the panel doors closed for the controller and the starter during operation.

Alien particles inside the starter panel can cause short circuit. Therefore always keep the door of the starter panel closed and completely block the entrance, such as pit, using barrier unless required otherwise.

Inspect the wiring and check the operation of the related devices after repair or part change.

9-1. Installation precautions by options

9-1-1. Power factor compensation condenser

Power factor compensation condenser is devised to compensate the power factor for the compressor motor. (Optional)

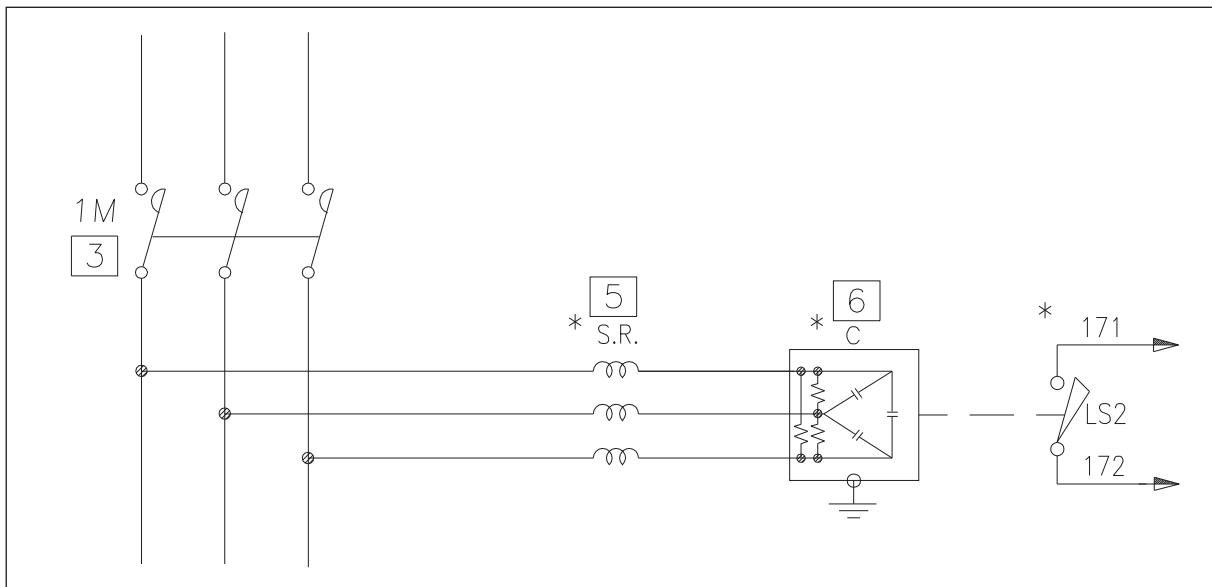
Reference : The voltage grade of condenser plate should be equal or higher than that of stamp compressor on the unit plate.

Appropriateness of the condenser to each compressor voltage request based on the motor capacity and power factor is decided and should be wired accurately to the starter.

If inappropriate, please be careful that the condenser can be incorrectly used and the overload protection function can be lost resulting in motor damage.



<Picture of condenser>

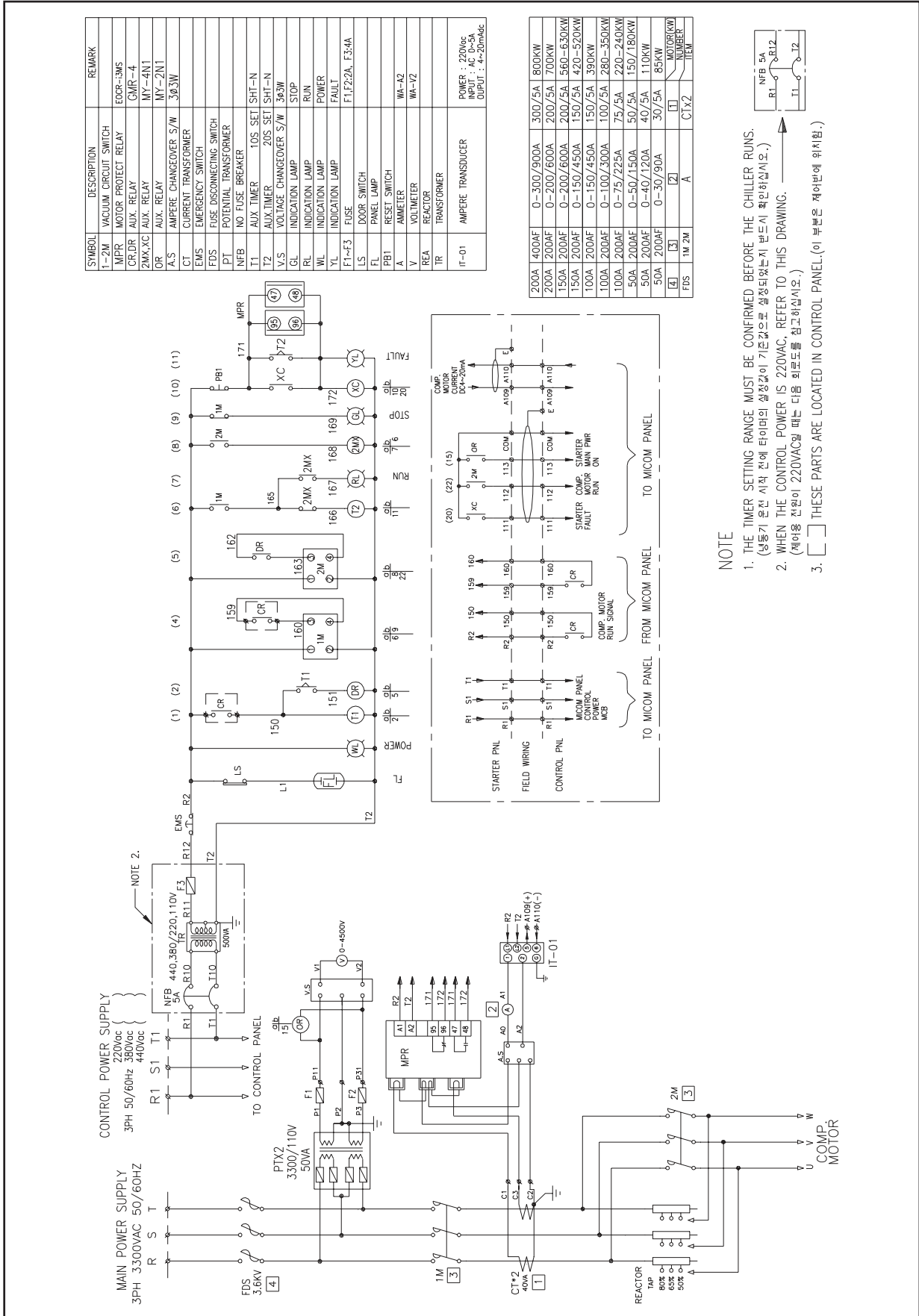


<Condenser circuit diagram>

9-2-1. Field wiring diagram for LG starter panel

9-2-1-1. Single stage Centrifugal Chiller RCWF***P Series, Two stage Centrifugal Chiller RCWFH Series

3300V reactor start

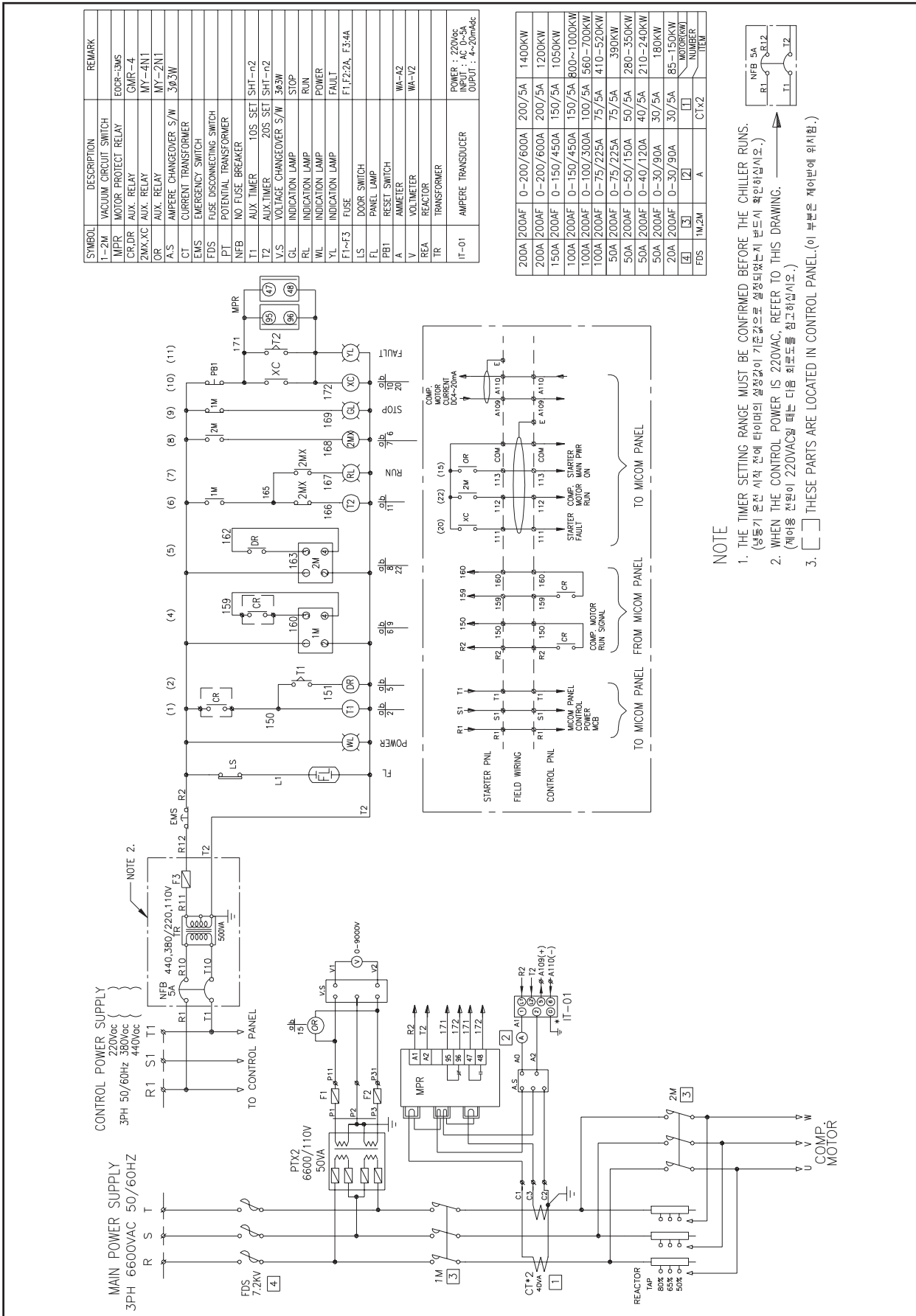


NOTE

1. THE TIMER SETTING RANGE MUST BE CONFIRMED BEFORE THE CHILLER RUNS.
(냉동기 운전 시작 전에 타이머의 설정값이 기온값으로 설정되었는지 반드시 확인하십시오.)
2. WHEN THE CONTROL POWER IS 220VAC, REFER TO THIS DRAWING.
(제어용 전원이 220VAC일 때는 다음 회로도들을 참고하십시오.)
3. [] THESE PARTS ARE LOCATED IN CONTROL PANEL.(이 부분은 제어반에 위치함.)

