

INSTALLATION MANUAL

Absorption Chiller Heater

Before installation, be sure to read the safety precautions and use correctly.
It is the content to keep the safety of the user and prevent damage to the property.
After reading the installation manual, keep it where user can see any time.
Only permitted persons can use.

Model name : WCDH****(H-Type, Ultra High efficiency)
WCDN****(N-Type, High efficiency)
WCDS****(S-Type, General)
WCDA****(A-Type, General)

Thank you for using our Absorption Chiller-heater product.

You can use it more conveniently and safely if you install following the directions after reading the installation manual.

- Be sure to read this installation manual before using in order to install the Chiller-heater safely and correctly.
- After installation work, be sure to perform commissioning and checking following the user's manual.

* This manual consists of safety precautions when installing the absorption chiller-heater, basic information of the product, delivery and installation and wiring information.

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1. SAFETY PRECAUTIONS_WARNING/CAUTION

Installation of the product, movement or delivery of a heavy object or installation environment can be dangerous due to its pressure, electric devices, installation location(rooftop, lifted structure), etc.

Please read carefully the warnings and cautions on this manual and the labels attached on the unit, and follow the instructions.

Please follow the following instructions to prevent any injury to other people or property damage

- Inaccurate operation by ignoring the instructions in this manual may result in an injury or damage. The seriousness of the result can be classified as the following signs.
- Please note that any failure of system caused by user's careless maintenance, natural disaster or the failure of the power cable shall not be warranted regardless of the warranty period.
- Please note that any part of this manual can be revised without notice for the product improvement.


WARNING


This symbol shows that there is possibility of serious injury or death when the instruction is ignored.

CAUTION

This symbol shows that there is possibility of property loss or damage when the instruction is ignored.

The meanings of symbols used in this manual are as shown below.

 Always prohibited.

 Follow the direction.

1-1. WARNING

- Have all electric work done by a licensed electrician according to "Electric Facility Engineering Standard" and "Interior Wire Regulations" and follow the instructions given in this manual and always use a specified circuit.
 - If the power source capacity is inadequate or electric work is performed improperly, electric shock or fire may result.
- The unit should be installed only by an authorized dealer who acquired installation license.
 - Improper installation may result in water leakage, electric shock, or fire.
- For movement or re-installation of the installed product, always contact a dealer or an Authorized Service Center.
 - It may cause fire, electric shock, explosion, or injury.
- Make sure to equip the circuit breaker and authorized fuse.
 - If they are not installed, there is a risk of fire or electric shock.
- Do not disassemble, repair or reconfigure the unit arbitrarily.
 - 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.
 - If not, there is risk of fire or electric shock.
- Do not store or use flammable gas or combustibles near the unit.
 - It may cause fire or failure of product.

- Do not reconstruct or change the settings of the protection devices.
 - If the pressure switch, thermal sensor, 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.
- 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 an authorized dealer.
- Do not use damaged circuit breaker or fuse works 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.
 - It may cause fire or electric shock.
- Use a dedicated outlet for this unit.
 - It may cause fire or electric shock.
- Be careful not to leak the exclusive absorption liquid(LiBr) when installing or moving to another location.
 - The absorption liquid causes dehydration when contacted with skin or clothes.
- Do not touch the power switch with wet hands.
 - It may cause fire, electric shock.
- Ventilate before operating the unit when explosive gas has 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.
- 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 a specialist.
- Redesigning the control panel is prohibited.
- Lock the control panel with locking device if possible and if you need to open the control panel inevitably, turn off the main power first.
 - Do not touch the wiring or parts inside the panel.
 - It may cause electric shock, fire or failure.
- Keep the permitted pressure level
 - Keep the regulated pressure for cold water, cooling water, refrigerant etc.
- Use fuse and leakage breaker of rated capacity.
 - If not, it may cause fire and defects.
- Be careful of fire, earthquake and lightning.
 - In case of any natural disaster such as fire, earthquake or lightning, immediately stop operating the unit.
 - If you continue to operate the unit, it can cause a fire or electronic shock.
- Follow all safety codes.
 - When operating 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.
 - To use an alternative refrigerant, contact the manufacturer.
- During installation and service, shut down the power supply.
 - If not, 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 devices.
 - Wear safety glasses and work gloves.
 - Be careful when installing or operating the chiller and operating electrical components.
- Always run fluid through heat exchangers when charging or removing refrigerant.
 - Potential damage to the tube within the heat exchanger can be prevented.
 - Use appropriate brine solution or chilled water in water circulation loop to prevent the freezing of heat exchangers when equipment is exposed to temperature below 0°C.
- Be careful of water leakage.
 - In case of any water leakage in the connection parts of 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 work cannot be completed, seal the loop cycle to prevent any contamination or rust within the unit, and charge dry nitrogen.

1-2. CAUTION

- Always check for gas leakage after installation or repair of product.
 - It may cause product failure.
- Do not install the unit where combustible gas may leak.
 - It may cause damage to the property.
- Keep level even when installing product.
 - Uneveled refrigerant can cause problems to the product.
- Do not use the product for special usage or location such as preserving animal/plant, precision machinery, 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 or 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 unit to operate erroneously, or fail to operate.
 - On the other hand, the unit 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) directly. If necessary, please install shield.
 - It may cause product deformation or defects.
- Make the connections securely so that tension may not be applied to the cable.
 - If tension is applied, the cable may break or heat may be generated causing fire.
 - If the power cable is damaged, do not replace it directly, but call the service center for replacement.
- Do not use the product in special environments.
 - Oil, steam and sulfuric fume can deteriorate the product performance or cause damage to the parts.
- Be careful when transporting the product.
 - When carrying the chiller, always consult a specialized expert.
- When transporting the chiller, always follow the methods described in the manual. If not, it can be overturned or fallen off.
- Be sure the installation area does not deteriorate with age.
 - If the base collapses, the chiller could fall off, 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 or vinyl 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 or after operation.
 - Pipe during or 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 a burn or a frostbite.
- Turn on the main power 12 hours before operating 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 running.
 - 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 or fire.
- Be careful of chiller installation.
 - Keep enough clearance around the product for service and especially for air cooling type, install the product in a well ventilated location where there is no obstacle.
- Do not use harsh chemical, household bleach or acid cleaner to clean the chiller.
 - These cleaners can be very difficult to rinse off and can accelerate corrosion at the contact surface when dissimilar materials are in contact.
 - Use eco-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 or defect.
- Use appropriate tools.
 - Use tools appropriate for the repair work and calibrate the measuring devices accurately before using.
 - Using inappropriate tools can cause 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. If not, 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 operation and contact the service center.
 - Insufficient check may cause fire, explosion or error.
- Do not attempt to eliminate or alter any of the factory wiring.
 - If compressor is operated in the opposite direction, the compressor may break and should be replaced.

- Do not use jumpers or other tools to short out components, or bypass the parts differently from recommended procedure.
 - Short-circuiting the control board ground line with other wires can damage the electric module or electric components.
- Water should be within design flow limits, and should be treated cleanly.
 - This ensures proper machine performance and reduce the potential of tubing damage due to corrosion, scaling, algae, etc.
 - LG Electronics is not responsible for any damage caused by chilled water not treated or improperly treated.
- Consult a water treatment specialist for proper treatment procedures.
 - Chemical treatment may be required to prevent or remove scale or corrosion.
- Turn the controller power off before service work.
 - It secures safety and prevents damage to the controller.
- 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 thermometers before welding.
 - After the welding is completed, reinstall the flow switch and thermometers
 - Failure to remove these devices may cause component damage.
- For some time after the installation and commissioning, be sure to do a periodic bleeding for 1~2 months.
 - Bleeding is an important process affecting the function of the chiller-heater and the life expectancy of the machine.
 - In air-conditioning mode, conduct at least once per week for the main body and 2~3 times per week for the lower chamber.
 - When heating, conduct 2~3 times per month only for the main body.
- When conducting bleeding, be careful of the processing order.
 - Pressure and temperature may rise due to the effect of air inflow.
- Water leakage may occur due to the effect of vibration during transportation since it is a heavy object.
 - Check the bolt tightening condition before supplying water.
- When supplying water, open the valves in the water system slowly.
 - It can extend the life expectancy of the machine.
- During commissioning, the circulating amount may run short due to improper absorbent control, improper cycle control or excessive differential pressure in the panel type heat exchanger.
 - Crystals may be generated if the circulating amount of the absorbent runs short.
 - It may cause insufficient performance or noise.
- To prevent freeze-ruptures, be sure to connect the interlock wiring so that the chilled water/cooling water pumps can be interlocked when the machine operates/stops.
 - Otherwise, it can cause damage to the machine.
- Do not apply shock to sensors, gauges or switches.
 - It can cause malfunctioning of the electric devices and damage to the machine.
- Be sure to check the circuit diagram in the interlock wiring and electric wiring.
 - Otherwise, it may cause damage to the machine or abnormal operation of the accessory equipment.
- Do not randomly adjust the set values of safety devices, dampers, valves, etc.
 - It can cause malfunctioning of the electric devices and damage to the machine.
- Do not operate with wet hands.
 - It may cause electric shock.
- Do not climb on top of the machine. It may cause injury due to slips and falls. Also do not step on weak parts such as the copper tubes.
 - It may cause falling and damage to the machine.
- Tighten bolts and screws with specified torques.
 - It may cause leakage.
- Be careful with the inflow of foreign materials (water, oil, absorbents)
 - It may cause the mercury column to be separated or reversed.

2. INTRODUCTION

2-1. General Information

This manual describes the installation of the general product group of the direct fired chiller-heaters which use water and apply the DN series.

2-2. Product structure

Figure 1 shows the general structure and parts composition of the absorption chiller-heater.

Since the location of the control panel, type of water box, directions of the chilled water/cooling water inlet/outlet and some piping may vary by model and customer specifications, prepare and check the approved drawing applicable to the site for detailed information.

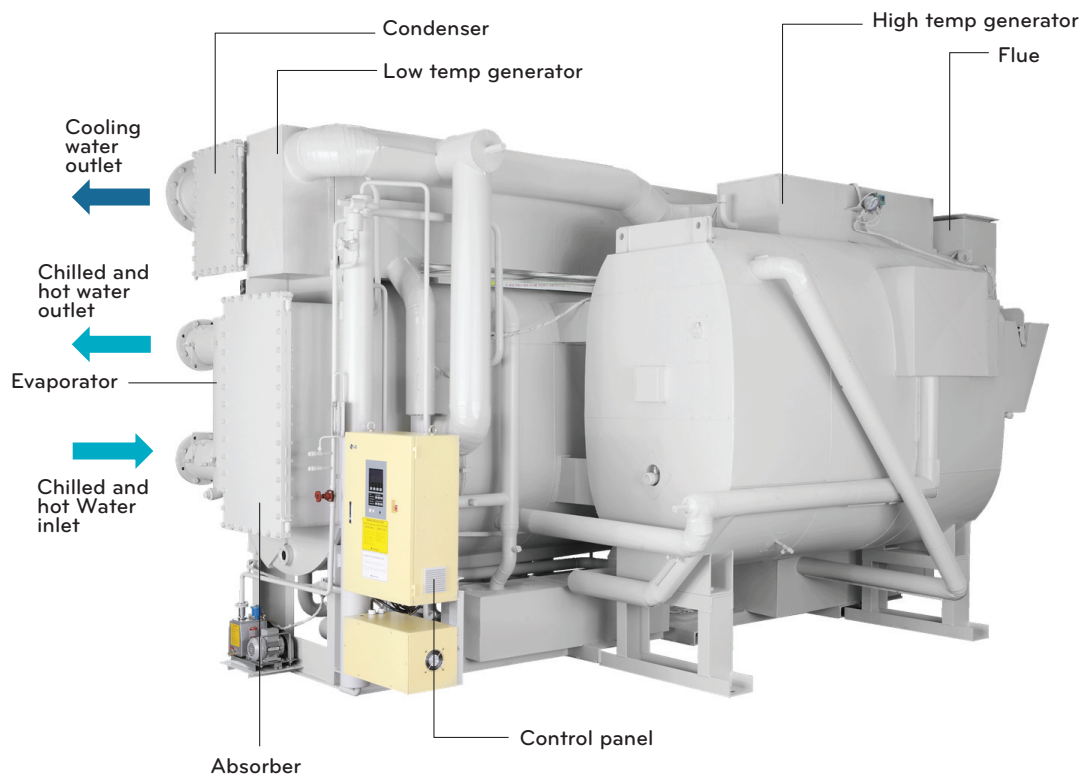


Figure 1. General structure of the direct fired chiller-heater

2-3. Nomenclature

The model name of the Centrifugal Chiller is as shown in Figure 2.

