LG
Life's Good

ENGLISH

INSTALLATION & OWNER'S MANUAL

Air-cooled Inverter Scroll Chiller

- Please read this installation manual completely before installing the product.
- Installation work must be performed in accordance with the national wiring standards by authorized personnel only.
- Please retain this installation manual for future reference after reading it thoroughly.

MODELS : ACAH Series

P/NO : MFL67262604

www.lg.com

IMPORTANT SAFETY INSTRUCTIONS

READ ALL INSTRUCTIONS BEFORE USING THE APPLIANCE.

Always comply with the following precautions to avoid dangerous situations and ensure peak performance of your product

⚠ WARNING

It can result in serious injury or death when the directions are ignored

⚠ CAUTION

It can result in minor injury or product damage when the directions are ignored

⚠ WARNING

- Installation or repairs made by unqualified persons can result in hazards to you and others.
- Installation of all field wiring and components MUST conform with local building codes or, in the absence of local codes, with the National Electrical Code 70 and the National Building Construction and Safety Code or Canadian Electrical Code and National Building Code of Canada.
- The information contained in the manual is intended for use by a qualified service technician familiar with safety procedures and equipped with the proper tools and test instruments.
- Failure to carefully read and follow all instructions in this manual can result in equipment malfunction, property damage, personal injury and/or death.

Installation

- Installation is to be performed by qualified personnel who are familiar with local codes and regulations.
  - There is risk of fire, electric shock, explosion, or injury.
- Always install a dedicated circuit and breaker.
  - Improper wiring or installation may cause fire or electric shock.
- 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.
- Do not install, remove, or re-install the unit by yourself (customer).
  - There is risk of fire, electric shock, explosion, or injury.
- Prepare for strong wind or earthquake and install the unit at the specified place.
  - Improper installation may cause the unit to topple and result in injury.
- When installing and moving the Product to another site, do not charge it with a different refrigerant from the refrigerant specified on the unit.
  - If a different refrigerant or air is mixed with the original refrigerant, the refrigerant cycle may malfunction and the unit may be damaged.
- 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 outdoor unit and fire or electric shock may result.
- If the Product is installed in a small room, measures must be taken to prevent the refrigerant concentration from exceeding the safety limit when the refrigerant leaks.
  - Consult the dealer regarding the appropriate measures to prevent the safety limit from being exceeded. Should the refrigerant leak and cause the safety limit to be exceeded, hazards due to lack of oxygen in the room could result.

- Use the correctly rated breaker or fuse.
  - There is risk of fire or electric shock.
- Have all electric work done by a licensed electrician according to 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.
- There must be no obstruction above the unit.
  - It would deflect discharge air downward where it could be re-circulated back to the inlet of the condenser coil. The condenser fans are propeller type and will not operate with ductwork on the fan outlet.
- When transporting the product, use the forklift or spreader bar in accordance with the manual.
  - Arbitrarily moving the product can cause product damage or injury.
- When moving the product using the forklift, check the weight of the chiller, size and length of the fork to select the appropriate equipment.
  - It can cause damage or injury.
- When hanging the product on the hoist to move the chiller, make sure that the load of the product is evenly distributed and leveled during the move.
  - It can cause damage or injury.
- When moving the product using the spreader bar, make sure to select the spreader bar with material and size to sufficiently support the strength spreader bar.
  - Using inappropriate spreader bar can cause the product to fall and cause injury due to the strength or size.
- Always ground the product.
  - There is risk of fire or electric shock.
- Do not store or use flammable gas or combustibles near the Product.
  - 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.
- Ventilate before operating Product when gas leaked out.
  - It may cause explosion, fire, and burn.
- Use a vacuum pump or Inert (nitrogen) gas when doing leakage test or air purge. Do not compress air or Oxygen and Do not use Flammable gases. Otherwise, it may cause fire or explosion.
  - There is the risk of death, injury, fire or explosion.

Use

- Do not damage or use an unspecified POWER CABLE.
  - There is risk of fire, electric shock, explosion, or injury.
- Use a dedicated outlet for this appliance.
  - There is risk of fire or electrical shock.
- Be cautious that water could not enter the Product.
  - There is risk of fire, electric shock, or product damage.
- Do not touch the power switch with wet hands.
  - There is risk of fire, electric shock, explosion, or injury.
- When installing and moving the Product to another site, do not charge it with a different refrigerant from the refrigerant specified on the unit.
  - If a different refrigerant or air is mixed with the original refrigerant, the refrigerant cycle may malfunction and the unit may be damaged.