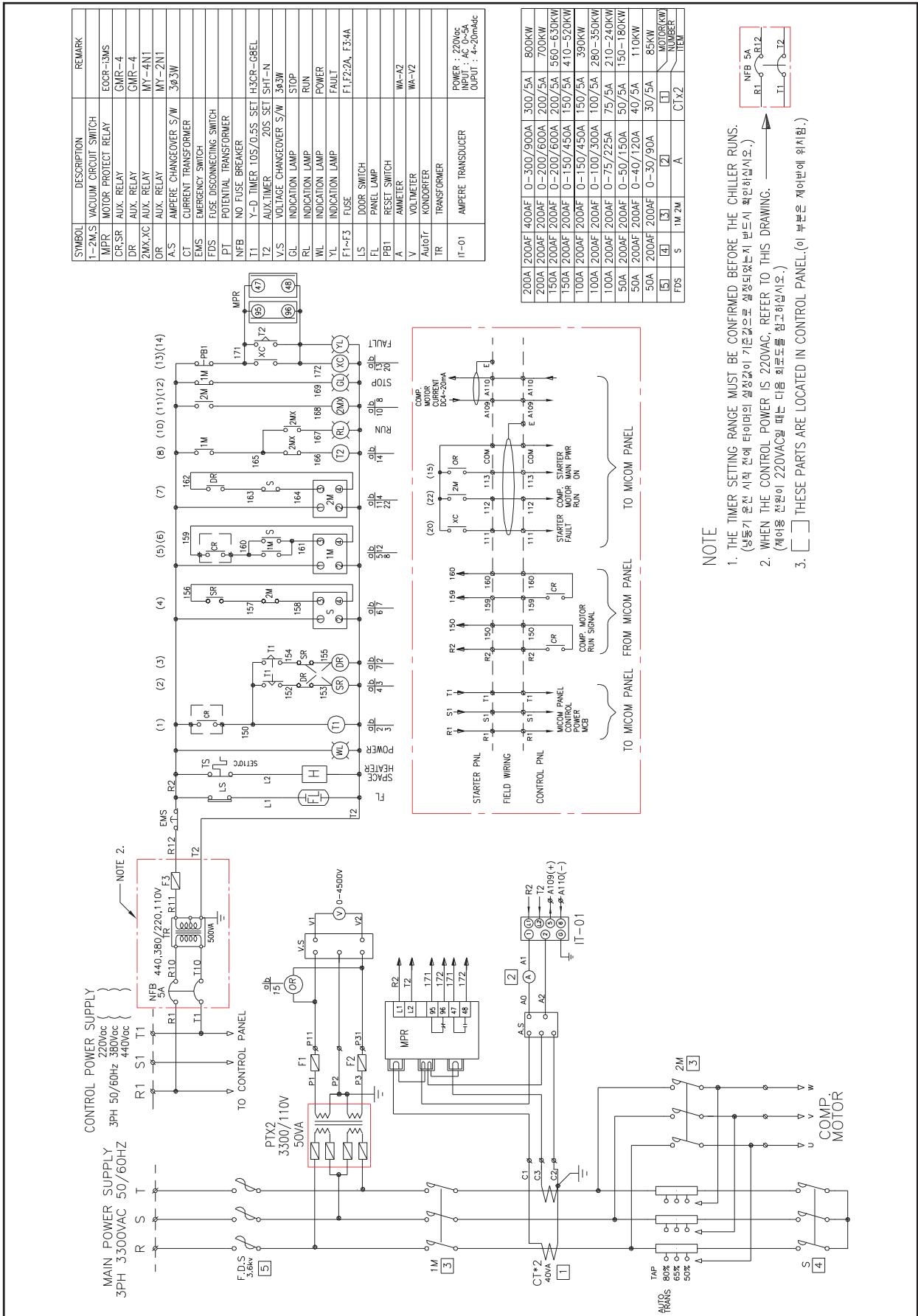
** Above drawing is for reference purpose only and can be changed for design improvement or based on the customer request. Therefore always refer to the approved drawing.

6600V reactor start



** Above drawing is for reference purpose only and can be changed for design improvement or based on the customer request. Therefore always refer to the approved drawing.

3300V Kondorfer starter

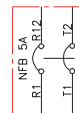


SYMBOL	DESCRIPTION	REMARK
T1~2M/S	VACUUM CIRCUIT SWITCH	
MPR	MOTOR PROTECT RELAY	EGCR-3MS
CR/SR	AUX. RELAY	GMR-4
DR	AUX. RELAY	GMR-4
2MX/XC	AUX. RELAY	MY-4N1
OR	AUX. RELAY	MY-2N1
A.S	AMPERE CHANGEOVER S/W	3Φ3W
CT	CURRENT TRANSFORMER	
EMS	EMERGENCY SWITCH	
FDS	FUSE DISCONNECTING SWITCH	
PT	POTENTIAL TRANSFORMER	
NFB	NO FUSE BREAKER	
T1	Y-D TIMER 10S/0.5S SET	H3CR-G8EL
T2	AUX.TIMER 20S SET	SHT-N
V.S	VOLTAGE CHANGEOVER S/W	3Φ3W
GL	INDICATION LAMP	STOP
WL	INDICATION LAMP	POWER
YL	INDICATION LAMP	FAULT
F1~F3	FUSE	F1:F22A F3:4A
LS	DOOR SWITCH	
FL	PANEL LAMP	
PB1	RESET SWITCH	WA-A2
A	AMMETER	WA-V2
AutoTr	KONDORFER	
TR	TRANSFORMER	
IT-01	AMPERE TRANSDUCER	POWER : 220VAC INPUT : AC 0-5A OUTPUT : 4-20mAdc

200A	2000AF	400AF	0-300/900A	300/5A	800KW
200A	200AF	200AF	0-200/600A	200/5A	700KW
150A	200AF	200AF	0-200/600A	200/5A	560-630KW
150A	200AF	200AF	0-150/450A	150/5A	410-520KW
100A	200AF	200AF	0-150/450A	150/5A	390KW
100A	200AF	200AF	0-100/300A	100/5A	280-350KW
100A	200AF	200AF	0-75/225A	75/5A	210-240KW
50A	200AF	200AF	0-50/150A	50/5A	150-180KW
50A	200AF	200AF	0-40/120A	40/5A	110KW
50A	200AF	200AF	0-30/90A	30/5A	85KW
[5]	[4]	[3]	[2]	[1]	MOTOR(KW) NUMBER
FDS	S	1M	2M	A	CTx2

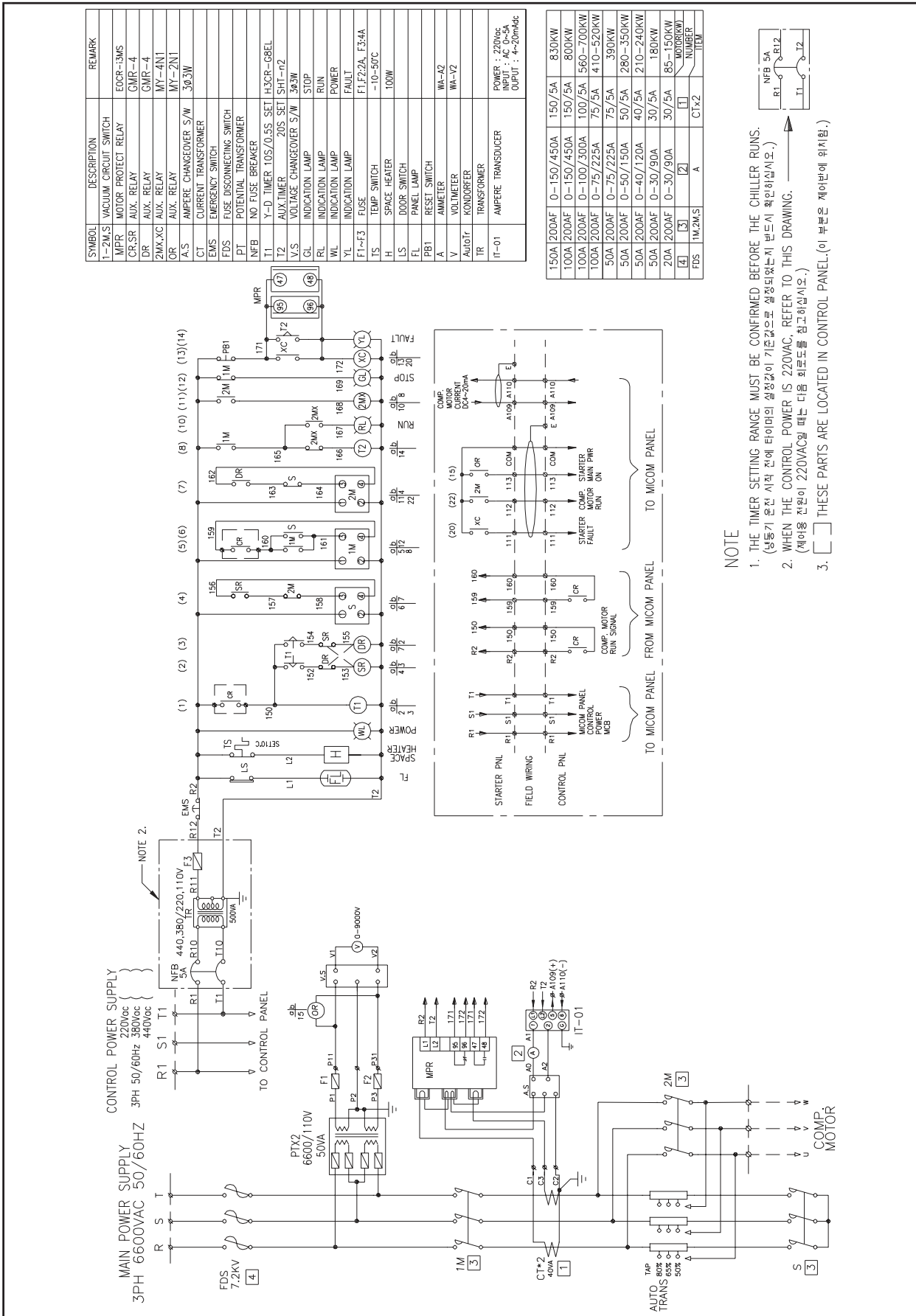
NOTE

1. THE TIMER SETTING RANGE MUST BE CONFIRMED BEFORE THE CHILLER RUNS.
(냉동기 운전 시작 전에 타이머의 설정값이 기온값으로 설정되었는지 반드시 확인하십시오.)
2. WHEN THE CONTROL POWER IS 220VAC, REFER TO THIS DRAWING.
(제어용 전원이 220VAC일 때는 다음 회로도들을 참고하십시오.)
3. [] THESE PARTS ARE LOCATED IN CONTROL PANEL.(이 부분은 제어반에 위치함.)



** Above drawing is for reference purpose only and can be changed for design improvement or based on the customer request. Therefore always refer to the approved drawing.

6600V Kondorfer start

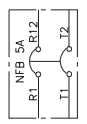


SYMBOL	DESCRIPTION	REMARK
1-2M.S	VACUUM CIRCUIT SWITCH	
MPR	MOTOR PROTECT RELAY	EOCR-3MS
CR.SR	AUX. RELAY	GMR-4
DR	AUX. RELAY	GMR-4
2MX.XC	AUX. RELAY	MY-4N1
CR	AUX. RELAY	MY-2N1
A.S	AMPERE CHANGEOVER S/W	363W
CT	CURRENT TRANSFORMER	
FMS	EMERGENCY SWITCH	
FDS	FUSE DISCONNECTING SWITCH	
PT	POTENTIAL TRANSFORMER	
NFB	NO FUSE BREAKER	
T1	Y-D TIMER 10S/0.5S SET	H3CR-GBEL
T2	AUX.TIMER 20S SET	SHT-n2
V.S	VOLTAGE CHANGEOVER S/W	363W
GL	INDICATION LAMP	STOP
RL	INDICATION LAMP	RUN
YL	INDICATION LAMP	POWER
XL	INDICATION LAMP	FAULT
F1~F3	FUSE	F1:F22A, F3:4A
TS	TEMP SWITCH	-10-50°C
H	SPACE HEATER	100W
LS	DOOR SWITCH	
FL	PANEL LAMP	
PB1	RESET SWITCH	WA-42
A	AMMETER	WA-V2
V	VOLTMETER	WA-V2
AUTO.TR	KONDORFER	
TR	TRANSFORMER	
IT-01	AMPERE TRANSDUCER	POWER : 220VAC INPUT : AC 0-5A OUTPUT : 4-20mADC

150A	200AF	0-150/450A	150/5A	830KW
100A	200AF	0-150/450A	150/5A	800KW
100A	200AF	0-100/300A	100/5A	560-700KW
100A	200AF	0-75/225A	75/5A	410-520KW
50A	200AF	0-75/225A	75/5A	390KW
50A	200AF	0-50/150A	50/5A	280-350KW
50A	200AF	0-40/120A	40/5A	210-240KW
50A	200AF	0-30/90A	30/5A	180KW
20A	200AF	0-30/90A	30/5A	85-150KW
4	3	2	1	KONDORFER NUMBER
FDS	1M,2M,S	A	CTx2	TYPE