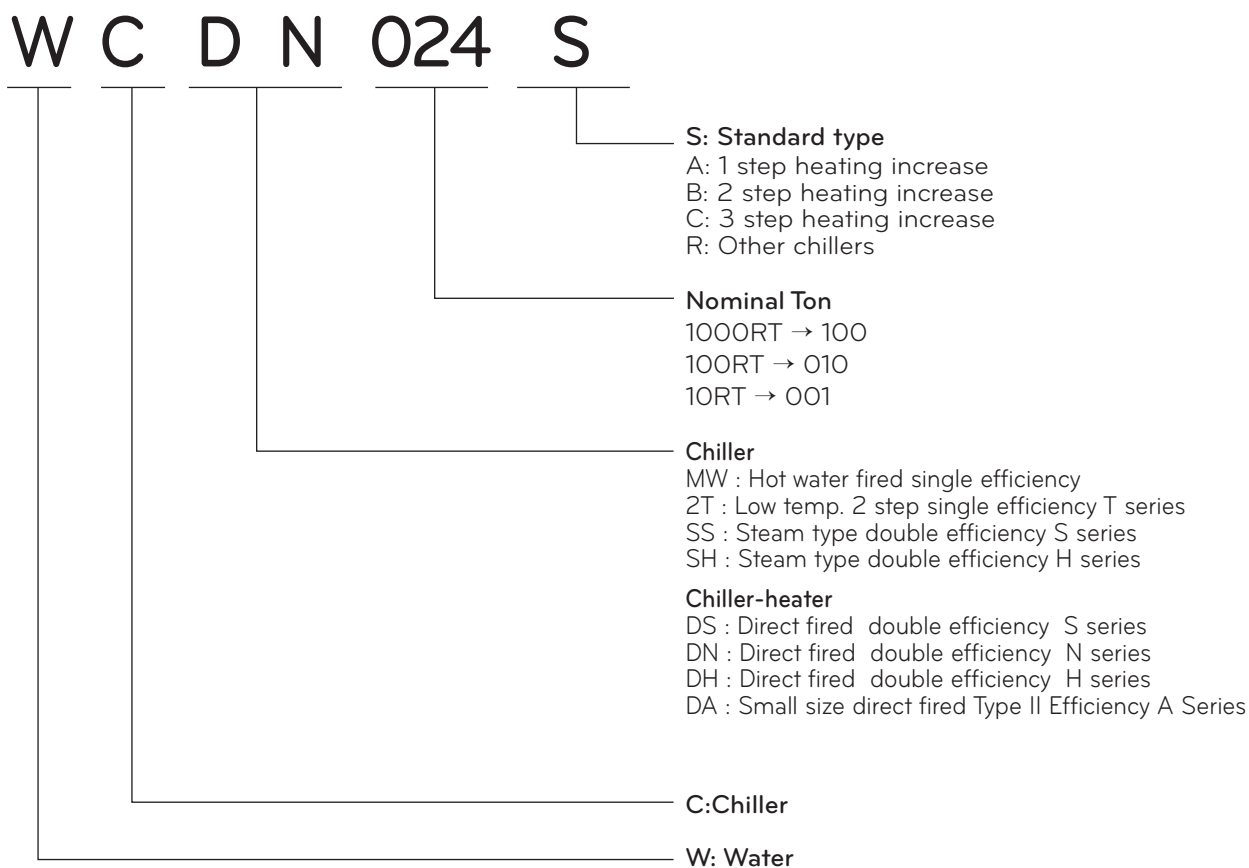


Figure 2. Nomenclature

2-4. Name plate

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

ABSORPTION CH & HEATER	
MODEL	
COOLING CAPACITY	USRT
HEATING CAPACITY	10 ³ kcal/h
CHILLED WATER FLOW RATE	m ³ /h
CHILLED WATER TEMP.	— °C
COOLING WATER FLOW RATE	m ³ /h
COOLING WATER TEMP.	— °C
HOT WATER FLOW RATE	m ³ /h
HOT WATER TEMP.	— °C
FUEL TYPE	
TOTAL CALORIFIC VALVE	kcal/Nm ³ , kg
GAS PRESSURE	mmAq
FUEL CONSUMPTION (COOLING)	10 ³ kcal/h
FUEL CONSUMPTION (HEATING)	10 ³ kcal/h
ELECTRIC POWER	~3Ø V Hz
SERIAL NO.	
MANUFACTURE DATE	

LG Electronics

- ① Model name
- ② Cooling capacity
- ③ Heating capacity
- ④ Chilled water flow rate
- ⑤ Chilled water temperature
- ⑥ Cooling water flow rate
- ⑦ Cooling water temperature
- ⑧ Hot water flow rate
- ⑨ Hot water temperature
- ⑩ Fuel type
- ⑪ Total Calorific valve
- ⑫ Gas pressure
- ⑬ Fuel consumption (Cooling)
- ⑭ Fuel consumption (Heating)
- ⑮ Electric power
- ⑯ Manufacture's serial number
- ⑰ Manufacture date

Figure 3. Name plate

3. PREPARATION FOR INSTALLATION

3-1. Checking site information

- Before installing the absorption chiller-heater, check the site beforehand, review necessary Details and coordinate the following items with the site personnel so that the installation can be performed safely and accurately.
 - 1) JOB Data: Check the scope of the site installation work and the approval document.
 - 2) Installation location: Check the environmental condition following 3-2 clause.
 - 3) Access check: Check the size of the receiving dock (width, length & height) and plan ahead to avoid any problems with the delivery, and check and review the access method and order sufficiently.

3-2. Condition for the installation site

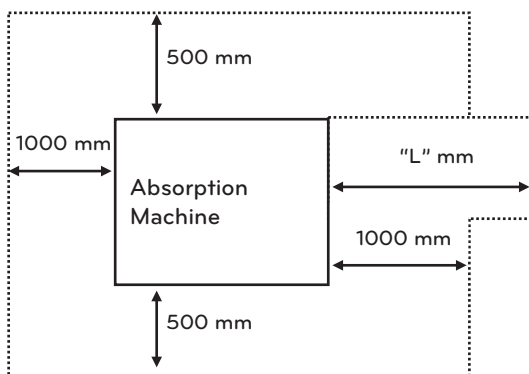
- To operate the machine efficiently and for easy maintenance, it is necessary to find a proper place for the equipment related to the machine. Do not locate the machine in a narrow space which limits the user's movement as well as tube cleaning or storing the absorbent, or where ventilation is unavailable, which can cause a gas explosion.

Please select a proper place which satisfies the following conditions.

- 1) The machine room should be equipped with a sufficient ventilation system with a surrounding temperature maintained at 5°C ~ 45°C. In case of the direct fired type, a poor ventilation system can cause a gas explosion. When calculating the total amount of air supply in the direct fired chiller-heater, the amount of air for fuel combustion must be considered, because the direct fired chiller-heater consumes indoor air for the combustion of fuel.

Total amount of air supply to the machine room = Amount of air ventilation + Amount of air for fuel combustion

- 2) Avoid places with high humidity or high amount of dust. Humidity or dust can cause electrical malfunctioning of the absorption chiller-heater.
For optimum operation, it is recommended to operate the machine in a place where the relative humidity is 20 ~ 80%RH.
- 3) The machine room should have enough service space for tube cleaning and future maintenance. The recommended separation distance is as follows.
Recommended service separation distance is as follows.



※ For detailed items, please refer to the approved drawing.

• Service separation distance

Model (RT)	L(mm)
100~120	2,400
150~240	3,400
280~500	4,500
560~630, 800	5,200
700, 900	5,700
1,200, 1,400	6,200
1,300, 1,500	6,700

3-3. Foundation work considerations

- 1) Before installing the absorption chiller-heater, always secure the service space specified in the foundation drawing. It is the minimum required space for maintenance.
- 2) For the installation of the absorption chiller-heater, it should be firmly installed at a location where the running weight can be endured based on the specifications indicated on the foundation drawing.
- 3) Make sure to arrange a drainage path for the chilled water and cooling water drainage for the cases of tube cleaning of the absorption chiller-heater and water disposal, and non-operation.
- 4) To guarantee the stable operation of the absorption chiller-heater, level the absorption chiller-heater by adjusting the leveling plate when installing. (The leveling degree should be within 2mm per 1,000mm)
- 5) Foundation work is out of the scope of LG. Please work according to the approved foundation drawing. LG Electronics is not responsible for equipment problems due to an inappropriate foundation design and construction.
- 6) Foundation work should be done enough to support the weight of the machine so that it can maintain its levelness. When installing on a roof or a high location, vibration and noise must be considered.
- 7) The absorption chiller-heater operates normally even if it is not anchored since its own weight is heavy enough. However, when needed, it is recommended to apply one of the works in Figure 4 below before installing the machine.

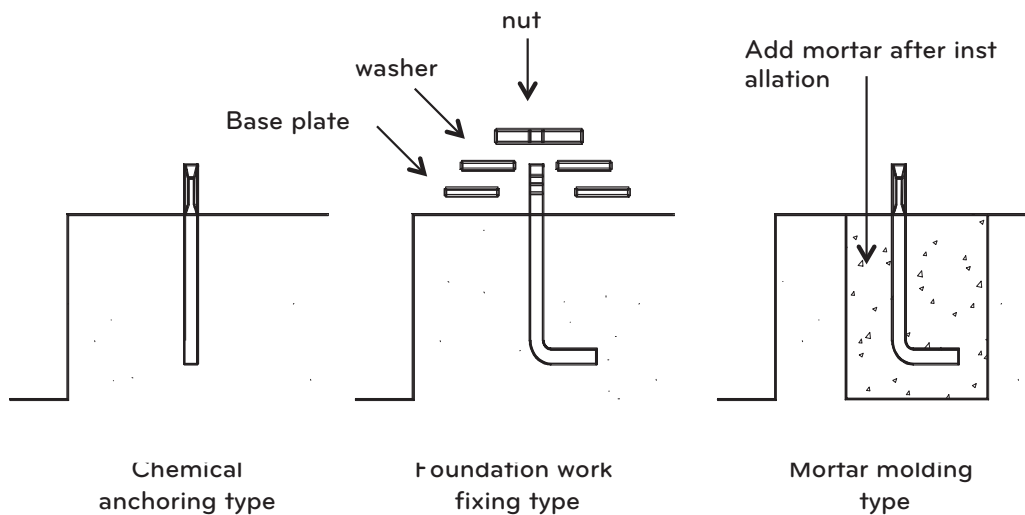


Figure 4. Considerations for foundation work

3-4. Long-term storage and proper place

In case of long-term storage of the absorption chiller-heater, regardless of whether before or after the installation, store and maintain in the following conditions.

3-4-1. Condition for the storage place

When storing the machine for a long period, store in a place where the conditions for the installation site specified in clause 3-2 can be satisfied. In the environmental condition where outside temperature is below 0°C or rapid temperature changes occur, store after completely draining the chilled water and cooling water in order to avoid freeze-bursts.