- When the product is soaked (flooded or submerged), contact an Authorized Service Center.
  - There is risk of fire or electric shock.
- Be cautious not to touch the sharp edges and coil.
  - It may cause injury.
- Take care to ensure that nobody could step on or fall onto the outdoor unit.
  - This could result in personal injury and product damage.
- Do not open the inlet grille of the product during operation. (Do not touch the electrostatic filter, if the unit is so equipped.)
  - There is risk of physical injury, electric shock, or product failure.
- Be careful during valve checkout about hot gas line
  - It may become hot enough to cause injury.
- Electric shock hazard. Can cause severe injury or death. Even when power to the panel is off, output board could be connected to high voltage.
- Electric shock hazard. Turn off all power before doing any service.

⚠ CAUTION

Installation

- Always check for gas (refrigerant) leakage after installation or repair of product.
  - Low refrigerant levels may cause failure of product.
- Do not install the product where the noise or hot air from the outdoor unit could damage the neighborhoods.
  - It may cause a problem for your neighbors.
- Keep level even when installing the product.
  - To avoid vibration or water leakage.
- Do not install the unit where combustible gas may leak.
  - If the gas leaks and accumulates around the unit, an explosion may result.
- Do not install the product where it is exposed to sea wind (salt spray) directly.
  - It may cause corrosion on the product. Corrosion, particularly on the condenser and evaporator fins, could cause product malfunction or inefficient operation.
- 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 Product to operate erroneously, or fail to operate. On the other hand, the Product may affect such equipment by creating noise that disturbs medical treatment or image broadcasting.
- Use power cables of sufficient current carrying capacity and rating.
  - Cables that are too small may leak, generate heat, and cause a fire.
- Do not use the product for special purposes, such as preserving foods, works of art, etc. It is a consumer Product, not a precision refrigeration system.
  - There is risk of damage or loss of property.
- Keep the unit away from children. The heat exchanger is very sharp.
  - It can cause the injury, such as cutting the finger. Also the damaged fin may result in degradation of capacity.
- The operator must provide protection against water circuit freezing on all Product units.
  - To prevent damage from freezing water.

Use

- Do not use the Product in special environments.
  - Oil, steam, sulfuric smoke, etc. can significantly reduce the performance of the Product or damage its parts.
- 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 a fire.
- Be sure the installation area does not deteriorate with age.
  - If the base collapses, the Product could fall with it, causing property damage, product failure, or personal injury.
- Install and insulate the drain hose to ensure that water is drained away properly based on the installation manual.
  - A bad connection may cause water leakage.
- Be very careful about product transportation.
  - Do not touch the heat exchanger fins. Doing so may cut your fingers.
  - When transporting the outdoor unit, suspending it at the specified positions on the unit base. Also support the outdoor unit at four points so that it cannot slip sideways.
- Safely dispose of the packing materials.
  - Packing materials, such as nails and other metal or wooden parts, may cause stabs or other injuries.
  - Tear apart and throw away plastic packaging 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.
- Turn on the power at least 6 hours before starting operation.
  - Starting operation immediately after turning on the main power switch can result in severe damage to internal parts. Keep the power switch turned on during the operational season.
- Do not touch any of the refrigerant piping during and after operation.
  - It can cause a burn or frostbite.
- Do not operate the Product with the panels or guards removed.
  - Rotating, hot, or high-voltage parts can cause injuries.
- Do not directly turn off the main power switch after stopping operation.
  - Wait at least 5 minutes before turning off the main power switch. Otherwise it may result in water leakage or other problems.
- When re-running the product after keep product long time in a low temperature conditions, touch function may not work temporarily.
  - Wait for a time. After time, product work normally.
- Do not insert hands or other objects through the air inlet or outlet while the Product is plugged in.
  - There are sharp and moving parts that could cause personal injury.
- Field wiring must be installed according to unit wiring diagram.
  - It may cause serious electrical damage can occur.
- Do not use an automotive grade antifreeze. Industrial grade glycols must be used. Automotive antifreeze contains inhibitors which will cause plating on the copper tubes within the Product evaporator. The type and handling of glycol used must be consistent with local codes.
- Electrical power must be applied to the compressor crankcase heaters 3 hours before starting unit to drive off refrigerant from the oil.

- Any changes to these parameters must be determined and implemented by qualified personnel with a thorough understanding of how these parameters affect the operation of the unit. Negligent or improper adjustment of these controls can result in damage to the unit or personal injury.
- Service on this equipment is to be performed by qualified refrigeration personnel familiar with equipment operation, maintenance, correct servicing procedures, and the safety hazards inherent in this work. Causes for repeated tripping of equipment protection controls must be investigated and corrected.
- Anyone servicing this equipment shall comply with the requirements set forth by the EPA in regards to refrigerant reclamation and venting.

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PRODUCT INTRODUCTION

General information

Product information

Inverter Scroll Chiller of LG Electronics provides cold water for cooling air conditioning system using AHU or FCU etc. Air Cooled R410A Refrigerant Scroll Chiller ACAH Series designed for outdoors is a single unit product of modular type composed of scroll compressor, air cooled condenser, electronic expansion valve, evaporator and LG HMI (Human Machine Interlock).