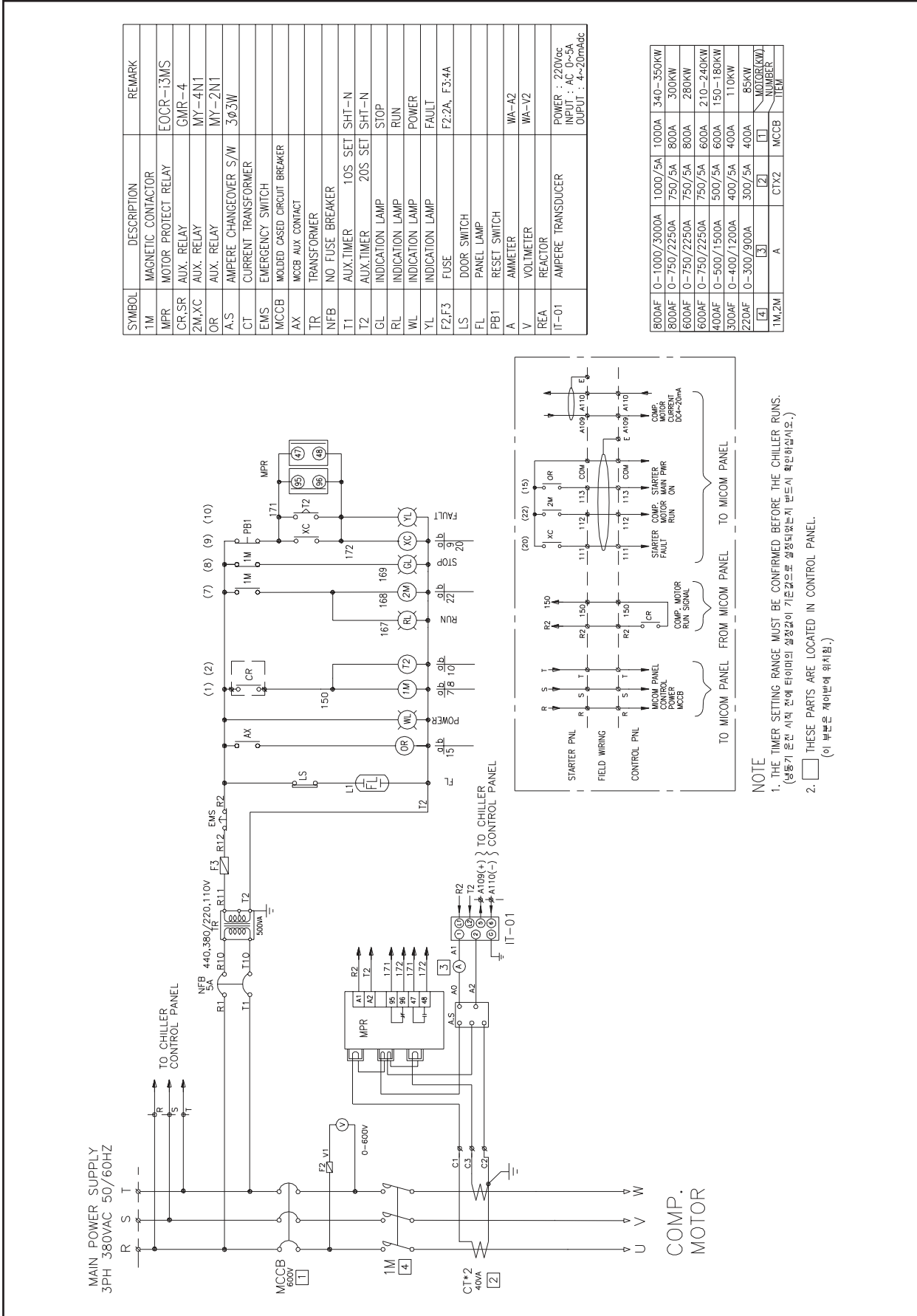
NOTE

1. THE TIMER SETTING RANGE MUST BE CONFIRMED BEFORE THE CHILLER RUNS. (냉동기 운전 시작 전에 타이머의 설정값이 기준값으로 설정되었는지 반드시 확인하십시오.)
2. WHEN THE CONTROL POWER IS 220VAC, REFER TO THIS DRAWING. (제어용 전원이 220VAC일 때는 다음 회로도를 참고하십시오.)
3. □ THESE PARTS ARE LOCATED IN CONTROL PANEL. (이 부분은 제어반에 위치함.)



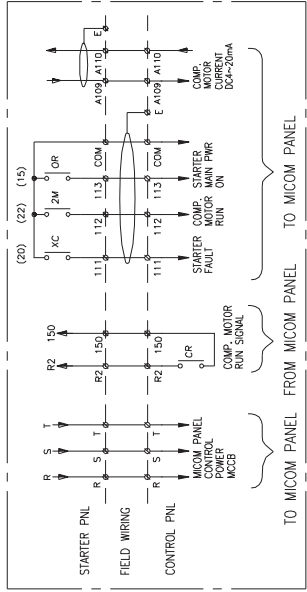
** Above drawing is for reference purpose only and can be changed for design improvement or based on the customer request. Therefore always refer to the approved drawing.

380V direct starter



SYMBOL	DESCRIPTION	REMARK
1M	MAGNETIC CONTACTOR	
MFR	MOTOR PROTECT RELAY	EOCR-3MS
CR/SR	AUX. RELAY	GMR-4
2M/XC	AUX. RELAY	MY-4N1
OR	AUX. RELAY	MY-2N1
A.S	AMPERE CHANGEOVER S/W	3φ3W
CT	CURRENT TRANSFORMER	
EMS	EMERGENCY SWITCH	
MCCB	MOLDED CASED CIRCUIT BREAKER	
AX	MCCB AUX CONTACT	
TR	TRANSFORMER	
NFB	NO FUSE BREAKER	
T1	AUX.TIMER	10S SET SHT-N
T2	AUX.TIMER	20S SET SHT-N
GL	INDICATION LAMP	STOP
RL	INDICATION LAMP	RUN
WL	INDICATION LAMP	POWER
YL	INDICATION LAMP	FAULT
F2.F3	FUSE	F2:2A, F3:4A
LS	DOOR SWITCH	
FL	PANEL LAMP	
PB1	RESET SWITCH	
A	AMMETER	WA-A2
V	VOLTMETER	WA-V2
REA	REACTOR	
IT-01	AMPERE TRANSDUCER	POWER : 220VAC INPUT : AC 0-5A OUTPUT : 4-20mAdc

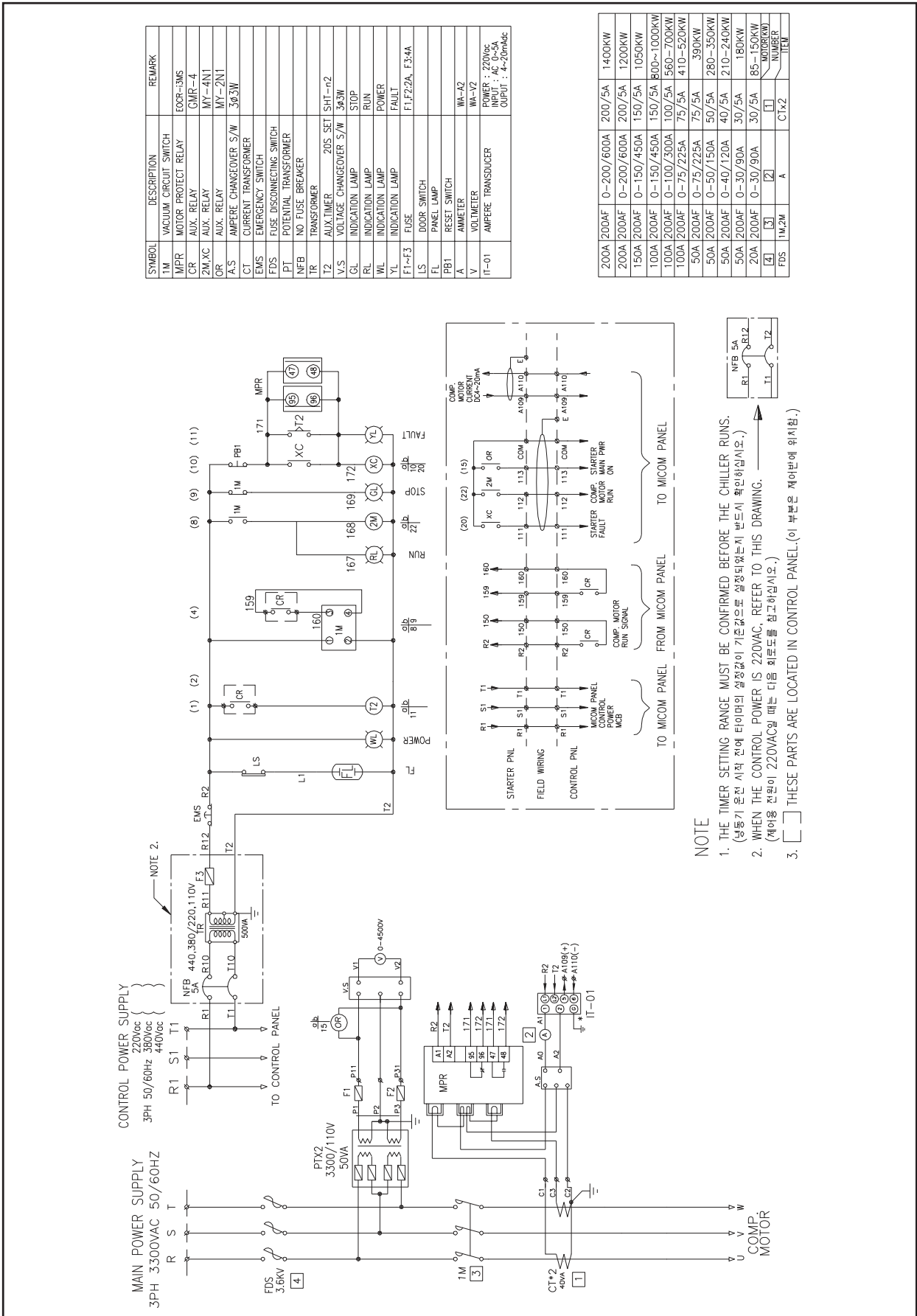
800AF	0-1000/3000A	1000/5A	1000A	340-350KW
800AF	0-750/2250A	750/5A	800A	300KW
600AF	0-750/2250A	750/5A	800A	280KW
600AF	0-750/2250A	750/5A	600A	210-240KW
400AF	0-500/1500A	500/5A	600A	150-180KW
300AF	0-400/1200A	400/5A	400A	110KW
220AF	0-300/900A	300/5A	400A	85KW
[4]	[3]	[2]	[1]	MOTOR (KW)
1M,2M	A	CTX2	MCCB	ITEM NUMBER



- NOTE
1. THE TIMER SETTING RANGE MUST BE CONFIRMED BEFORE THE CHILLER RUNS.
(냉동기 운전 시점 전에 타이머의 설정값이 기온값으로 설정되었는지 반드시 확인하십시오.)
 2. THESE PARTS ARE LOCATED IN CONTROL PANEL.
(이 부분은 제어반에 위치함.)

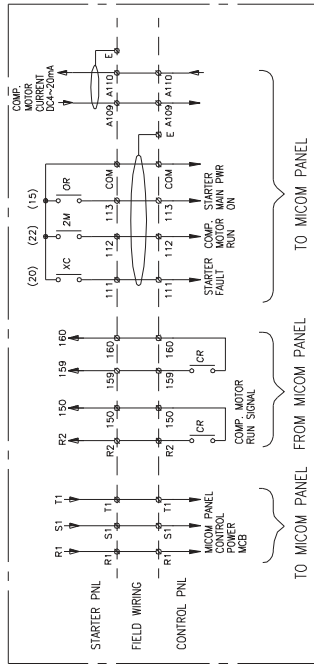
** Above drawing is for reference purpose only and can be changed for design improvement or based on the customer request. Therefore always refer to the approved drawing.