For electric parts such as the control panel or vane operation, install protective covers and store them in a place that is dry, vibration-free and safe from long-term exposure to sunlight.

3-4-2. Checkpoints when storing the absorption chiller-heater for the long term

Checking Item	Checking time	Check points
Chiller condition check	When arriving at site	Check the exterior of the chiller and see whether there is any damage or refrigerant leakage. Especially, check whether there is any leakage in the pipe connection parts.
Storage of the electrical system	That day	Fully cover the operation panel, security relays and control motor, etc. with a vinyl cover and add desiccants(silica gel, etc.) inside the cover. For other electrical systems, cover with vinyl to keep them from collecting dust.
Periodic check	Once a week	Check visually for any damage to pipes and leakage of connecting parts. Check the pressure gauge installed on the condenser, and record/manage the changes in the pressure level. In case of refrigerant leakage, take action according to the installation manual. Check visually for any damage to pipes and leakage of connecting parts. Check the pressure gauge installed on the condenser, and record/manage the changes in the pressure level. In case of refrigerant leakage, take action according to the installation manual.

3-4-3. Check after long-term storage

- 1) When the long-term storage period is over 2 years, check through the site glass for any mechanical or electrical problems before operating the machine again. If there are any problems, those should be checked by an LG engineer.
After storing for a long period of time, it is recommended to have an inspection performed by a professional service agency.
- 2) When the product is left without any nitrogen pressure or refrigerant, have the machine checked by LG or a professional service engineer before operation.
- 3) Checking the electrical system
Check if there are any defects in the parts or problems in the pipe connection parts, and measure the motor insulation resistance. For the checking procedure and judgment criteria, proceed based on the procedure indicated in the operation and maintenance manual.
- 4) Checking the water system
The interior of the chilled water/cooling water system is expected to be contaminated due to the inflow of dust or external particles when stopped for a long period. Clean the water system and check the filter.
The cooling water system needs special care since it is generally of an open type piping system.
- 5) Perform commissioning based on the operation & maintenance manual.

3-5. Cautions on product installation

LG Electronics is not responsible for problems caused by not following the cautions.

3-5-1. Checkpoints before carrying in and installing the machine

- 1) Check whether a ventilation system is equipped in the room where the absorption chiller-heater is installed.
- 2) Select a place where the room temperature is below 40°C, ventilation is sufficient and the temperature is low. Especially be aware of temperature rises in the long-term storage place and keep the room temperature below 40°C.

3-5-2. Cautions when carrying in and installing the machine

- 1) Move the machine in a fully balanced position. If the machine is subjected to impact or tilted, the refrigerant may leak causing damage to the machine, so pay close attention.
- 2) When raising the machine, be careful not to get the wires caught in valves or piping, etc.
- 3) When raising or lowering the machine, be careful not to get the valves or piping to clash with columns or obstacles.
- 4) The carrying-in weight includes the weight of the charged refrigerant and oil. When carrying it in, always consider the added weight.

3-5-3. Cautions after the installation

- 1) During the processes of water pipe connection, safety valve exhaust pipe connection, insulation, etc., be careful not to damage the valves, piping, etc. of the machine.
- 2) After completing the water piping work, be careful not to allow hot water to flow through.
- 3) In case of long-term storage, consult a service personnel.
- 4) Always operate a ventilation system.

3-5-4. Action when liquid absorbent is leaking

- 1) In case the liquid absorbent leaks out due to external damage or leakage, capture the leaking absorbent in a clean vessel.
- 2) Immediately after identifying the leakage or absorbent leakage, stop operation and contact LG.
- 3) If the leakage amount is small, wipe off with a dry cloth. If the amount is large, always capture it in a clean vessel.
- 4) In the process of collecting the absorbent or filling in a vessel, if the absorbent contacts with skin or clothes, wipe it off with soap water.

4. PRODUCT RECEIPT

4-1. Check item list and product condition

Absorption chiller-heater is shipped either in the single unit type or separate unit type, and charged with refrigerant or nitrogen depending on the situation of the site.

Check the specifications of the site.

1) Single unit type or separate unit type

For the single unit type, all parts are preassembled upon delivery, and for the separate unit type, the product is separated into 2 or 3 units upon delivery depending upon the site condition. Especially for the separate unit type, check and record whether all the parts are shipped properly according to the delivery list.

2) Refrigerant charged delivery or nitrogen charged delivery

For the single unit type, the product is shipped with the refrigerant or nitrogen charged following the requested conditions by the customer.

For the refrigerant charged product, the absorbent and refrigerant which are required in the chiller are included.

In case of nitrogen charging, it is shipped from the plant with a pressure of 0.3~0.5 kg/cm²·G.

If the pressure is "0", record the condition as there is a danger of leakage, and always check for any leakage.

4-2. Product inspection

1) Check whether the packing list and the receipt list match each other.

2) Check the information on the product plate against the project information.

Refer to clause 2-4 for details on the information on the plate.

3) Check the exterior condition of the product and check if there are any damages or leakages.

If any damaged parts are found on the equipment, first check the safety of the damaged parts (refrigerant or absorbent leakage, etc.), and if there is no damage, procure a photograph and contact an LG engineer for further action.

4-3. Product protection

When receiving the product, check and record the following details to protect the product.

1) When shipped, the product is charged with refrigerant or nitrogen to prevent corrosion from external moisture penetration. Be careful not to randomly operate or open the valve and connector attached to the product.

If the water box is sealed with a blank flange, nitrogen is charged at a pressure of 0.3 ~0.5 kg/cm²·G.

Therefore, purge with nitrogen first and then open the flange.

2) When receiving the product, check the exterior and pipe condition, and check and record any leakage from damages or loose bolts.

3) If the product is damaged, or if there is an issue with a part when checking, immediately provide the details of the problem to the delivery personnel and contact the personnel in charge at LG Electronics. A damaged product should not be installed without the approval of LG.

5. PRODUCT CARRYING IN AND MOVING

5-1. Considerations when carrying in the product

When receiving the product, check the size and weight of the product, and check in advance whether the size of the receiving dock is sufficient. After checking the environmental condition of the site, prepare the transportation device and method appropriate for the weight and size of the product.

Secure the minimum required receiving dock and be careful not to damage the product when delivering the product. Since detailed dimensions are different by product, please refer to the provided approved drawing.

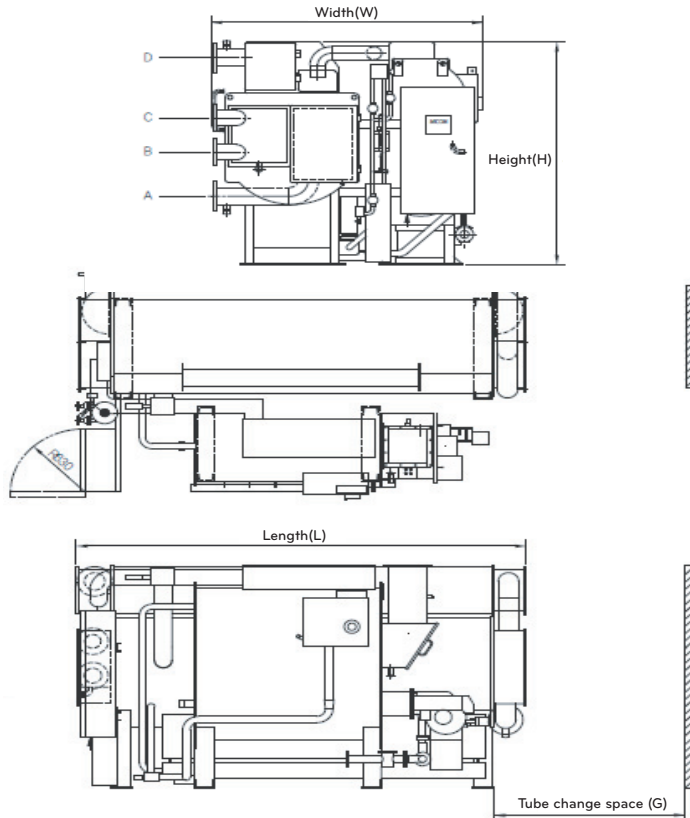


Figure 5. Product delivery

! NOTE

1. For pipes for the chilled/hot water, cooling water and fuel, etc, insertion welding type flanges of a nominal pressure of 10K are used according to ANSI 150.
2. Space for tube changing is needed in either side of the chiller-heater.
3. The following minimum space is needed around the chiller-heater.
Lengthwise: 1,000mm
Top area : 200mm
Other area: 500mm
4. Refer to LG's approved drawing for directions on inlet/outlet piping of chilled water, cooling water and hot water.

5-2. Transportation method

5-2-1. Moving by crane

When lifting up and moving the machine, hang the connecting rings, and hook the wires to the holes on the pipe plate of the machine so that the load is centered, to level the absorption chiller-heater.

The lifting holes are provided in the lower unit or upper unit as well as in the high temp. generator. And it is recommended to use the chains and wire ropes in the following specifications.

Item	Quantity	Specification
Connecting ring	4	18(JIS B 2801)
Wire rope	4	Circumference 16mm, length 4m or longer

Please move the product always abiding by the following warning/caution.

! WARNING

- Balance the machine sufficiently when lifting it up. Secure the minimum chain length. First lift it up about 0.5m to test and check whether the product is leveled, and check if the product is appropriately lifted. Each cable should be capable of supporting the weight of the product. When using a crane, to prevent excess mechanical stress, a pint cable should be attached to show that it is balanced.
- Tilting the machine while lifting up or moving can damage the product, and the product can drop down due to the biasedly concentrated load, causing major injury or death.
- In order to prevent damage, it is recommended to receive advice from an expert when receiving the machine, and the machine should be properly handled depending on the site condition.
- When a cable contacts with the machine, support it with mat(linen) or a wood piece to prevent damage to the machine.
- Do not remove the packaging material of the machine until the machine is completely moved.

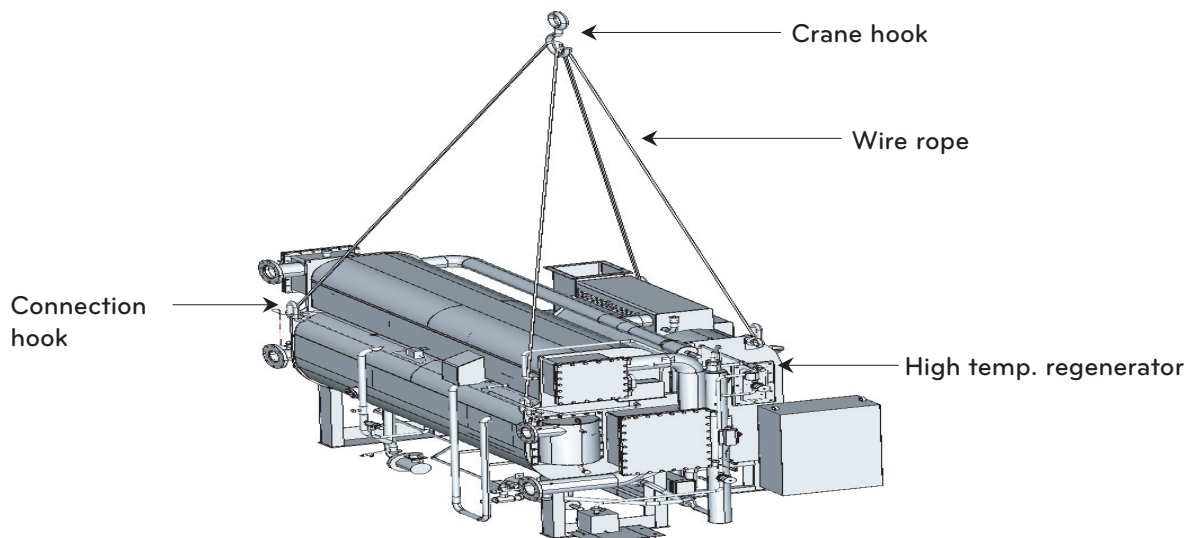


Figure 5. Moving equipment using crane

5-2-2. Moving using rollers

Make sure the receiving dock entrance has additional clearance of 300mm or more from each of the maximum width and height of the machine. The following figure shows how to carry in the product using rollers. Make sure not to apply any impact to the machine. If damaged, repair may not be easy.