3300V direct starter



SYMBOL	DESCRIPTION	REMARK
1M	VACUUM CIRCUIT SWITCH	
MPR	MOTOR PROTECT RELAY	EOCR-3MS
CR	AUX. RELAY	GMR-4
2M, XC	AUX. RELAY	MY-4N1
OR	AUX. RELAY	MY-2N1
A.S.	AMPERE CHANGEOVER S/W	343W
CT	CURRENT TRANSFORMER	
EMS	EMERGENCY SWITCH	
FDS	FUSE DISCONNECTING SWITCH	
PT	POTENTIAL TRANSFORMER	
NFB	NO FUSE BREAKER	
TR	TRANSFORMER	20S SET SHIT-n2
T2	AUX.TIMER	20S SET SHIT-n2
V.S	VOLTAGE CHANGEOVER S/W	343W
GL	INDICATION LAMP	STOP
RL	INDICATION LAMP	RUN
WL	INDICATION LAMP	POWER
YL	INDICATION LAMP	FAULT
F1~F3	FUSE	F1, F2: 2A, F3: 4A
LS	DOOR SWITCH	
FL	PANEL LAMP	
PB1	RESET SWITCH	WA-A2
A	AMMETER	WA-V2
V	VOLTMETER	POWER : 220Vdc INPUT : AC 0-5A OUTPUT : 4-20mADC
IT-01	AMPERE TRANSDUCER	

200A	2000AF	0-200/600A	200/5A	1400KW
200A	200AF	0-200/600A	200/5A	1200KW
150A	200AF	0-150/450A	150/5A	1050KW
100A	200AF	0-150/450A	150/5A	800~1000KW
100A	200AF	0-100/300A	100/5A	560~700KW
100A	200AF	0-75/225A	75/5A	410~520KW
50A	200AF	0-75/225A	75/5A	390KW
50A	200AF	0-50/150A	50/5A	280~350KW
50A	200AF	0-40/120A	40/5A	210~240KW
50A	200AF	0-30/90A	30/5A	180KW
20A	200AF	0-30/90A	30/5A	85~150KW
FDS	1M, 2M	A	CTx2	MOTOR(KW) NUMBER ITEM

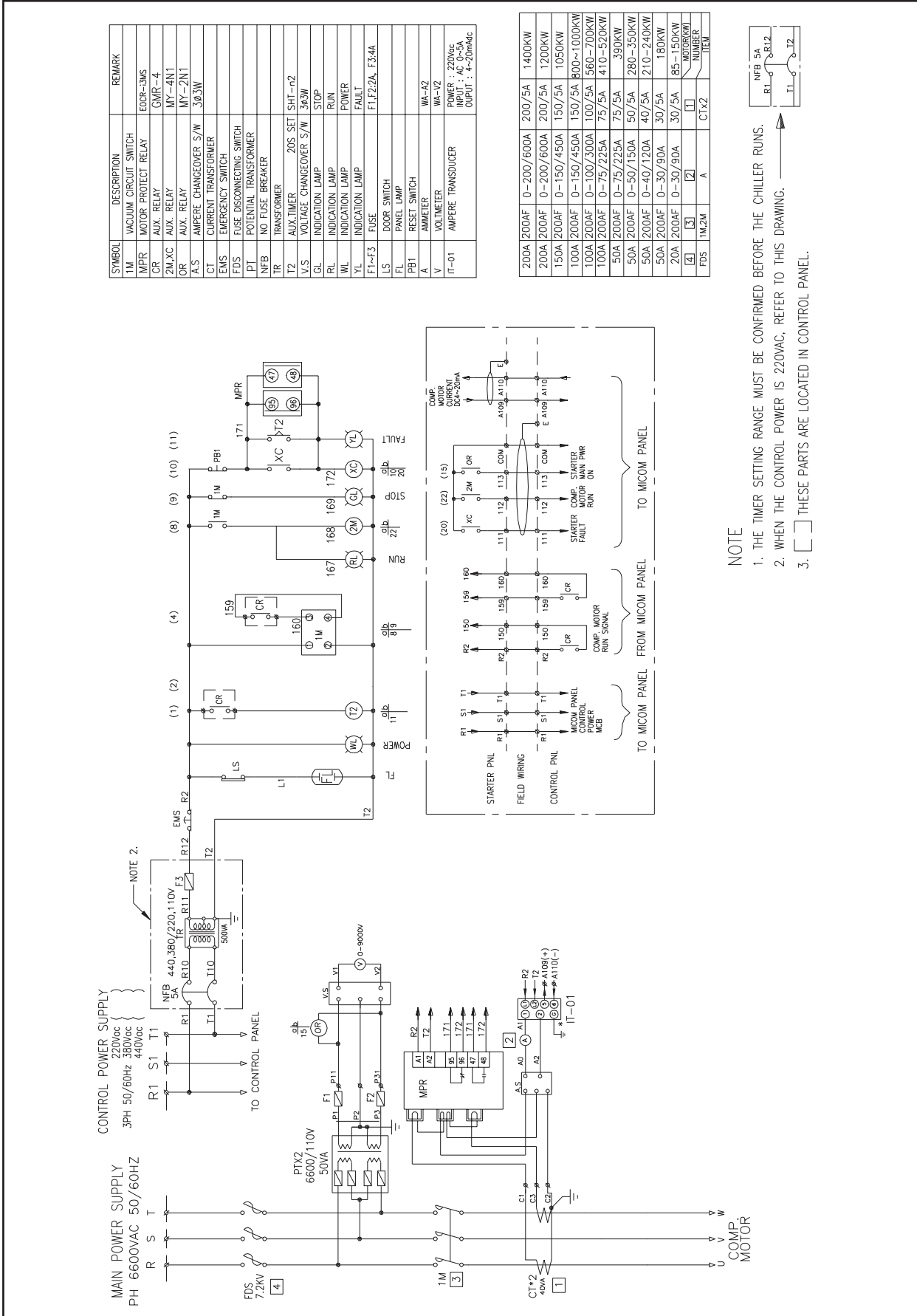


NOTE

1. THE TIMER SETTING RANGE MUST BE CONFIRMED BEFORE THE CHILLER RUNS.
(상동기 운전 시작 전에 타이머의 설정값이 기준값으로 설정되었는지 반드시 확인하십시오.)
2. WHEN THE CONTROL POWER IS 220VAC, REFER TO THIS DRAWING.
(제어용 전원이 220VAC일 때는 다음 회로도를 참고하십시오.)
3. [] THESE PARTS ARE LOCATED IN CONTROL PANEL.(이 부분은 제어반에 위치함.)

** Above drawing is for reference purpose only and can be changed for design improvement or based on the customer request. Therefore always refer to the approved drawing.

6600V direct starter

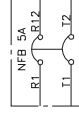


SYMBOL	DESCRIPTION	REMARK
1M	VACUUM CIRCUIT SWITCH	
MPR	MOTOR PROTECT RELAY	ECPR-3MS
CR	AUX. RELAY	GMR-4
2M, XC	AUX. RELAY	MY-4N1
A.S.	AMPERE CHANGEOVER S/W	MY-2N1
CT	CURRENT TRANSFORMER	3φ 3W
EMS	EMERGENCY SWITCH	
FDS	FUSE DISCONNECTING SWITCH	
PT	POTENTIAL TRANSFORMER	
NFB	NO FUSE BREAKER	
TR	TRANSFORMER	
T2	AUX. TIMER	20S SET SHT-n2
V.S	VOLTAGE CHANGEOVER S/W	3φ 3W
GL	INDICATION LAMP	STOP
RL	INDICATION LAMP	POWER
WL	INDICATION LAMP	FAULT
YL	INDICATION LAMP	F1, F2, 2A, F3, 4A
F1-F3	FUSE	
LS	DOOR SWITCH	
FL	PANEL LAMP	
PBT	RESET SWITCH	WA-A2
A	AMMETER	WA-V2
V	VOLTMETER	
IT-01	AMPERE TRANSDUCER	POWER : 220vac INPUT : AC 0-5A OUTPUT : 4-20mAc

200A	200AF	0-200/600A	200/5A	1400KW
200A	200AF	0-200/600A	200/5A	1200KW
150A	200AF	0-150/450A	150/5A	1050KW
100A	200AF	0-150/450A	150/5A	800-1000KW
100A	200AF	0-100/300A	100/5A	560-700KW
100A	200AF	0-75/225A	75/5A	410-520KW
50A	200AF	0-75/225A	75/5A	390KW
50A	200AF	0-50/150A	50/5A	280-350KW
50A	200AF	0-40/120A	40/5A	210-240KW
50A	200AF	0-30/90A	30/5A	180KW
20A	200AF	0-30/90A	30/5A	85-150KW
[4]	[3]	[2]	[1]	MOTOR(KW)
FDS	1M, 2M	A	CTx2	ITEM

NOTE

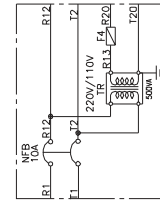
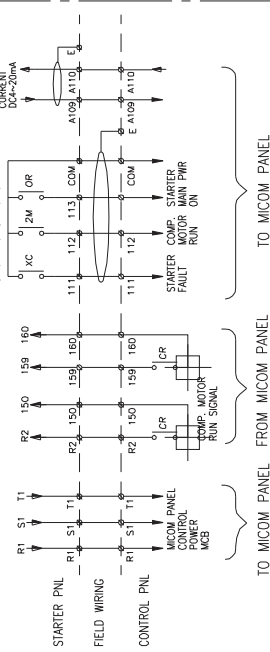
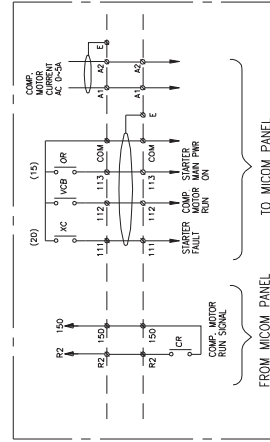
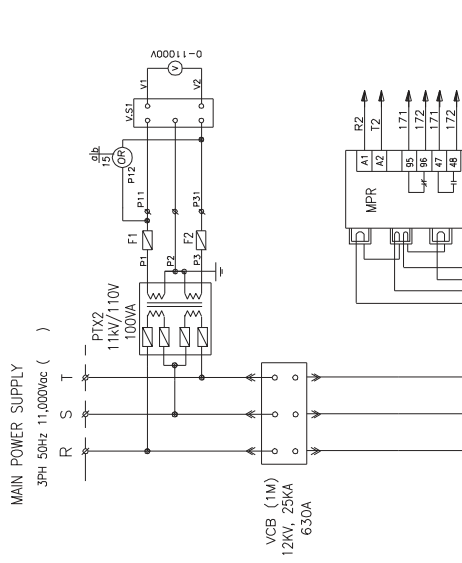
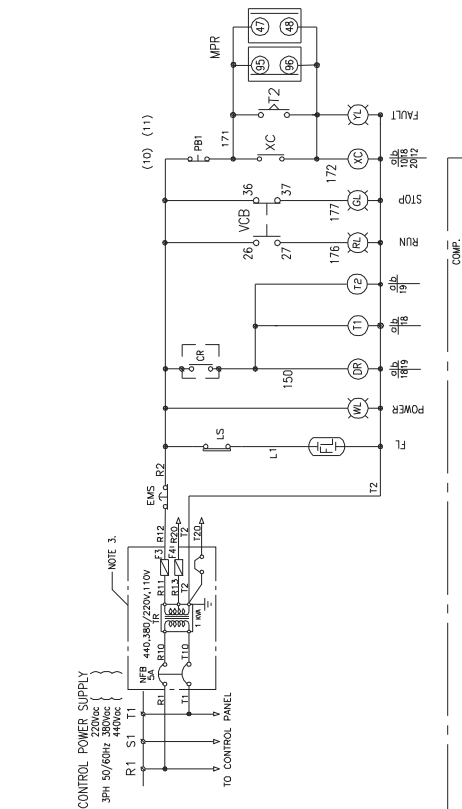
1. THE TIMER SETTING RANGE MUST BE CONFIRMED BEFORE THE CHILLER RUNS.
2. WHEN THE CONTROL POWER IS 220VAC, REFER TO THIS DRAWING.
3. [] THESE PARTS ARE LOCATED IN CONTROL PANEL.



** Above drawing is for reference purpose only and can be changed for design improvement or based on the customer request. Therefore always refer to the approved drawing.

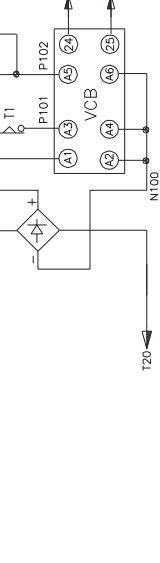
11000V direct starter

SYMBOL	DESCRIPTION	REMARK
CR	AUX. RELAY	FROM LCP
DR	AUX. RELAY	HMAX
XC	AUX. RELAY	HMAX
OR	AUX. RELAY	HMAX
A.S	AMPERE CHANGEOVER S/W	3Φ3W
CT	CURRENT TRANSFORMER	
EMS	EMERGENCY SWITCH	
VCB	VACUUM CIRCUIT BREAKER	LVB-12G-250
PT	POTENTIAL TRANSFORMER	
NFB	NO FUSE BREAKER	
V.S	VOLTAGE CHANGEOVER S/W	3Φ3W
GL-1	INDICATION LAMP	STOP
RL-1	INDICATION LAMP	RUN
WL-1	INDICATION LAMP	POWER
YL-1	INDICATION LAMP	FAULT
F1~F4	FUSE	F1:F22A, F3:F44A
LS	DOOR SWITCH	
L	PANEL LAMP	
FB1	RESET SWITCH	WA-42
A	AMMETER	WA-VZ
TR	TRANSFORMER	
T1	ON DELAY TIMER	2SEC
T2	OFF DELAY TIMER	2SEC
MPR	MOTOR PROTECT RELAY	EOCR



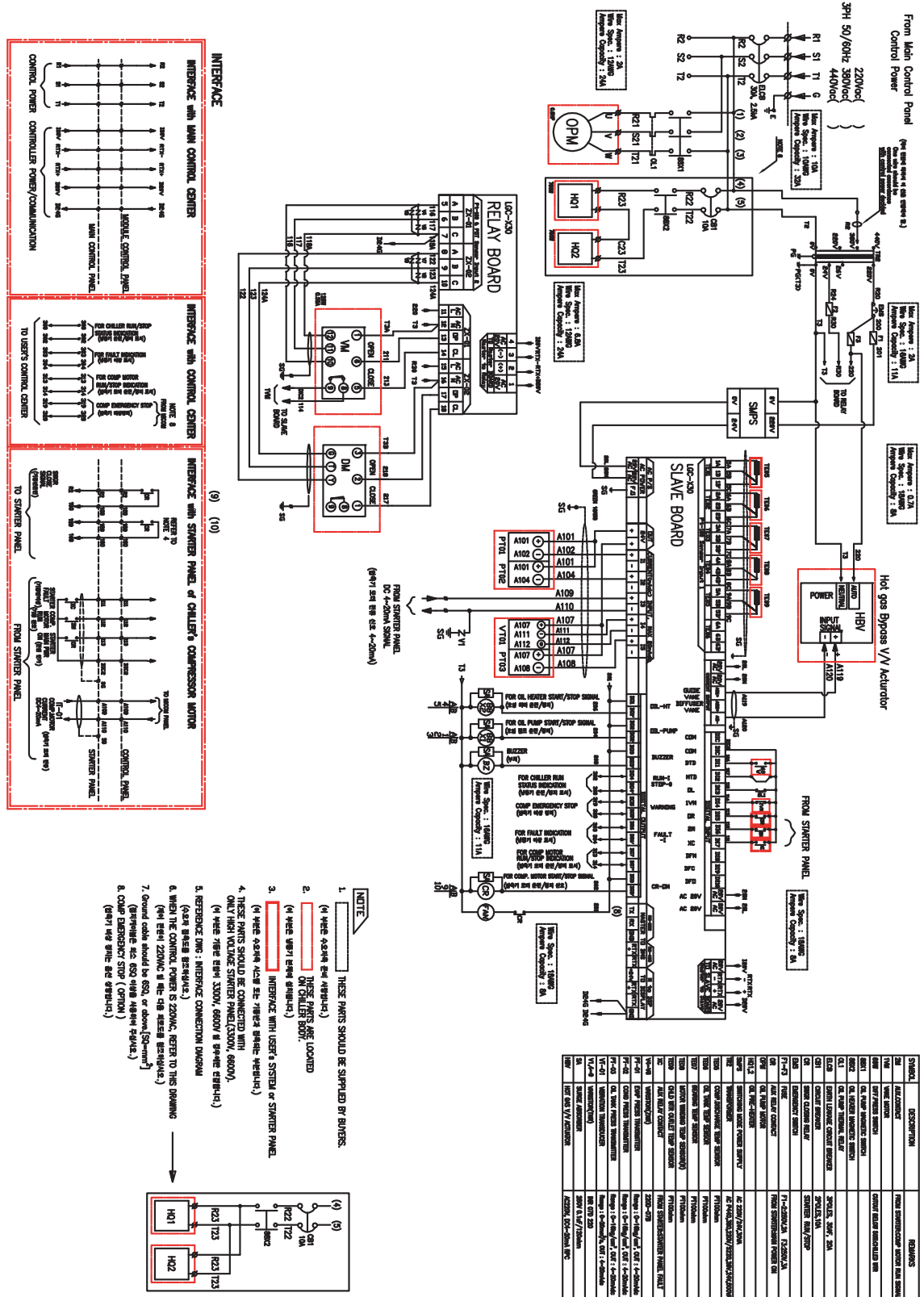
NOTE

1. THE TIMER SETTING RANGE MUST BE CONFIRMED BEFORE THE CHILLER RUNS.
2. [] THESE PARTS ARE LOCATED IN CONTROL PANEL.
3. WHEN THE CONTROL POWER IS 220VAC, REFER TO THIS DRAWING. (제어용 전원이 220VAC일 때는 다음 회로도를 참고하십시오.)



9-2-1-2. Two-stage Centrifugal Chiller RCWFM Series

6600V Line Start



* The diagram shown above is a reference diagram. As it may change depending on design improvements and customer requests, please refer to the approved diagram.

9-2-2. Precautions on other company's starter panel field wiring diagram

- When applying other starter panel from by different manufacturer, be careful of the interface signal between the control panel and the starter panel.

Symbol	Signal	Control panel → Starter panel	Starter panel → Control panel	Signal detail
CR	Dry A Contact (A contact point) Contact point capacity 250Vac, 10A	Main motor operation signal	-	Signal to control run/stop operation of the main motor from the control panel (Run: Close, Stop: Open)
2M	Dry A Contact (A contact point) Contact point capacity 20Vdc, 20mA	-	Main motor operation check interlock signal	Signal to check the running condition status of the main motor from the control panel (Main motor running condition: Close)
XC	Dry A Contact (A contact point) Contact point capacity 20Vdc, 20mA	-	Fault signal in starter panel	Signal to check for error from control panel to starter panel (Error in starter panel: Close)
OR	Dry A Contact (A contact point) Contact point capacity 20Vdc, 20mA	-	Power connection signal in starter panel	Signal to check whether the power is connected to the 1st side of starter panel (Power connection: Close)
IT-01	DC 4~20mA (Analog Signal)	-	Main motor current signal	Signal to check whether the power is connected to the 1st side of starter panel (Power connection: Close)

- Above signal is very important in safely starting and running the Centrifugal Chiller. Refer to the following cable specification, and wire properly.
- Current signal (DC 4~20mA) must should be Shield grounded. Especially keep in mind that the compressor run/stop signal (CR) is always provided through the contact point.
 - * Wire for control signal (Control Signal): F-CVV 2.5SQ
 - * Wire for motor current signal (Analog signal): F-CVVS 1.5SQ

9-3. Power supply connection

3 phase motor power

- 1) Verify that the starter nameplate ratings are compatible with the power supply characteristics and with the electrical data on the chiller unit nameplate.
- 2) If the starter enclosure must be cut to provide electrical access, exercise care to prevent debris from falling inside the enclosure.
- 3) Use copper (Cu) conductors to connect the 3-phase power supply to the remote or unit-mounted starter panel.
- 4) The size of the wiring of the power supply is indicated on the interface diagram, and it may be changed based on the consultation with customer and site condition.
- 5) Make sure that the incoming power wiring is properly phased. Each power supply cable must be connected correctly when wiring to the startup panel.
- 6) Make sure that the power supply conduit does not interfere with the serviceability or with structural members and equipment.
- 7) Reinforcing rotating power – Follow the method on the document of rotating power from the starter manufacturer and its annual test method.
Also the conduit should be of a sufficient length in case for the service works such as the replacement of the starter panel.
(e.g. removing the starter panel)

Part damaged!

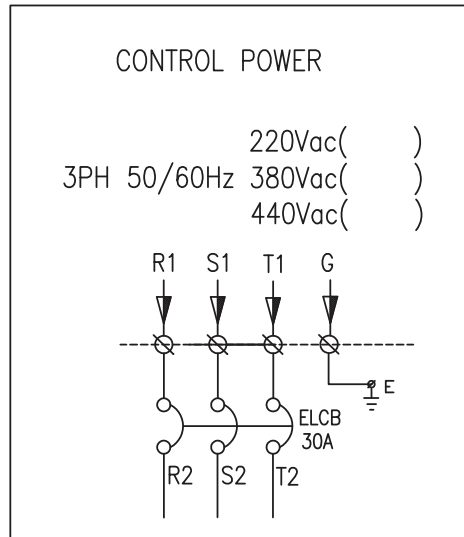
- Keep the inside of the Startup panel clean by removing dirt and debris.
Failure to do so may cause electric leakage or major damage to the starter parts.

9-4. Field wiring diagram for control panel

Control panel power supply

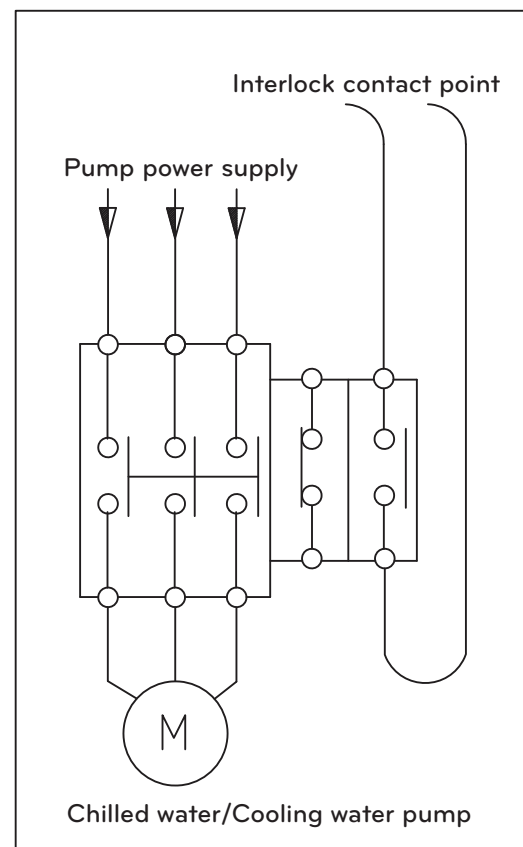
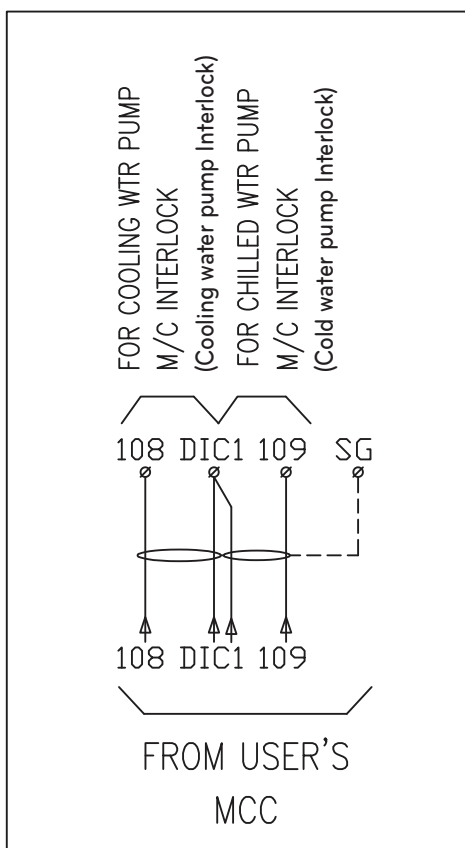
The control panel should be supplied with 3 phase 3 wire type power. (Including grounding wire)

1. Nominal voltage is 220/380/440VAC, 60/50Hz and permitted range is within $\pm 10\%$.
It varies according to the power environment of the user.
2. Power capacity: 4kVA or higher is required.
3. Be careful of R, S and T wiring.
4. Cable size of 6SQ or higher is recommended.
5. Always make sure to connect the grounding wire.



User interlock contact point

Chilled water/cooling water pump interlock contact point should be wired to prevent freezing. It should be provided in non-voltage contact, and if this contact point is not connected, it may cause a critical problem to the Centrifugal Chiller, therefore it should be connected for safety reason.



9-5. Motor protection

Customers supplied with the Chiller would be concerned about the protection and safety of the Chiller compressor high voltage motor (Medium voltage) but LG Chiller has a safety function in the Starter to protect the high voltage motor as shown below.