When receiving the product using rollers, the required rollers 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 with regard to safety when transporting the product.

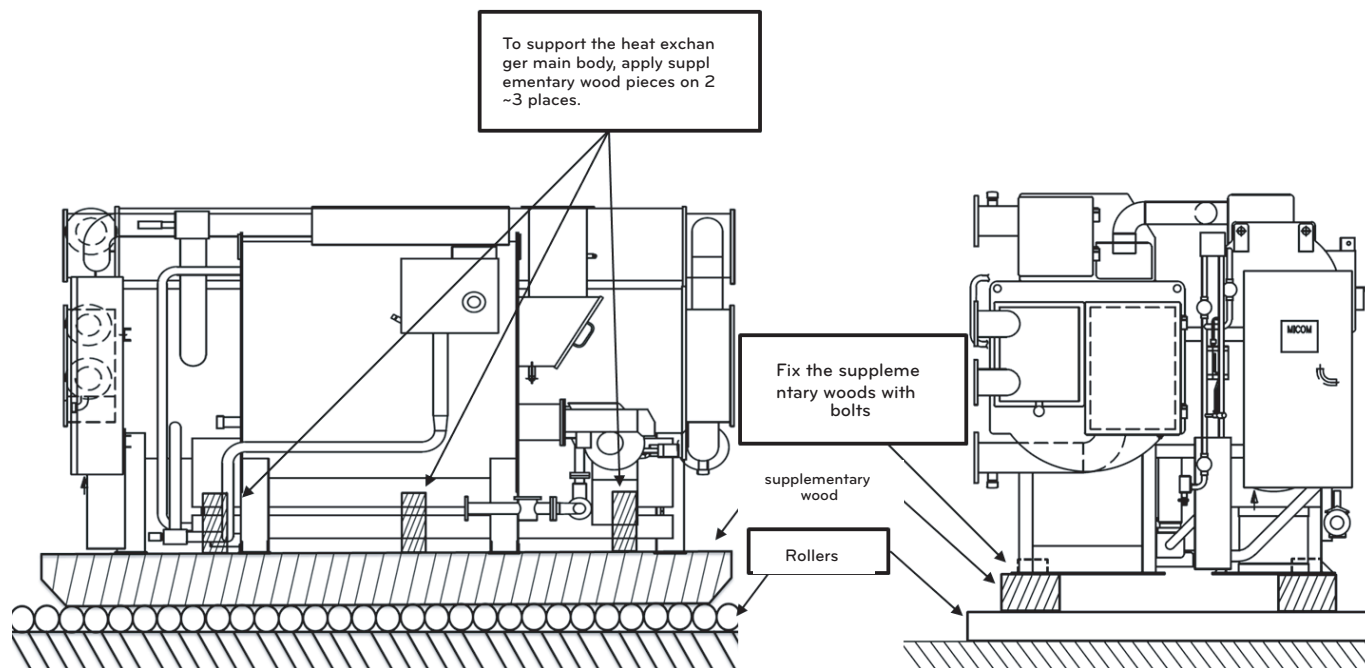


Figure 6. Moving the machine using rollers

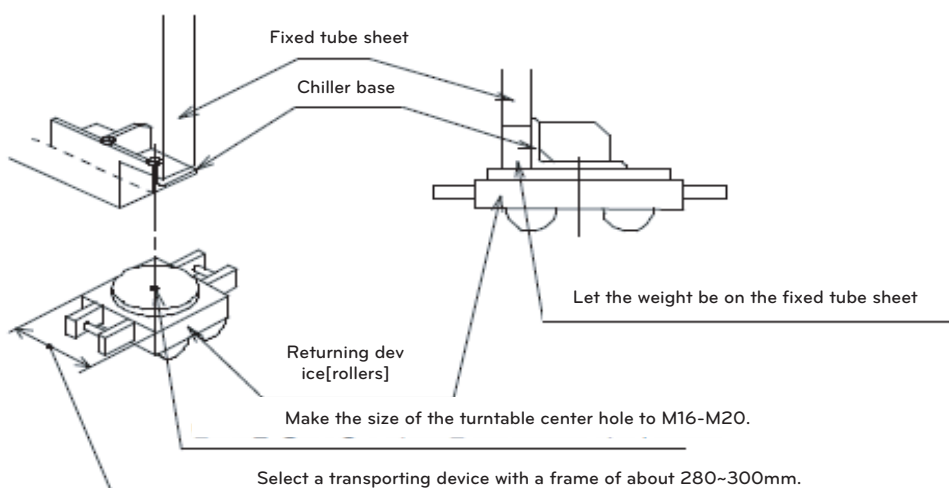


Figure 7. How to use the transporting device (roller)

6. PRODUCT INSTALLATION

6-1. Installation requirements

- 1) Secure sufficient space to install the attached devices, wiring and pipes and for service work when considering the location of the machine. Check the level and strength of the base for installation. To maintain the best operating condition, the leveling degree should be smaller than 2/1,000mm tolerance. For information on the part used to lift the absorption chiller-heater, mounting, and the product weight and operating weight, refer to the product specifications, product dimension and foundation drawing.
- 2) Service space for the absorption chiller-heater varies by model. Secure sufficient space to provide service work for the chiller.
- 3) When installing multiple absorption chiller-heaters in the same site, secure appropriate service space.
- 4) Since detailed dimensions are different by product, please refer to the provided approved drawing.

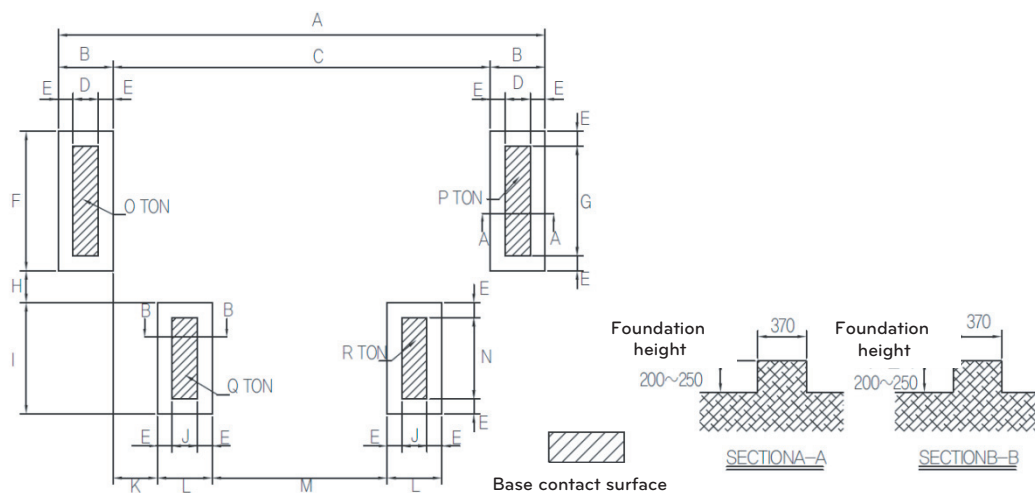


Figure 8 Base dimension (Standard model)

! WARNING

- Install the absorption chiller-heater at a location with sufficient strength to support the weight. If the strength is insufficient, the machine can drop and cause injury.
- Install the machine so that it can be protected against earthquakes. The machine may drop and cause injury due to improper installation. Be especially careful on floor support strength when constructing the foundation surface, drainage (processing water coming from the machine during operation), piping and wiring.

6-2. Unit leveling

To make sure the refrigerant is leveled and to ensure the reliability and stability of the machine during operation, always make sure to level the product during the installation. (Keep within a 2mm deviation per 1m). When leveling the product, consider all the directions including front/back/left/right, length and width directions.

** How to ensure that the product is leveled

1) Use the water head difference. (Use a transparent vinyl hose.)

The horizontal deviation checking point is marked at each edge of the tube sheet in the bottom shell of the machine. When checking the levelness after deciding the position, fill water in a clean vinyl hose and measure the differences of the water head between one point and the other three points, as shown in Figure 3-3.

2) Check whether the allowance in end-to-end and side-to-side is 2mm per 1m for the 1 meter distance between the points. If the machine does not meet this condition, the height of the machine should be adjusted using a bottom board (liner plate) to meet the horizontal allowance.

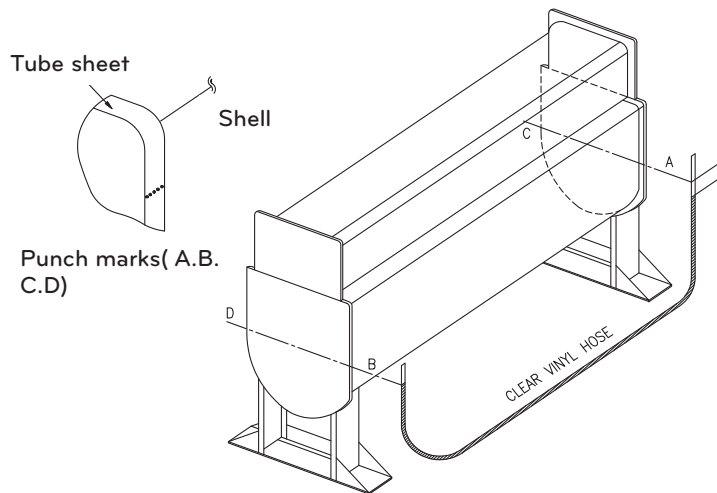


Figure 8. Leveling the machine

6-3. Unit isolation

To minimize the transfer of noise and vibration through the building structure, install an isolation pad under the base surface of the product.

6-3-1. Standard unit isolation (isolation pad)

1) For the basic anti-vibration, install an isolation pad on the base of the product, as shown in the figure below.

2) Installation of anchor bolt (optional)

Even though there is no anchor bolt fixing, the chiller will have no problem, when asked by customer, install as shown in the figure.

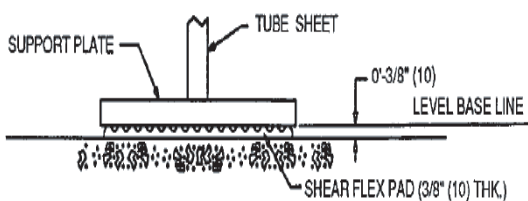


Figure 9. Isolation pad (Standard)

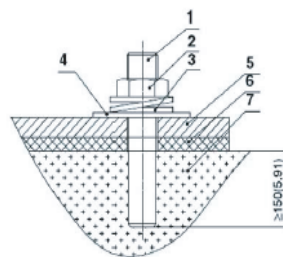


Figure 10. Installation of anchor bolts (Optional)

[Unit: mm(inch)]

No	Name
1	Foundation bolt
2	Nut
3	Spring washer
4	Flat washer
5	Product base
6	Isolation pad
7	Foundation floor

7. PIPE INSTALLATION

7-1. Considerations on connecting water pipes

Install the water piping to the Centrifugal Chiller considering the following details.

Water piping is not included in the scope of the LG's standard installation work scope.

When installing the Centrifugal Chiller, check whether the considerations are appropriately applied.