Motor protection relay

By applying motor protection relays having short circuit, over-current, phase reversal and lock current protection function, the safe operation of the high voltage motor in the chiller is checked. It has the protective function to immediately stop the chiller by sending a signal to the chiller control panel in case a current which is of higher than set value is flowing.

Power fuse

As the main circuit breaker of the high voltage motor (Medium voltage) Starter, fused disconnected switch is basically installed.

In case of a high short circuit current is generated, high resistance is built from insulator by the fuse element and the unique inherent short circuit current is limited within a short time of 0.5 cycle to protect the circuit by limiting the current.

Vacuum Circuit Breaker - Optional

VCB (Vacuum Circuit Breaker) can be applied as the main circuit breaker of the Starter as an option. Due to the characteristics of the vacuum circuit breaker of blocking in 3 cycles, it may burn the high voltage motor with by the surge when opening/closing the switch.

To protect this, Surge Absorber is applied between the end of VCB and high voltage motor to protect the motor from power surge when opening/closing the switch.

Surge Absorber

When running/stopping the high voltage motor using Vacuum Circuit Breaker or Vacuum Contactor, always apply the Surge Absorber to protect the motor.

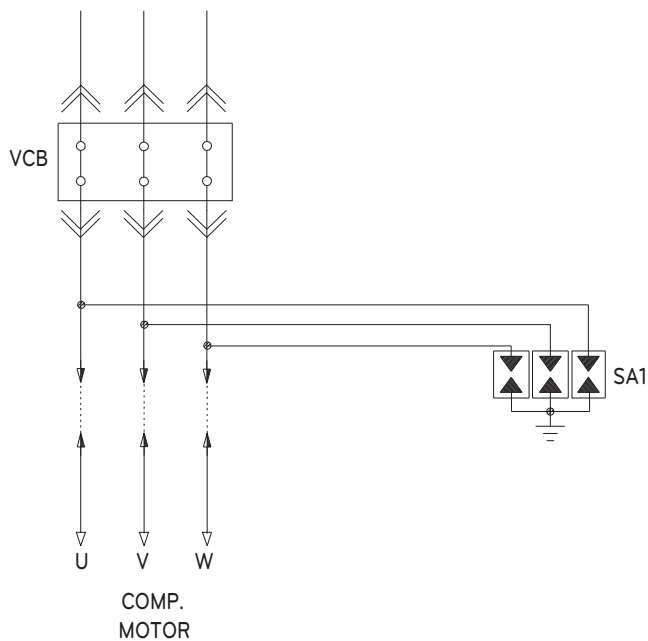
<Application of Surge Absorber>

Protection Equipment \ Switching	Oil filled Transformer	Oil filled Transformer	Motor	Condenser	Transformer + Motor
Vacuum Circuit Breaker	X	O	O	X	O
Vacuum Contactor	X	O	O	X	O

O : Necessary

X : N/A

<How to connect Surge Absorber>

**CAUTION**

When directly operating the LG motor using VCB (Vacuum Circuit Breaker) or VCS (Vacuum Contactor), always apply the surge absorber.

If the Surge Absorber is not installed, it may damage the motor.

Appendix

1. Installation checklist

- Check before installation

NO	Check item	Result	Remarks
1	Is the information pertain to the equipment installation of the chiller installation site received? (Hot water flowchart, machine room diagram, base drawing, electric wiring diagram)		
2	Is the overall process schedule table pertain to the chiller and construction around the area received? (Check equipment receiving and pipe connection schedule)		
3	Is the size of the equipment receiving dock checked?		
4	Are the equipment receiving path and plan established?		
5	Is the base size and height appropriate? (Check machine room and drawing)		
6	Is there any obstacle in the installation space? (Horizontal pipe within the machine room, etc.)		
7	Does the product have separation distance from any heating device? (Domestic high pressure gas approval)		

- Chiller

NO	Check item	Result	Remarks
1	Are the accessories pertain to the chiller accurately received?		
2	Are exterior damage or internal wiring problem caused during the transportation checked?		
3	Is there any leakage after sealing the refrigerant? (Check refrigerant pressure)		
4	Is the equipment insulation including evaporator and economizer sturdy?		
5	Is the inlet/outlet direction of the chilled water/cooling water of the installed chiller the same as in the drawing?		
6	Is the chiller leveled?		
7	Is the isolation rubber pad installed?		
8	Have the tightening elements solidly tightened as the specified torques?		Appendix. 4

- Piping

NO	Check item	Result	Remarks
1	Are all pipes installed and connected according to the installation guide?		7. PIPING
2	Are the pipe diameter and inlet/outlet of the chilled water and cooling water correctly connected?		
3	Are the particles in the pipe removed and, Air Purge work done?		
4	Is the water pipe for the chiller connected according to the drawing? (Strainer, flexible, balancing valve, pressure gauge, etc.)		
5	Are the insulations for the pipe, flange and valve insulation firm done securely?		

** Result: Good : O, Poor: X, Not applicable: N/A

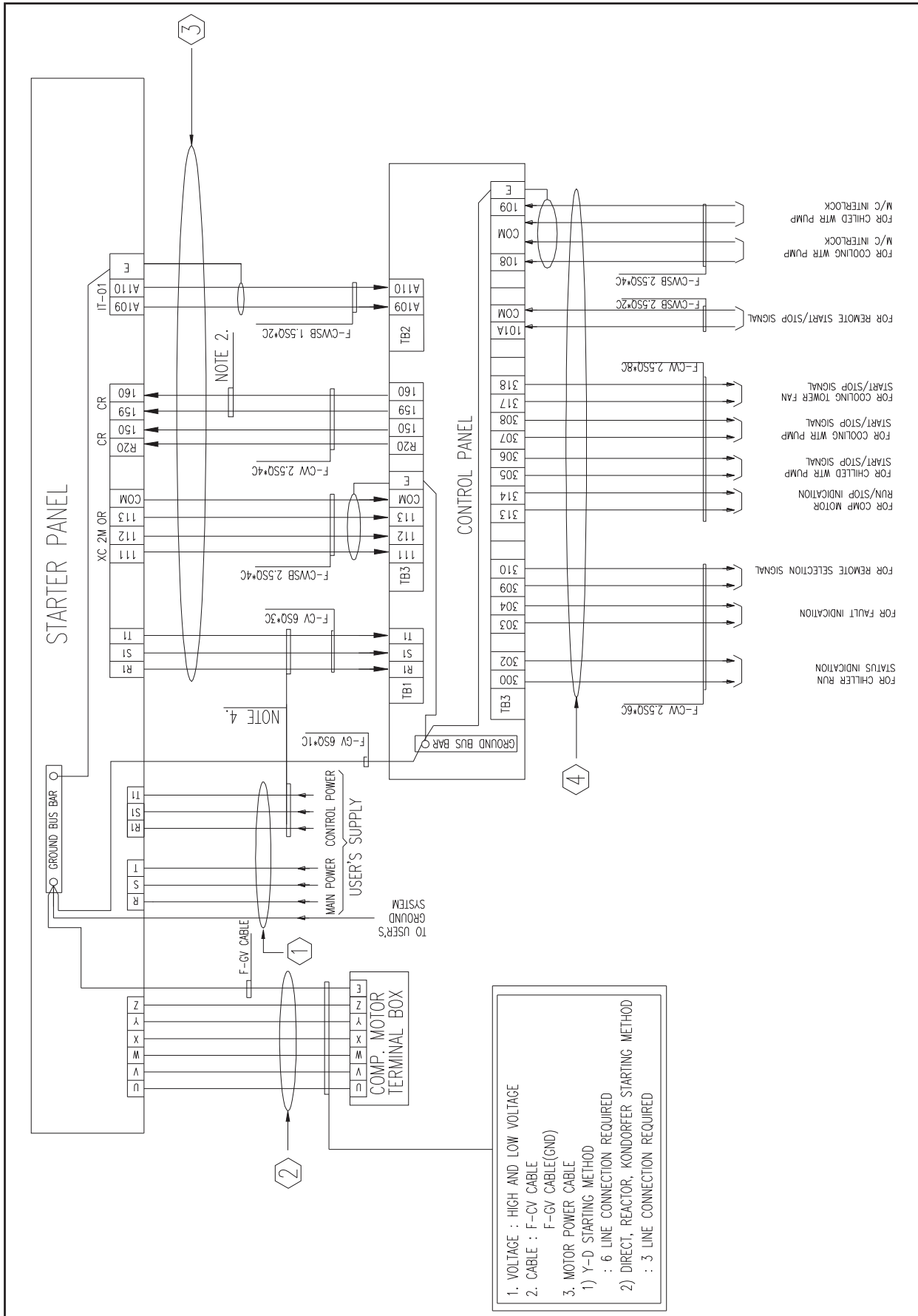
- Electricity

NO	Check item	Result	Remarks
1	Are the specifications and dimensions of the used cable and material in accordance to the drawing and specification? (Refer to interface diagram)		
2	Is the wire pipe checked to make sure whether it is cleaned before inserting the wires?		
3	Is the curved radius of the cable satisfactory to the regulation?		
4	Is the coating of the cable properly removed and wired without damaging the conductor by using proper tools?		
5	At the place where wire support or tie is required, are the wires neatly arranged?		
6	When the external layer of the cable needs grounding, is it grounded properly through appropriate connection?		
7	Are the wires permitted in the pull box and joint box arranged neatly?		
8	Are all unused holes within the box blocked using appropriate parts?		
9	Is there any wire connected within the wire pipe?		
10	Are the connectors for connecting the wires appropriately applied with a flame resistant type and in appropriate sizes?		
11	Are the wires color coded?		
12	Is the wiring work well done not to deteriorate electric resistance, insulation resistance and tensile strength?		
13	Are the circuit display appropriately attached based on the permitted method?		
14	Is the insulation resistance of the wire measured after inserting the wire?		
15	After the installation and measurement are completed, is the wire coating and conductor appropriately protected to avoid damage?		
16	Is the clearance between high voltage cable and low voltage cable or weak current cable in compliance with the standard?		
17	When the cable is inserted, is it complied with the standard of not using vehicle or other heavy equipment?		
18	Is the cable inserting device approved and used in the customer site?		
19	Are appropriate accessories used for connecting the CABLE TRAY?		
20	Are the support interval and material for the CABLE TRAY appropriate?		
21	Are the sharp parts that can damage the CABLE tray removed?		
22	Are Is the BONDING JUMPER installed at the connecting part of the CABLE TRAY installed?		
23	Is the 2nd control construction (Startup panel-Control panel) cable connection terminal strip the same as in the drawing?		
24	Is the motor current signal wiring the same as in the drawing?		
25	Is the chilled water/cooling water pump interlock cable wiring terminal strip the same as in the drawing?		
26	Is the tightened condition of each terminal good?		

** Result: Good : O, Poor: X, Not applicable: N/A

2. Centrifugal interface drawing (1/2)

Single stage Centrifugal Chiller RCWF***P Series, Two stage Centrifugal Chiller RCWFH Series



- * Incoming cable for Control Power: F-CV 6SQ or higher
- * Wire for control signal: F-CVV 2.5SQ
- * Wire for motor current signal (Analog signal): F-CVSB 1.5SQ

2. Turbo interface drawing (2/2)

SELECTION TABLE

Method Power SELECT MOTOR	Y-DELTA STARTING							
	380 V		440 V		3300 V		EARTH SIZE	
	FLA $\frac{\sqrt{3}}$	WIRE SIZE	FLA $\frac{\sqrt{3}}$	WIRE SIZE	FLA $\frac{\sqrt{3}}$	WIRE SIZE	380V 440V	3300V 6600V
100KW	113.3A	50SQ	97.8A	50SQ	12.8A	16SQ	35SQ	70SQ
120KW	135.9A	50SQ	117.4A	50SQ	15.3A	16SQ	35SQ	70SQ
150KW	171.9A	95SQ	148.4A	95SQ	19.1A	16SQ	35SQ	70SQ
180KW	211.4A	95SQ	177.1A	95SQ	23.0A	16SQ	35SQ	70SQ
210KW	235.2A	120SQ	203.1A	95SQ	27.3A	25SQ	35SQ	70SQ
260KW	287.9A	150SQ	248.7A	150SQ	33.1A	25SQ	35SQ	70SQ
300KW	332.3A	185SQ	287.0A	150SQ	38.3A	25SQ	35SQ	70SQ
340KW	376.6A	240SQ	325.2A	185SQ	42.4A	25SQ	35SQ	70SQ
390KW					47.6A	35SQ	35SQ	70SQ
410KW					50.3A	35SQ	35SQ	70SQ
460KW					60.3A	35SQ	35SQ	70SQ
510KW					67.3A	35SQ	35SQ	70SQ
580KW					75.7A	35SQ	35SQ	70SQ
640KW					79.4A	35SQ	35SQ	70SQ
700KW					86.8A	60SQ	35SQ	70SQ
800KW					98.2A	60SQ	35SQ	70SQ

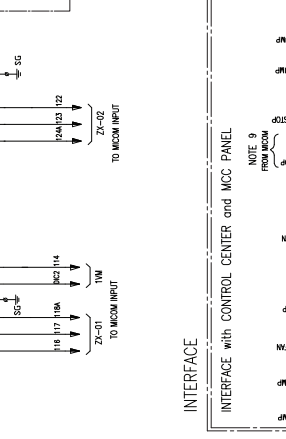
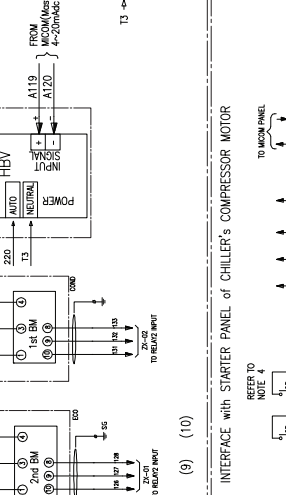
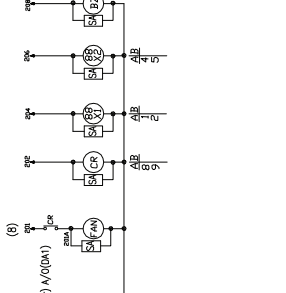
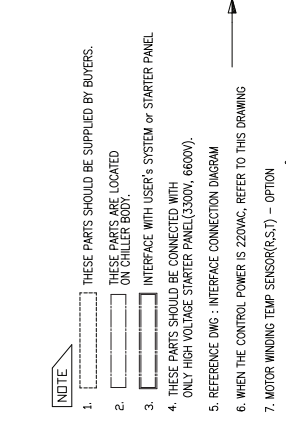
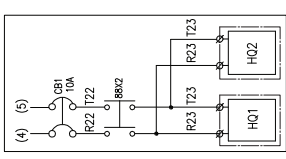
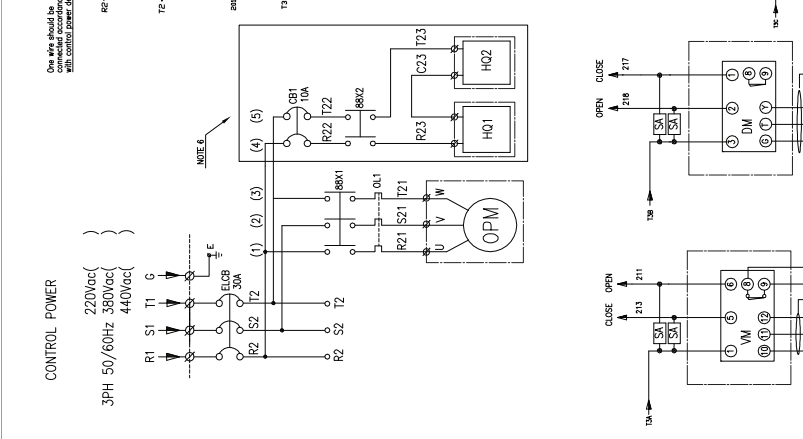
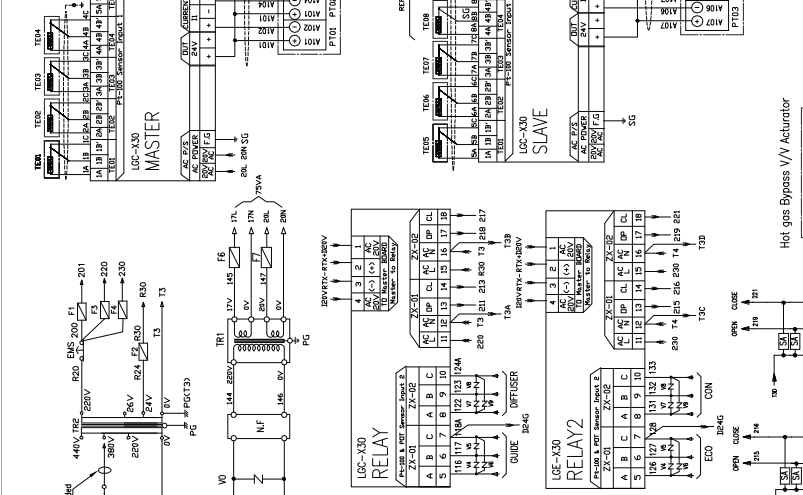
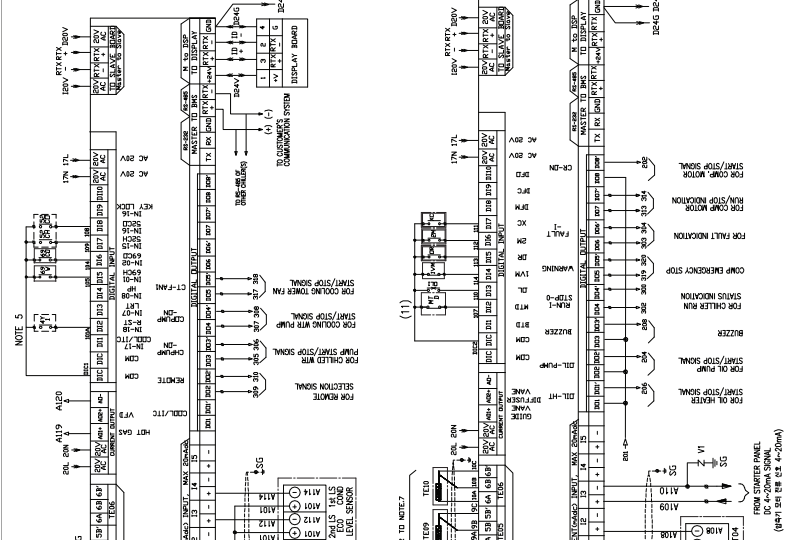
Method Power SELECT MOTOR	DIRECT, REACTOR, KONDORFER STARTING									
	380V		440V		3300/3600V		6600V		EARTH SIZE	
	FLA	WIRE SIZE	FLA	WIRE SIZE	FLA	WIRE SIZE	FLA	WIRE SIZE	380V 440V	3300V 6600V
100KW	196.2A	95SQ	169.4A	95SQ	22.1A	16SQ	11.0A	16SQ	35SQ	70SQ
120KW	235.4A	120SQ	203.3A	95SQ	26.5A	16SQ	13.3A	16SQ	35SQ	70SQ
150KW	297.7A	120SQ	257.1A	120SQ	33.1A	25SQ	16.6A	16SQ	35SQ	70SQ
180KW	366.2A	185SQ	306.7A	120SQ	39.8A	25SQ	19.9A	16SQ	35SQ	70SQ
210KW	407.4A	240SQ	351.8A	185SQ	47.2A	25SQ	23.6A	16SQ	35SQ	70SQ
260KW	498.7A	300SQ	430.7A	240SQ	57.4A	25SQ	28.1A	16SQ	35SQ	70SQ
300KW	575.5A	150SQ*2	497.0A	300SQ	66.3A	35SQ	33.1A	25SQ	35SQ	70SQ
340KW	652.2A	185SQ*2	563.2A	150SQ*2	73.4A	35SQ	38.9A	25SQ	50SQ	70SQ
390KW					82.4A	50SQ	41.4A	25SQ	60SQ	70SQ
410KW					87.1A	50SQ	43.6A	35SQ	60SQ	70SQ
460KW					104.5A	50SQ	50.8A	35SQ	60SQ	70SQ
510KW					116.6A	50SQ	56.3A	35SQ	60SQ	70SQ
580KW					131.1A	70SQ	64.8A	35SQ	60SQ	70SQ
640KW					137.5A	70SQ	71.5A	35SQ	60SQ	70SQ
700KW					150.4A	70SQ	73.9A	35SQ	60SQ	70SQ
800KW					170.0A	70SQ	85.0A	35SQ	60SQ	70SQ
900KW					194.4A	70SQ	97.2A	35SQ	60SQ	70SQ
1000KW					216.0A	70SQ	108.0A	35SQ	60SQ	70SQ
1200KW					259.2A	95SQ	129.6A	35SQ	60SQ	70SQ

→ Centrifugal Chiller 2nd power construction cable table.

Above table may change based on the situation of the customer site.

Two stage Centrifugal Chiller RCWFH Series

SYMBOL	DESCRIPTION	REMARKS
ZM	AIR CONTACT	FROM STARTER COMP MOTOR RUN SIGNAL
YM	WAKE MOTOR	SUPPLIED BY USER
Y1M	REVERT RUN/STOP SIGNAL	SUPPLIED BY USER
Y2M	STOP BY USER	SUPPLIED BY USER
Y3M	STOP BY USER	SUPPLIED BY USER
Y4M	STOP BY USER	SUPPLIED BY USER
Y5M	STOP BY USER	SUPPLIED BY USER
Y6M	STOP BY USER	SUPPLIED BY USER
Y7M	STOP BY USER	SUPPLIED BY USER
Y8M	STOP BY USER	SUPPLIED BY USER
Y9M	STOP BY USER	SUPPLIED BY USER
Y10M	STOP BY USER	SUPPLIED BY USER
Y11M	STOP BY USER	SUPPLIED BY USER
Y12M	STOP BY USER	SUPPLIED BY USER
Y13M	STOP BY USER	SUPPLIED BY USER
Y14M	STOP BY USER	SUPPLIED BY USER
Y15M	STOP BY USER	SUPPLIED BY USER
Y16M	STOP BY USER	SUPPLIED BY USER
Y17M	STOP BY USER	SUPPLIED BY USER
Y18M	STOP BY USER	SUPPLIED BY USER
Y19M	STOP BY USER	SUPPLIED BY USER
Y20M	STOP BY USER	SUPPLIED BY USER
Y21M	STOP BY USER	SUPPLIED BY USER
Y22M	STOP BY USER	SUPPLIED BY USER
Y23M	STOP BY USER	SUPPLIED BY USER
Y24M	STOP BY USER	SUPPLIED BY USER
Y25M	STOP BY USER	SUPPLIED BY USER
Y26M	STOP BY USER	SUPPLIED BY USER
Y27M	STOP BY USER	SUPPLIED BY USER
Y28M	STOP BY USER	SUPPLIED BY USER
Y29M	STOP BY USER	SUPPLIED BY USER
Y30M	STOP BY USER	SUPPLIED BY USER
Y31M	STOP BY USER	SUPPLIED BY USER
Y32M	STOP BY USER	SUPPLIED BY USER
Y33M	STOP BY USER	SUPPLIED BY USER
Y34M	STOP BY USER	SUPPLIED BY USER
Y35M	STOP BY USER	SUPPLIED BY USER
Y36M	STOP BY USER	SUPPLIED BY USER
Y37M	STOP BY USER	SUPPLIED BY USER
Y38M	STOP BY USER	SUPPLIED BY USER
Y39M	STOP BY USER	SUPPLIED BY USER
Y40M	STOP BY USER	SUPPLIED BY USER
Y41M	STOP BY USER	SUPPLIED BY USER
Y42M	STOP BY USER	SUPPLIED BY USER
Y43M	STOP BY USER	SUPPLIED BY USER
Y44M	STOP BY USER	SUPPLIED BY USER
Y45M	STOP BY USER	SUPPLIED BY USER
Y46M	STOP BY USER	SUPPLIED BY USER
Y47M	STOP BY USER	SUPPLIED BY USER
Y48M	STOP BY USER	SUPPLIED BY USER
Y49M	STOP BY USER	SUPPLIED BY USER
Y50M	STOP BY USER	SUPPLIED BY USER
Y51M	STOP BY USER	SUPPLIED BY USER
Y52M	STOP BY USER	SUPPLIED BY USER
Y53M	STOP BY USER	SUPPLIED BY USER
Y54M	STOP BY USER	SUPPLIED BY USER
Y55M	STOP BY USER	SUPPLIED BY USER
Y56M	STOP BY USER	SUPPLIED BY USER
Y57M	STOP BY USER	SUPPLIED BY USER
Y58M	STOP BY USER	SUPPLIED BY USER
Y59M	STOP BY USER	SUPPLIED BY USER
Y60M	STOP BY USER	SUPPLIED BY USER
Y61M	STOP BY USER	SUPPLIED BY USER
Y62M	STOP BY USER	SUPPLIED BY USER
Y63M	STOP BY USER	SUPPLIED BY USER
Y64M	STOP BY USER	SUPPLIED BY USER
Y65M	STOP BY USER	SUPPLIED BY USER
Y66M	STOP BY USER	SUPPLIED BY USER
Y67M	STOP BY USER	SUPPLIED BY USER
Y68M	STOP BY USER	SUPPLIED BY USER
Y69M	STOP BY USER	SUPPLIED BY USER
Y70M	STOP BY USER	SUPPLIED BY USER
Y71M	STOP BY USER	SUPPLIED BY USER
Y72M	STOP BY USER	SUPPLIED BY USER
Y73M	STOP BY USER	SUPPLIED BY USER
Y74M	STOP BY USER	SUPPLIED BY USER
Y75M	STOP BY USER	SUPPLIED BY USER
Y76M	STOP BY USER	SUPPLIED BY USER
Y77M	STOP BY USER	SUPPLIED BY USER
Y78M	STOP BY USER	SUPPLIED BY USER
Y79M	STOP BY USER	SUPPLIED BY USER
Y80M	STOP BY USER	SUPPLIED BY USER
Y81M	STOP BY USER	SUPPLIED BY USER
Y82M	STOP BY USER	SUPPLIED BY USER
Y83M	STOP BY USER	SUPPLIED BY USER
Y84M	STOP BY USER	SUPPLIED BY USER
Y85M	STOP BY USER	SUPPLIED BY USER
Y86M	STOP BY USER	SUPPLIED BY USER
Y87M	STOP BY USER	SUPPLIED BY USER
Y88M	STOP BY USER	SUPPLIED BY USER
Y89M	STOP BY USER	SUPPLIED BY USER
Y90M	STOP BY USER	SUPPLIED BY USER
Y91M	STOP BY USER	SUPPLIED BY USER
Y92M	STOP BY USER	SUPPLIED BY USER
Y93M	STOP BY USER	SUPPLIED BY USER
Y94M	STOP BY USER	SUPPLIED BY USER
Y95M	STOP BY USER	SUPPLIED BY USER
Y96M	STOP BY USER	SUPPLIED BY USER
Y97M	STOP BY USER	SUPPLIED BY USER
Y98M	STOP BY USER	SUPPLIED BY USER
Y99M	STOP BY USER	SUPPLIED BY USER
Y100M	STOP BY USER	SUPPLIED BY USER