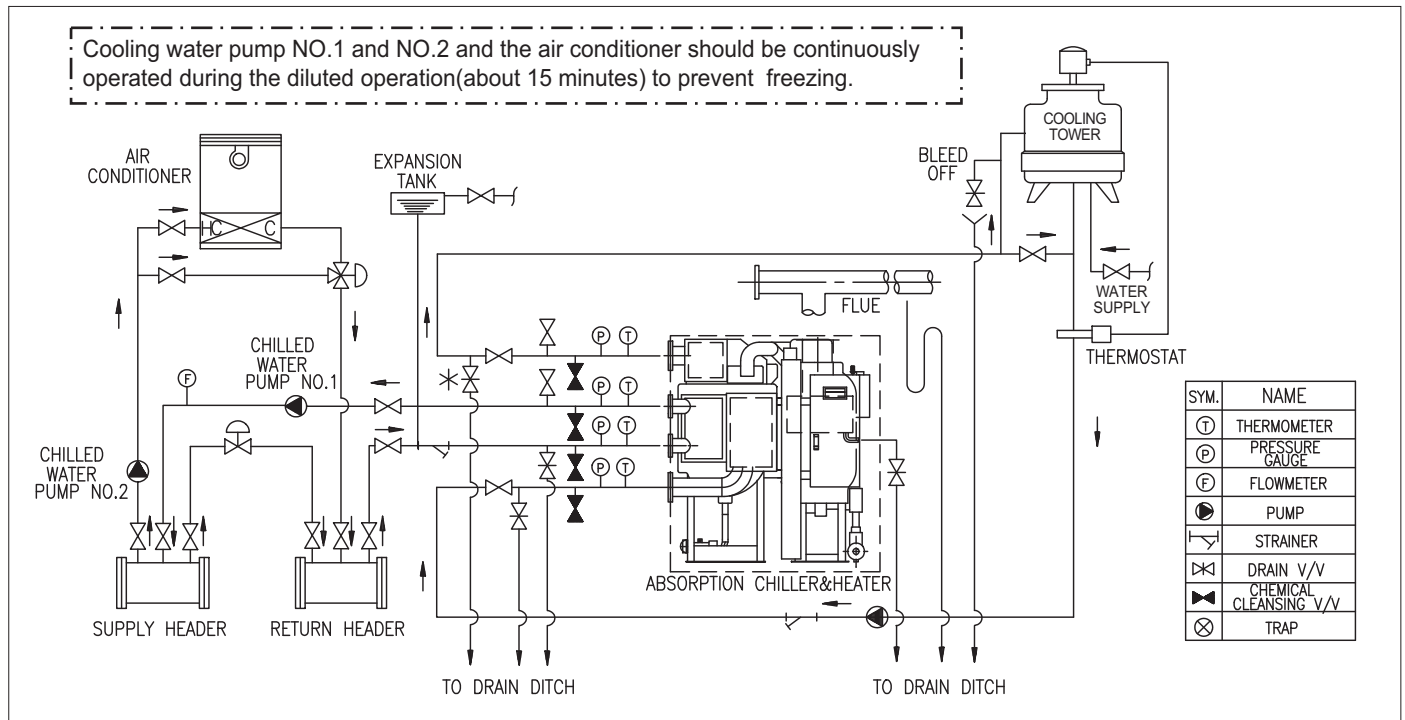


Figure11. Piping diagram of absorption chiller-heater

- 1) All external equipment other than shown in the document (inside the dotted line) are not prepared or supplied by the absorption chiller-heater manufacturer.
- 2) Regarding pipe connections and diameters, refer to the external dimension drawing and specifications table which are separately provided.
- 3) Determine the locations of the chilled(hot) water pump, cooling water pump and expansion tank considering the hydrostatic head of the pumps and building height. And, make sure not to apply a higher pressure than the designed maximum pressure in the absorption chiller-heater. LG's standard pressure is 10kg/cm².
- 4) Chilled(hot) water pump and cooling water pump should be supplied exclusively for each machine use as much as possible.
- 5) For cooling water quality control, it is recommended to install a cooling water bleeding device in the inlet pipeline of the cooling tower.
- 6) Install a strainer of about 10 mesh in all of the chilled(hot) water and cooling water lines.
- 7) For the maintenance and inspection of the machine, install the following devices not only on chilled(hot) water and cooling water inlet/outlet lines but also on the stop valve.
 - Install a thermometer and pressure gauge on chilled(hot) water and cooling water inlets and outlets.
 - Install an air relief valve on each chilled(hot) water and cooling water line at a higher position than their respective water rooms.
 - Install a drain valve at the lowest position between each stop valve of chilled(hot) water and cooling water and the machine. The pipe of the drain valve should be connected to the drain.
 - Install a PT 1 1/2" valve between the stop valve and the inlet/outlet of each water line for cleaning of the water line.

7-2. Considerations on the flue duct and chimney

Figure 11 below is provided as reference for piping design and water flow planning to be used as the information pertain to water box.

This shows the Nozzle In Head Type for standard product, and for non-standard specification, such as Marine Type, please contact LG Electronics.

IMPORTANT

The following applications show typical examples, and do not mean they should be prioritized over regional regulations or standards in any way.

The chimney/flue system should be designed using the method and material following regional regulations and standards. Also, the overall chimney system should be based on specific standards utilized by an experienced designer who has knowledge of chimney design, location, ventilation control, multiple device application and regional regulations.

- 1) In all the rooms and space including fueling equipment, air with a precisely controlled pressure should be continuously supplied.
- 2) For flue material, anti-corrosion material should be used to protect the flue from corrosion due to moisture in the exhaust gas.
- 3) The top of the flue should be located far enough from the cooling tower, building water intake and exhaust ventilation opening to prevent contamination.
- 4) The exhaust of the flue should be designed not to allow rain, wind, snow, etc. from flowing into the flue.
- 5) The chimney and flue should be insulated, and a condensing water drop drain should be supplied.
- 6) The chimney should not be connected to the incinerator flue.
- 7) If pressure deviates from the fixed pressure or down-wind blow occurs in the chimney, supply a draft regulator. Several methods of controlling the wind blowing in the chimney are required to maintain proper combustion efficiency.
- 8) If a common flue is used, the exhaust gas should not flow into equipment which is not operating.
- 9) The chimney flange should be designed so that its after pressure is a maximum of -5mmAg.

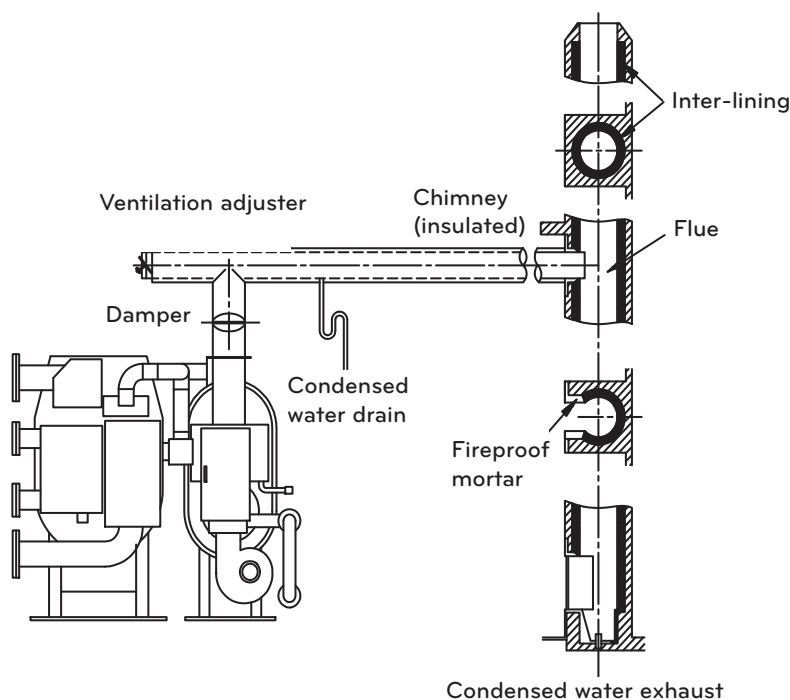


Figure 12. Diagram of typical chimney and flue connection

※ In case of a gas burner, there is a high possibility of explosion or suffocation caused by gas leaks, so always ventilate the machine room. Conduct routine gas leak tests and ventilate the machine room by operating the ventilation fan before operating the chiller-heater.

7-3. Fuel piping

7-3-1. Gas type

IMPORTANT

The absorption chiller-heater is designed by one of the following methods. When installing the fuel system, check the machine specifications and then install according to the design specifications of the absorption chiller-heater and fuel system.

The following applications show typical examples.

1) Gas pressure : 200mmAq

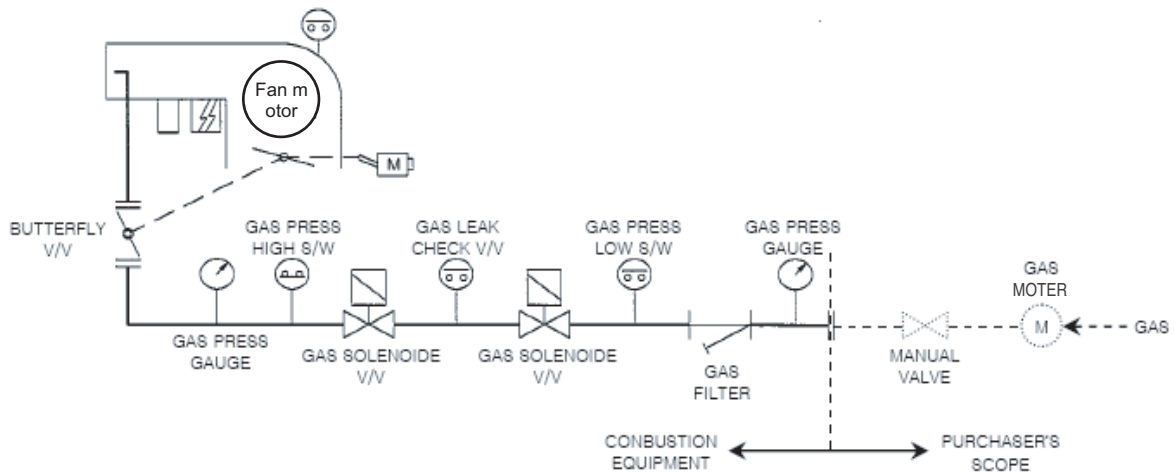


Figure 13. Diagram of typical gas combustion system (Gas pressure : 200mmAq)

2) Gas pressure : 900mmAq ~ 4,000mmAq

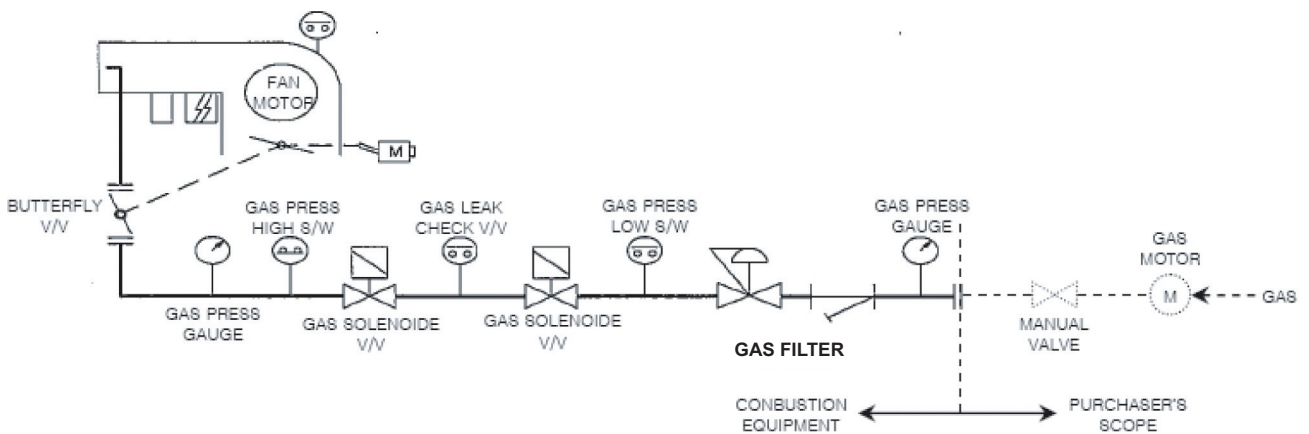


Figure 14. Diagram of typical gas combustion system (Gas pressure : 900mmAq~4000mmAq)

7-3-2. Oil type

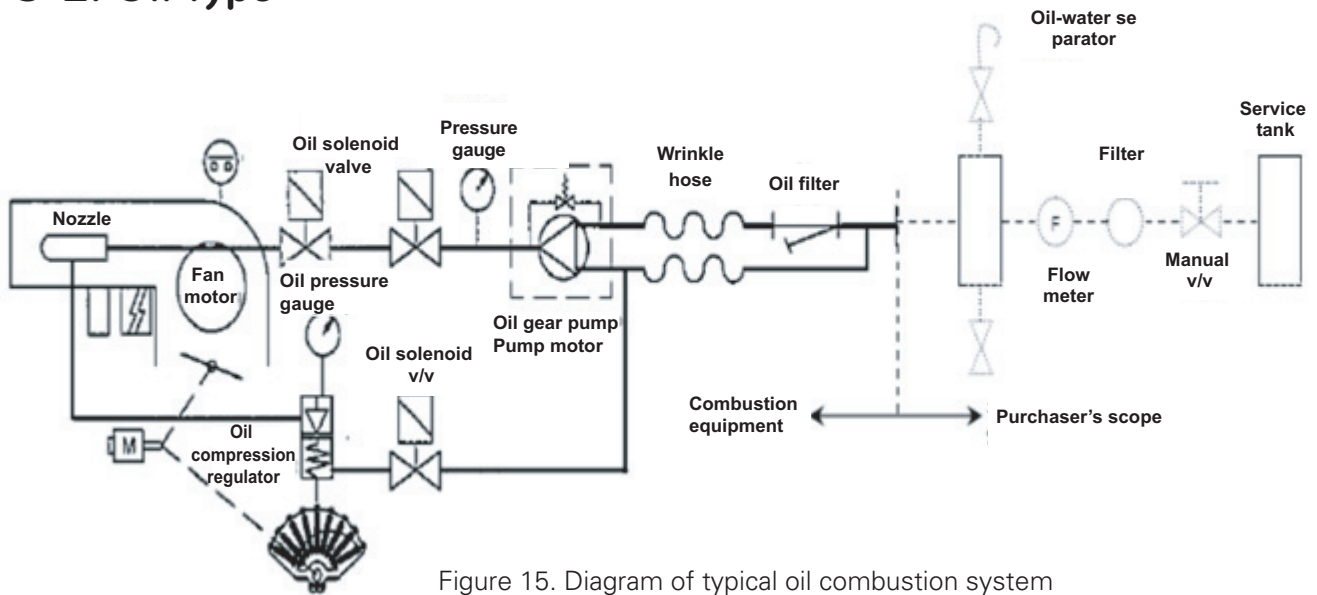


Figure 15. Diagram of typical oil combustion system

- 1) The strainer in the service tank exhaust shall be over mesh 80.
- 2) It is recommended to install a ventilation system where pipelines are installed.
- 3) Install an oil-return line in the service tank. The oil-return does not have a cock or valve.
- 4) Keep the oil level in the service tank below 4m.
- 5) Keep the suction pressure of the pump at $0 \sim 0.35\text{kg/m}^2$.
- 6) The height of the oil-return line should be 5m or below.
- 7) If a flow meter is needed, it is recommended to install one in both the supply line and the return line.



CAUTION

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

7-4. Water quality control standard

- Prevent any potential accidents through periodic water quality control.
Scaling and corrosion have many causes, and there is no single solution.
Because this machine is designed based on the water quality conditions defined in the chilled water/cooling water quality management standard in the Korean Industrial Standard, install it so that the water quality can be adequately maintained within these water quality standard values at all times.
Refer to the operation manual for details on how to manage the water quality.

	Item	Cooling water		Chilled(hot) water		trend	
		Circulating cooling water	Supplied water	Circulating chilled(hot) water	Supplied water	Corrosion	Scaling
Standard item	pH(25°C)	6.5 ~ 8.0	6.5 ~ 8.0	6.5 ~ 8.0	6.5 ~ 8.0	○	○
	Electric conductivity (Ma/m)(25°C) (μs/cm) (25°C)	Below 800	Below 200	Below 500	Below 200	○	
	M-alkalinity(PPM)	Below 100	Below 50	Below 100	Below 50		○
	Total hardness (PPM)	Below 200	Below 50	Below 100	Below 50		○
	Chloride ion Cl ⁻ (PPM)	Below 200	Below 50	Below 100	Below 50	○	
	Sulfuric ion SO ₄ ²⁻ (PPM)	Below 50	Below 50	Below 100	Below 50	○	
	Fe (PPM)	Below 1.0	Below 0.3	Below 1.0	Below 0.3	○	○
	Sulfide ion S ²⁻ (PPM)					○	
	Ammonium ion NH ₄ ⁺ (PPM)	Below 1.0	Below 0.2	Below 0.5	Blow 0.2	○	
	Silica SiO ₂ (PPM)	Below 50	Below 30	Below 50	Below 30		○
	Free carbon dioxide (PPM)	3	3	10	10	○	

Table 2. Chilled water/Cooling water quality management standard

! NOTE

- Each item above has a great effect on corrosion or scaling. Periodic inspections are required since the possibility of corrosion or scaling is higher when any of the above items exceeds the standard value.
- For water treatment, it is necessary to ask a professional water treatment company to set proper water quality control values since the scope of usable water quality differs by chemical.

7-4-1. Example of water treatment

Even though the supplied water for the cooling system is within the scope of water quality standard values, once the circulating cooling water gets concentrated, the water quality deteriorates, thus the water treatment shown as follows is needed. Although there is a difference between chilled water and cooling water, conduct water treatment using the following as reference. Especially, if the thermal storage tank is made of concrete, special attention should be given.

(1) Blow down

Periodic or continuous blow down.

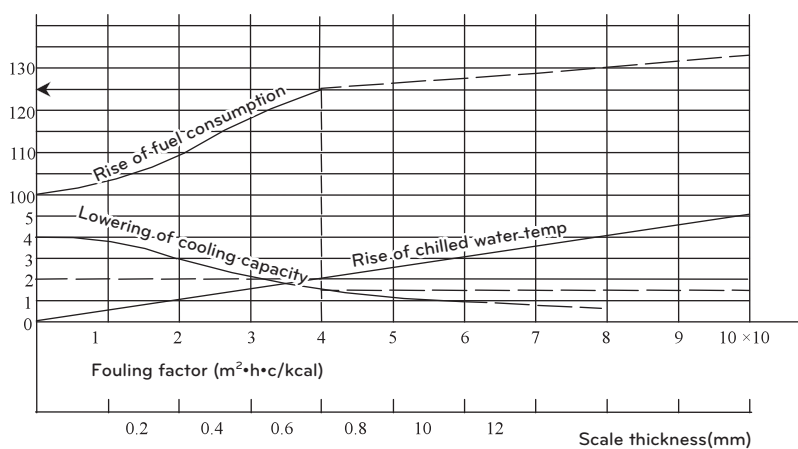
Blow down based on electric conductivity analysis.

(2) Addition of anticorrosive

(3) Addition of algicide(slime control)

(4) Implement required actions following regular water quality analysis

Open the cover of the chiller-heater's water tank periodically, and check the condition of tube corrosion, and clean tubes when needed.



When a scale with a thickness of 0.6mm is attached to the tube, the cooling capacity is reduced by 76%, and the chilled water temperature increases by 2°C. Also, fuel consumption increases by 25%.

7-4-2. Water quality control during long-term stop

- When stopping the operation for a long period without flowing chilled water, cooling water or hot water, manage the water quality by applying the following standards.

- **Cooling water system**

In principle, the cooling water system should be stored with water filled full in the machine. However, if there is a danger of the cooling water freezing in the machine, the inside of the tube(water room side) should be dried and stored.

Be careful since the valve opening and closing are different for full water storage and dry storage respectively.

*** In case of full water storage**

- (1) Drain the water which was flowing during operation through the cooling water drain pipe.
- (2) Add anticorrosives. Check the full water amount of the machine, and add the proper amount of anticorrosive in the right mixing ratio.
- (3) Fill new water into the pipe.
- (4) Run the cooling water pump for a while so that the anticorrosive can be mixed evenly.
- (5) Close all of the cooling water inlet/outlet valves (blocking valves in the pipe to the equipment side).

*** In case of dry storage.**

Clean the insides of tubes and create an anticorrosion layer, then dry store the machine.

- (1) Drain the water which was flowing during operation through the cooling water drain pipe.
- (2) Clean the insides of tubes to remove scale and slime attached to the tube insides. If mechanical cleaning is insufficient, conduct chemical cleaning in parallel.
- (3) After cleaning the insides of the tubes sufficiently, add anticorrosive and fill water.
- (4) Run the cooling water pump for over 30 minutes so that the anticorrosive can be mixed completely.
- (5) Drain water completely and open the cooling water drain valve to dry store while the drain valve is kept open.

• Chilled water, hot water system

In principle, store with full water in the machine.

7-4-3. Measures for wintertime

- When the temperature surrounding the chiller-heater is below 0°C in wintertime, various measures are needed. Do not let the chilled water freeze by continuing the heating operation (operate the chiller-heater in pre-designated times by using the reservation run function in micom) or keep the pump running. And when dry storing the cooling water system, open the drain valve of the cooling water system at all times to prevent freezing due to the water room being filled with condensed water. However, since the equipment condition varies by site, consult a service center for details.

8. THERMAL INSULATION WORK

LG Electronics does not perform thermal insulation work to the product when delivering the product. Perform thermal insulation work before commissioning after the leakage test on the site.

Thermal insulation should be applied according to the standard thermal insulation procedure. LG(95)-G-2067-01

• Cautions on thermal insulation work

- 1) Make sure there is no gap between heat/cold insulation material and main body, and between heat/cold insulation material and exterior material.
- 2) Do not allow any open gaps in the connection areas of the insulation.
- 3) When using 2 layers of insulation, do not let the connection areas overlap in the same places.
- 4) Do not let water or moisture get into the insulation.
- 5) Consider expansion or contraction.
- 6) As shown in the picture for detailed work, the structure of the parts requiring inspection should allow the parts to be separated without damaging the insulation.