- NOTE**
1. THESE PARTS SHOULD BE SUPPLIED BY BUYERS.
 2. THESE PARTS ARE LOCATED ON CHILLER BODY.
 3. INTERFACE WITH USER'S SYSTEM or STARTER PANEL
 4. THESE PARTS SHOULD BE CONNECTED WITH ONLY HIGH VOLTAGE STARTER PANEL (3300V, 6600V).
 5. REFERENCE DWG - INTERFACE CONNECTION DIAGRAM
 6. WHEN THE CONTROL POWER IS 220VAC, REFER TO THIS DRAWING
 7. MOTOR WINDING TEMP SENSOR(R.S.1) - OPTION
 8. Ground cable should be 6SQ, or above (SQ=mm²)
 9. COMP EMERGENCY STOP (OPTION)

CONTROL POWER
220Voc
3PH 50/60Hz 380Voc
440Voc

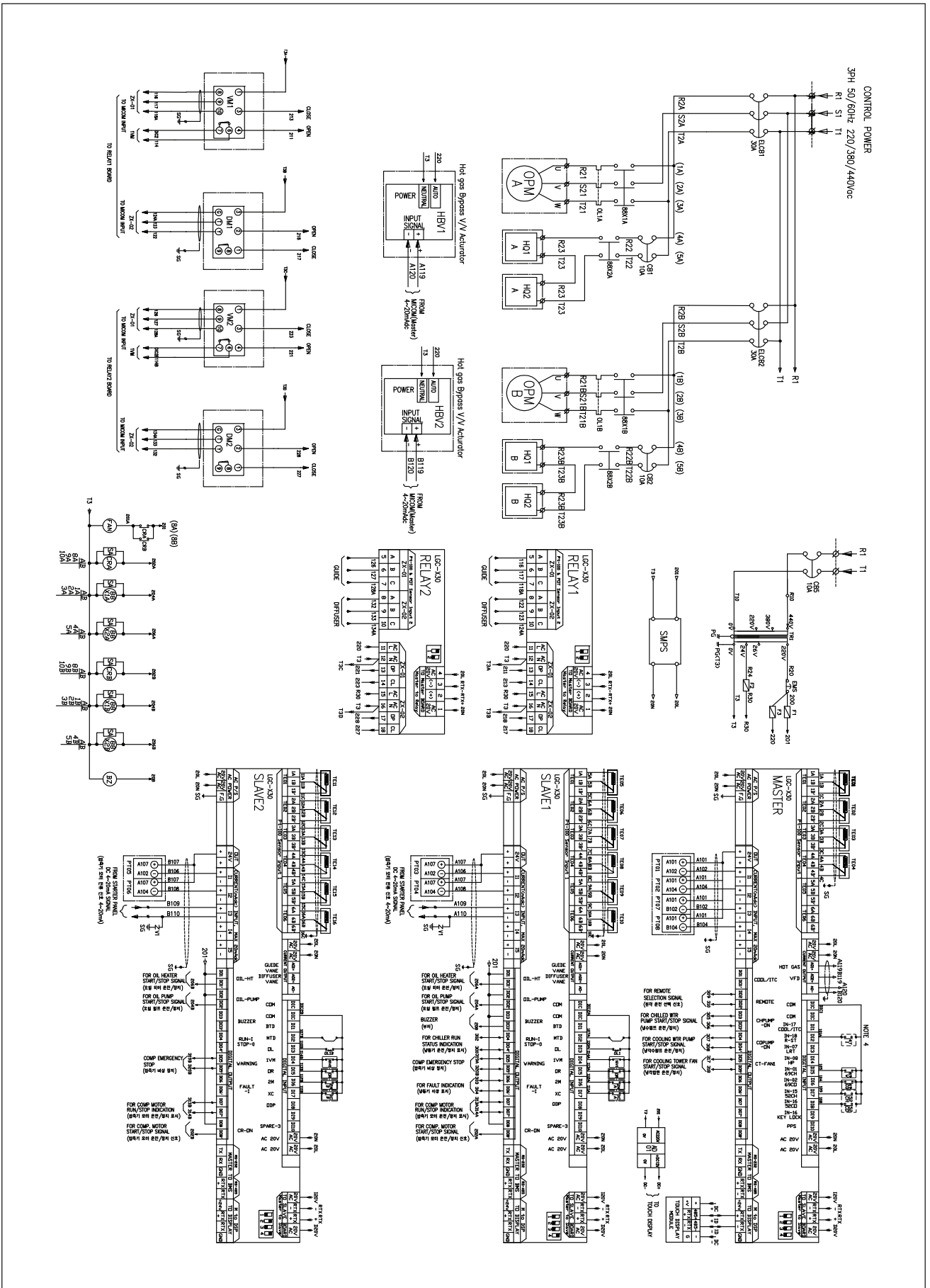
One wire should be with control power divided

NOTE 6

NOTE 9

NOTE 10

Two-stage Centrifugal Chiller RCWFM Series



77

ENGLISH

Two-stage Centrifugal Chiller RCWFM Series

SYMBOL	DESCRIPTION	REMARKS
RA1A	AUX CONTACT	FROM STARTER/COMP MOTOR RUN SIGNAL
RA11,2	FASE MOTOR	
4T1	REMOTE RUN/STOP SIGNAL	SUPPLIED BY USER
5CO	AUX CONTACT	COOLING WTR FLOW SWITCH
5COH	AUX CONTACT	CHILLED WTR FLOW SWITCH
6W	REF-PRESS SWITCH	CIRCUIT BELOW DISCONNECTED WTR
6W1(A)(B)	OIL PUMP MAGNETIC SWITCH	
6W2(A)(B)	OIL HEATER MAGNETIC SWITCH	
OL1(A)(B)	OIL PUMP THERMAL RELAY	
BZ	BURZZER	
ELB1,2	FAULT LED/LAMP CIRCUIT BREAKER	
MCB1,2	MICRO CUT CIRCUIT BREAKER	
CS1~3	CIRCUIT BREAKER	
OM(A)	STARTER CLOSING RELAY	STARTER RUN/STOP
EM(S)	EMERGENCY SWITCH	F1,2: 2A, F3: 3A
F1~3	FUSE	
SS100	CONVERTER	K222W/DK-3W
PS01	POWER SUPPLY	
FAN	COOLING FAN	CIRCUIT BELOW DISCONNECTED WTR
6F0	REF-PRESS SWITCH	CIRCUIT BELOW DISCONNECTED WTR
6F1	AUX RELAY CONTACT	FROM STARTER/MAIN POWER ON
6F2(A)(B)	OIL PUMP MOTOR	
6F3(A)(B)	OIL HEATER MOTOR	
6F4(A)(B)	OIL PUMP MOTOR	
6F5(A)(B)	OIL HEATER MOTOR	
70MA	TRANSFORMER	
TE01	CHLD WTR INLET TEMP SENSOR	PT100ohm
TE02	CHLD WTR OUTLET TEMP SENSOR	PT100ohm
TE03	COOLING WTR INLET TEMP SENSOR	PT100ohm
TE04	COOLING WTR OUTLET TEMP SENSOR	PT100ohm
TE05,11	COMP DISCHARGE TEMP SENSOR	PT100ohm
TE06,12	OIL WTR TEMP SENSOR	PT100ohm
TE07,13	REFRIG TEMP SENSOR	PT100ohm
TE08,14	MOTOR WINDING SENSOR(S)	PT100ohm
TE09,15	MOTOR WINDING SENSOR(S)	PT100ohm
TE10,16	MOTOR WINDING SENSOR(S)	PT100ohm
KX(A)	AUX RELAY CONTACT	FROM STARTER/STARTER PANEL FAULT
AD-01	AMPLIFIER	
PT-01,07	EMV PRESS TRANSMITTER	Range: 0~30kg/cm ² OUT: 4~20mA
PT-02,08	COND PRESS TRANSMITTER	Range: 0~30kg/cm ² OUT: 4~20mA
PT-03,09	OIL WTR PRESS TRANSMITTER	Range: 0~30kg/cm ² OUT: 4~20mA
PT-04,10	OIL DISCHARGE TRANSMITTER	Range: 0~30kg/cm ² OUT: 4~20mA
HMV,2	HOT GAS BRASS V/V ACTUATOR	
AMV(ON/OFF)	AMV ACTUATOR	
VI	INTERLOCK (V)	
SA	SIREN ABSORBER	471b-10A

INTERFACE

INTERFACE with CONTROL CENTER and MCC PANEL

REFERS TO NOTE 5

(9A) (10A)

INTERFACE with STARTER PANEL of CHILLER's COMPRESSOR MOTOR

(9B) (10B)

NOTE

1. THESE PARTS SHOULD BE SUPPLIED BY BUYERS.
(이 부분은 수요자측 준비 사항입니다.)
2. THESE PARTS ARE LOCATED ON CHILLER BODY.
(이 부분은 냉동기 본체에 설치됩니다.)
3. INTERFACE WITH USER'S SYSTEM or STARTER PANEL
(이 부분은 수요자측 시스템 또는 기동반과 접속되는 부분입니다.)
4. REFERENCE DWG : INTERFACE CONNECTION DIAGRAM
(수요자 접속도를 참조하십시오.)
5. COMP EMERGENCY STOP(CES) - OPTION
(옵션 모터 비상 정지 접점은 옵션 사항입니다.)

APPENDIX

1. Torque specification for bolts tightening

Flare part

Type	Tightening torque (N m)	
	Union-Type	Flare Type
1/4"	20	20
3/8"	30	35
5/8"	100	85
7/8"	250	150

Electrical wiring part

Type	Tightening torque (N m)
M3	0.6 ~ 0.8
M3.5	1 ~ 1.3
M4	1.5 ~ 2
M5	3 ~ 4
M6	5 ~ 6
M8	12 ~ 15
M10	24 ~ 49
M12	41 ~ 100
M16	103 ~ 127