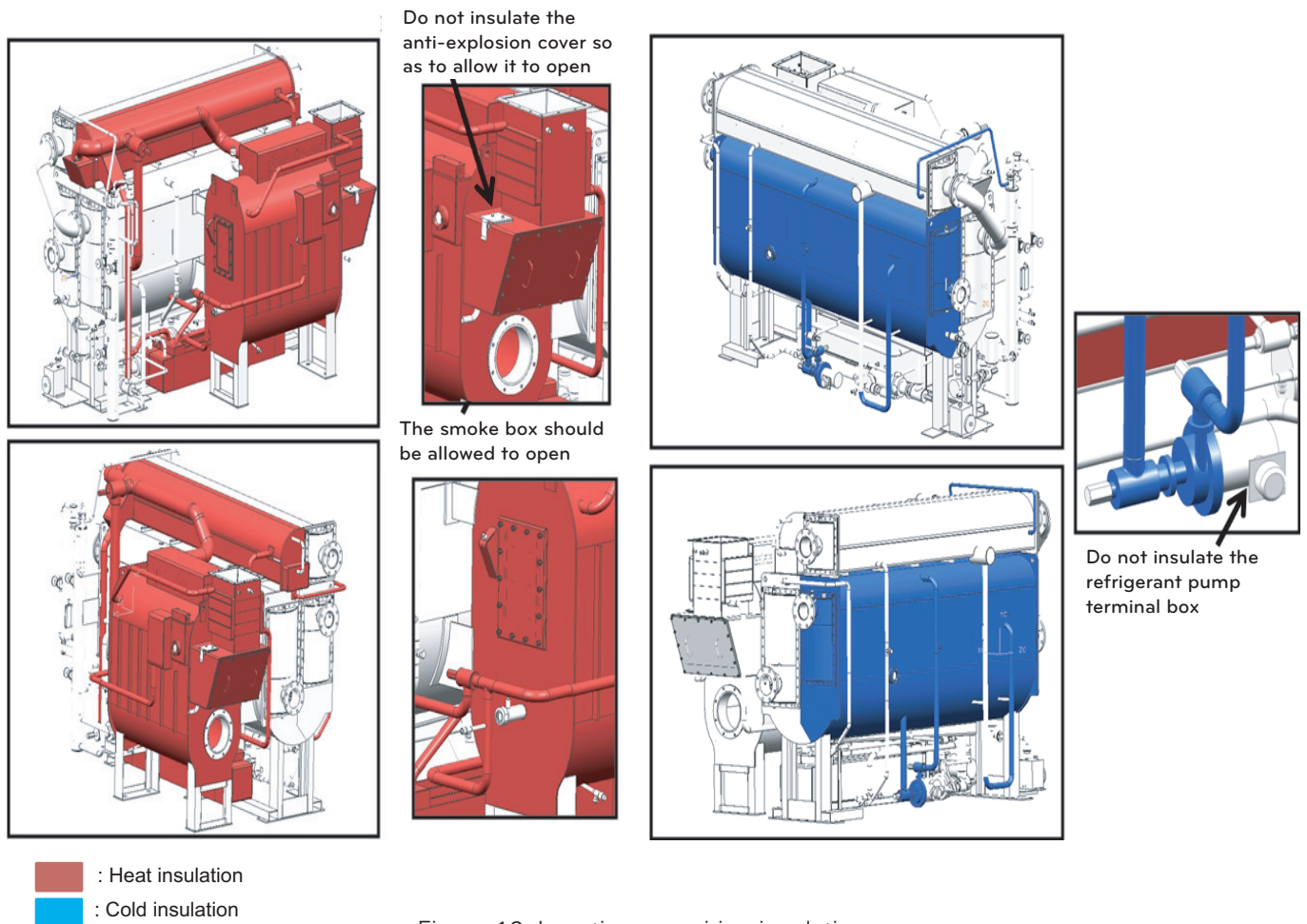
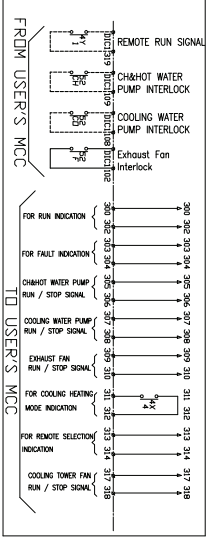
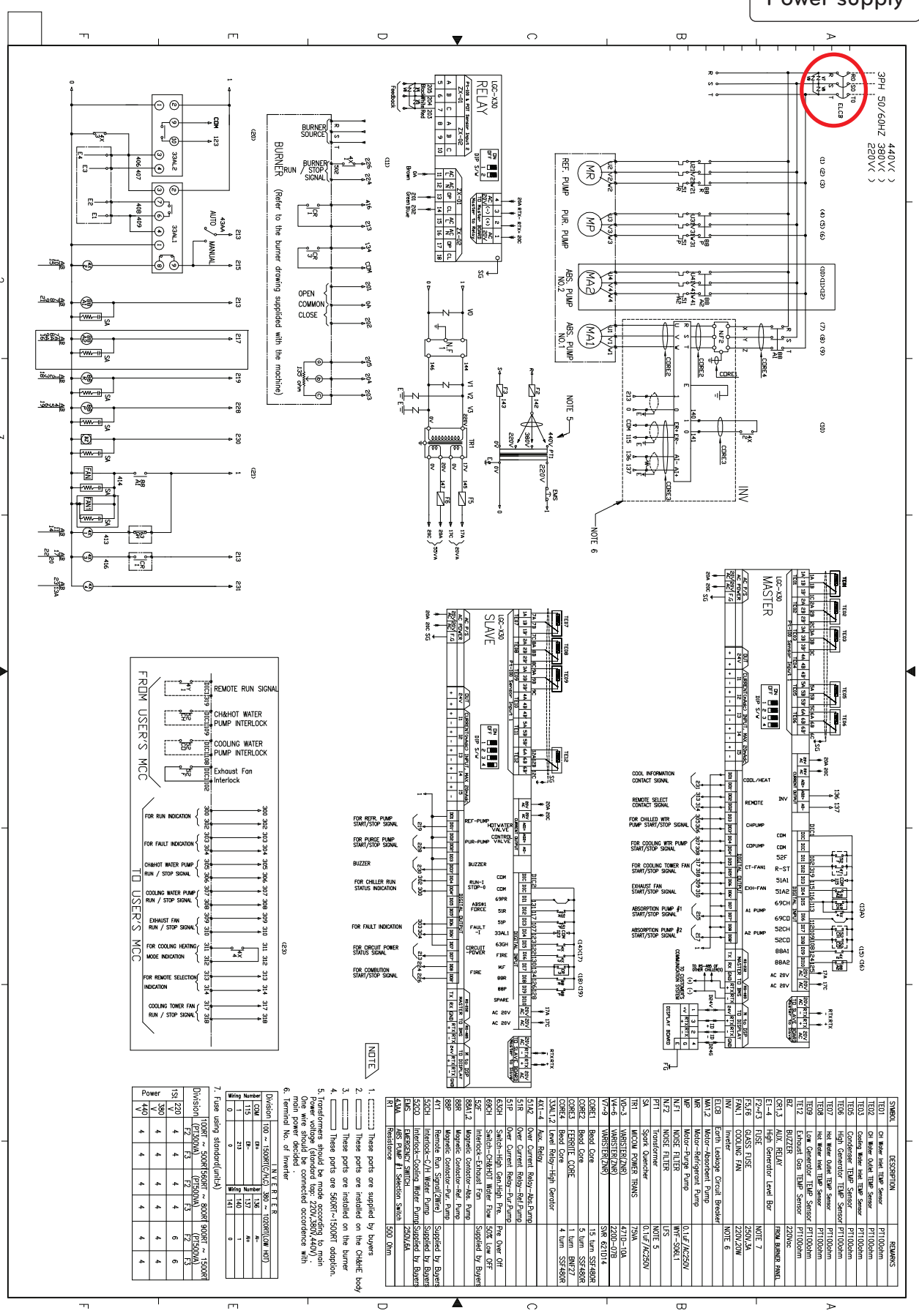


Figure 16. Locations requiring insulation

9-1-2. Chiller-heater 80°C control panel site wiring diagram

Power supply



Division	NO.	1500R(C/L/A)	300	1500R(C/L/A)	NO.7
Wiring No.	115	116	117	118	119
Power	220	4	4	4	4
Division	1500R(C/L/A)	300	1500R(C/L/A)	NO.7	
Wiring No.	120	121	122	123	124
Power	220	4	4	4	4

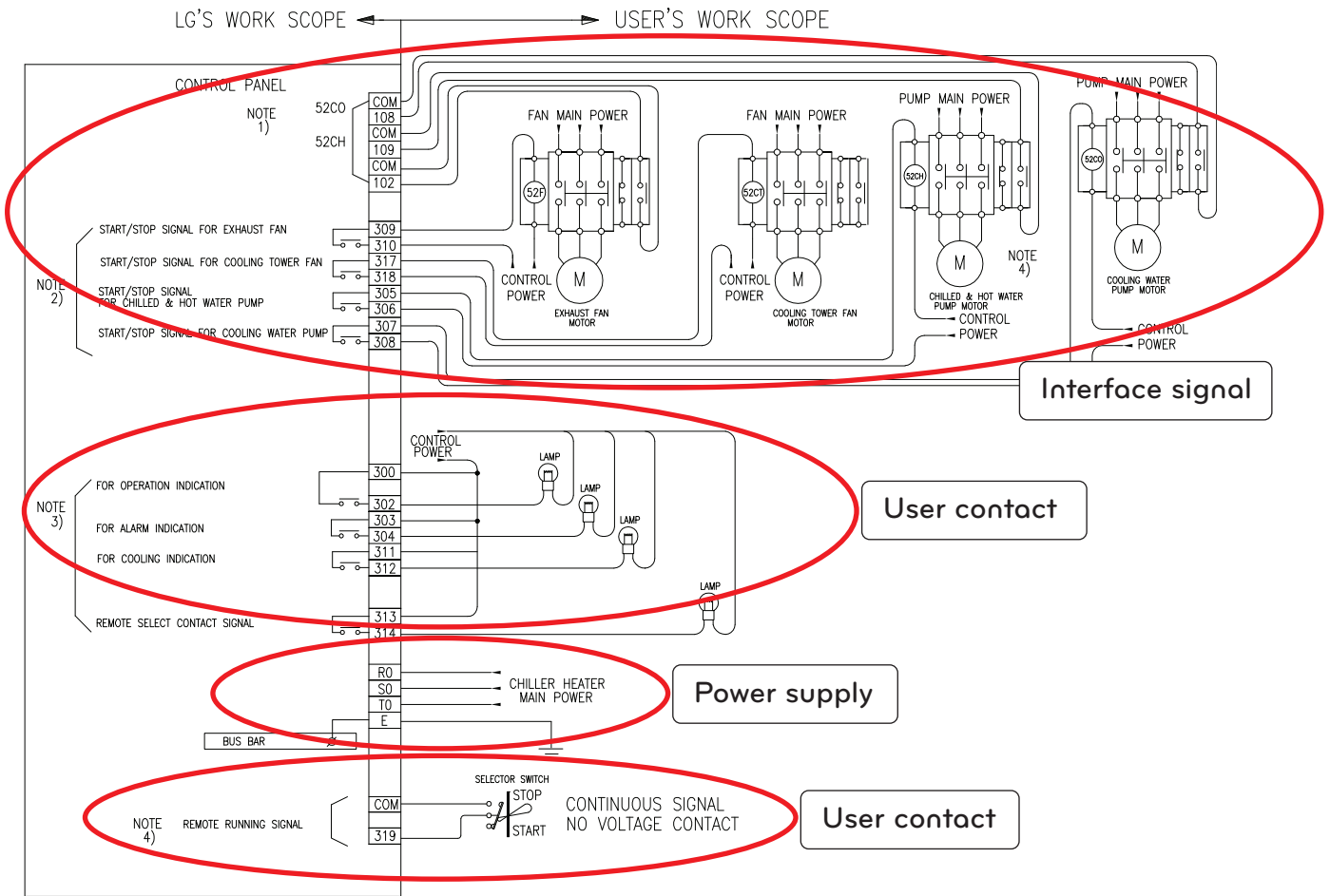
- NOTE**
- These parts are supplied by buyers
 - These parts are installed on the Chiller body
 - These parts are installed on the burner
 - These parts are 500RT-150RT
 - Transformers should be made according to main Power voltage (standard type: 220V/50Hz/400V)
 - One wire should be connected accordance with terminal No. of main box

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- These parts are installed on the Chiller body
- These parts are installed on the burner
- These parts are 500RT-150RT
- Transformers should be made according to main Power voltage (standard type: 220V/50Hz/400V)
- One wire should be connected accordance with terminal No. of main box

Symbol	Description	Remarks
T01	Oil Water Heat Tap Sensor	PT100ohm
T02	Oil Water Outlet Tap Sensor	PT100ohm
T03	Condenser Water Heat Tap Sensor	PT100ohm
T06	Condenser Temp Sensor	PT100ohm
T09	High Generator Temp Sensor	PT100ohm
T10	Hot Water Outlet Tap Sensor	PT100ohm
T11	Hot Water Inlet Tap Sensor	PT100ohm
T09	Hot Water Outlet Tap Sensor	PT100ohm
T12	Exhaust Gas Temp Sensor	PT100ohm
BZ	Buzzer	220vac
CR-1	Relay	150V/500VA
CR-2	Relay	150V/500VA
CR-3	Relay	150V/500VA
CR-4	Relay	150V/500VA
CR-5	Relay	150V/500VA
CR-6	Relay	150V/500VA
CR-7	Relay	150V/500VA
CR-8	Relay	150V/500VA
CR-9	Relay	150V/500VA
CR-10	Relay	150V/500VA
CR-11	Relay	150V/500VA
CR-12	Relay	150V/500VA
CR-13	Relay	150V/500VA
CR-14	Relay	150V/500VA
CR-15	Relay	150V/500VA
CR-16	Relay	150V/500VA
CR-17	Relay	150V/500VA
CR-18	Relay	150V/500VA
CR-19	Relay	150V/500VA
CR-20	Relay	150V/500VA
CR-21	Relay	150V/500VA
CR-22	Relay	150V/500VA
CR-23	Relay	150V/500VA
CR-24	Relay	150V/500VA
CR-25	Relay	150V/500VA
CR-26	Relay	150V/500VA
CR-27	Relay	150V/500VA
CR-28	Relay	150V/500VA
CR-29	Relay	150V/500VA
CR-30	Relay	150V/500VA
CR-31	Relay	150V/500VA
CR-32	Relay	150V/500VA
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CR-36	Relay	150V/500VA
CR-37	Relay	150V/500VA
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CR-42	Relay	150V/500VA
CR-43	Relay	150V/500VA
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CR-93	Relay	150V/500VA
CR-94	Relay	150V/500VA
CR-95	Relay	150V/500VA
CR-96	Relay	150V/500VA
CR-97	Relay	150V/500VA
CR-98	Relay	150V/500VA
CR-99	Relay	150V/500VA
CR-100	Relay	150V/500VA

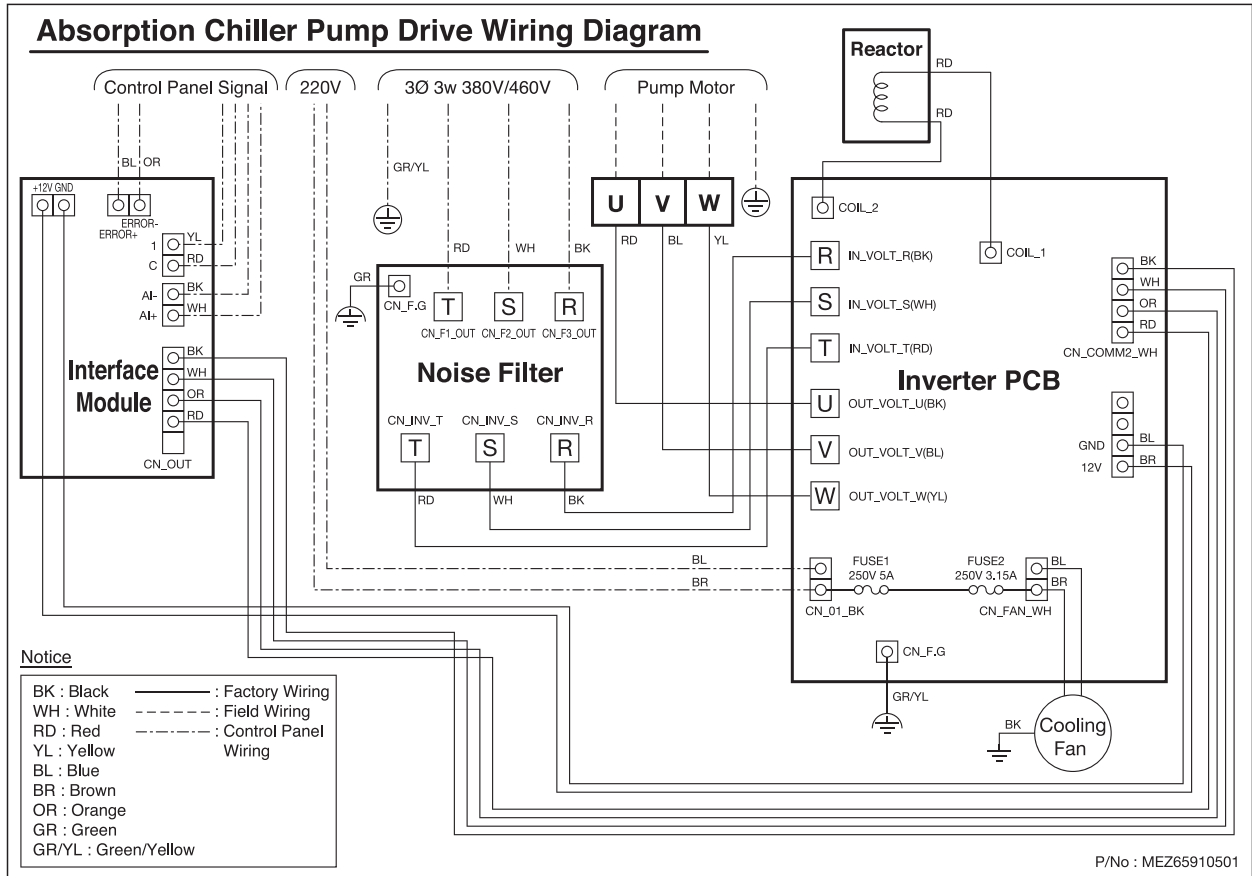
9-2. Interface drawing

9-2-1. Chiller-heater Interface drawing



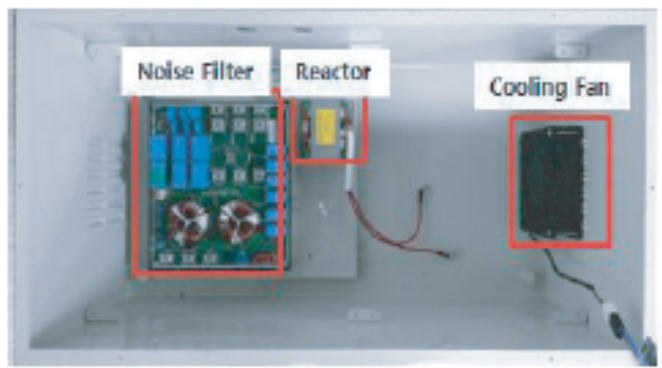
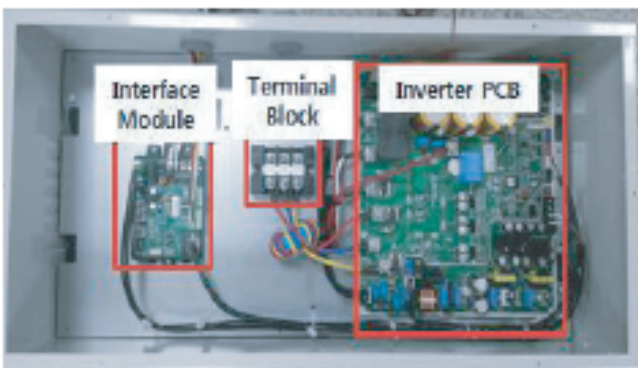
9-3. Absorbent pump 1 inverter

9-3-1. Absorbent pump 1 inverter wiring diagram



Top

Bottom



10. APPENDIX

10-1. Installation check list

- Before installation check

NO	Check item	Result	Remarks
1	Have the drawings related to the chiller and which were designed at the site been obtained? (Heat source flow chart, Machine room layout, Foundation drawing, Electrical drawing)		
2	Has the overall construction schedule related to the chiller and peripherals been obtained? (Check equipment delivery and piping connection schedule)		
3	Has the size of the receiving dock entrance been checked?		
4	Has the equipment moving line and movement plan been established?		
5	Are the foundation size and height appropriate? (Check machine room and check drawing)		
6	Are there any obstacles in the installation space? (Transverse pipes in the machine room, etc.)		
7	Has distance from flammable objects been maintained? (Domestic approval for high pressure gas)		

- Installation check _ Chiller

NO	Check item	Result	Remarks
1	Has the chiller manufacturer's shipment test completion approval been checked?		
2	Have all the chiller related parts been correctly received?		
3	Have the occurrence of damage to the equipment exterior during transportation as well as internal wiring abnormalities been checked?		
4	Has the refrigerant been leaked after charging?(Check refrigerant pressure)		
5	Are the insulations on equipment such as the evaporator or economizer secure?		
6	Are the directions of the chilled water and cooling water inlets/outlets of the installed chiller the same as in the design drawing?		
7	Has the levelness of the chiller been secured?		
8	Has an isolation rubber pad been installed?		
9	Have the tightening elements solidly tightened as the specified torques?		Appendix. 10-3

- Installation check _ Piping

NO	Check item	Result	Remarks
1	Have all the pipes been installed and connected according to the installation guideline?		7. PIPE INSTALLATION
2	Have the chilled water and cooling water connection pipes (diameters/inlet-outlet) been correctly connected?		
3	Have foreign material in the piping been removed and air purge been done?		
4	Have the chiller water pipe connections been constructed according to the drawing? (Strainer, Flexible, Balancing valve, Pressure gauge, etc)		
5	Has the insulation for the piping, flanges and valves been firmly made?		

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

- Installation check_ Electricity

NO	Check item	Result	Remarks
1	Are the size and dimensions of the installed cable and material suitable to the specifications?		
2	Has the cleanness of the conduit been checked before inserting the wire?		
3	Has the cable bending radius been checked against the regulated value?		Appendix.2
4	Have the wires been connected after removing the sheath without causing damage to the conductor, using appropriate tools?		
5	Is the arrangement condition satisfactory in case the wires require support or binding?		
6	Is the grounding done through the proper connection method complete in case the cable's outer sheath grounding is needed?		
7	Have the holes which are not used been blocked with proper parts?		
8	Is there any case of wires contacting with each other in the conduit?		
9	Are the wire connectors made of appropriately non-flammable materials and in the proper sizes for the place of use?		
10	Have the wires been arranged in colors by phase?		
11	Have the electrical contacts been properly made not to cause a lowering of electric resistance, insulation resistance and tensile strength?		
12	Have the wire's circuit identification been properly attached according to the approved method?		
13	Has the insulation resistance been measured after the wire insertion?		
14	Has the proper protective measure been put in place not to damage the wire sheathing and conductor after construction and measurement?		
15	Vehicles or other heavy equipment should not be used when inserting cables. Has this been complied with?		
16	Has the cable insertion device been used after receiving approval at the customer's site?		
17	Are there sharp parts which can damage the cable? If there are, have they been removed?		
18	Did the cable connection terminal blocks for second control work(starter panel – control panel) match each other?		
19	Did the chilled water/cooling water pump interlock cable connection terminal blocks match each other?		
20	Has the control valve of the absorption chiller been wired correctly following the drawing?		
21	Is the tightening condition of each terminal satisfactory?		

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

10-2. Electricity related regulations

NO.	Rule	Content
1	Bending radius (Interior line regulation 2275-3)	Establish the radius of curvature for the cable's curved part for the low voltage cable to be 6 times (in case of single cable-8 times) bigger than the cable diameter, and for extra-high voltage cable, 10-20 times bigger than the cable diameter.

10-3. 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