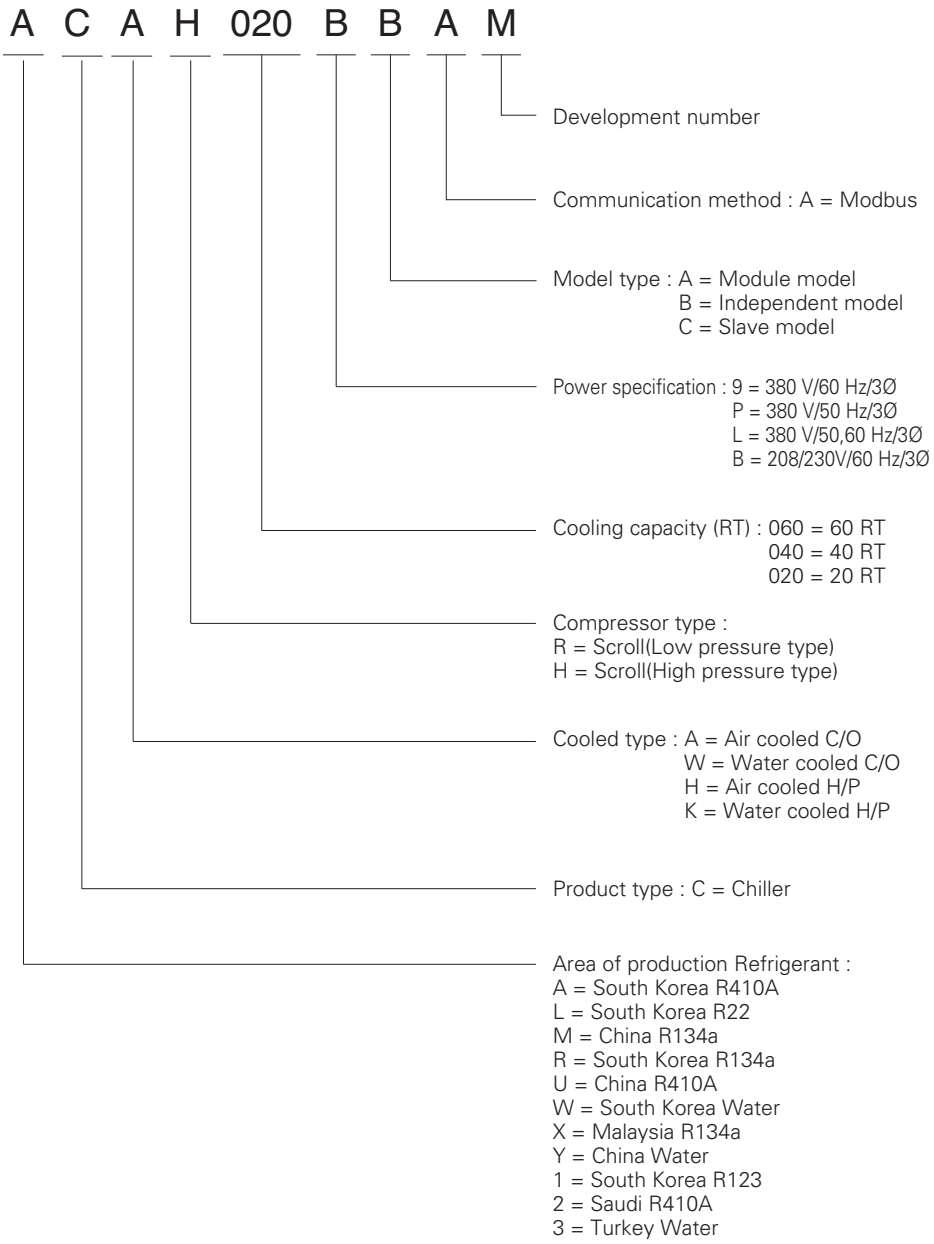
ACAH Series is composed of 1 inverter compressor and 2 static speed compressors to form independent refrigerant cycle and one unit module can configure up to maximum of 3 refrigerant cycles and can interlock with up to 3 modules for control.

ACAH Series applies the inverter technology to the compressor and condenser fan motor for not only high load but also highly efficient operation in all operating areas.

HMI controller of ACAH Series has the LG's unique control logic to monitor all parameters controlling the operation. These parameters can be controlled to improve the operational efficiency to continuously supply cold water by optimizing to the environment.

Each refrigerant cycle includes the check valve, electronic expansion valve, strainer and refrigerant charge valve. Evaporator connected to the cold water uses the plate type heat exchanger and the condenser uses the air cooled pin tube heat exchanger.

Model naming convention



Product information

Main Model

Model Name			ACAH020BBAM	ACAH040BBAM	ACAH060BBAM
Feature					
Power Supply		Ø, V, Hz	3, 208/230, 60	3, 208/230, 60	3, 208/230, 60
Cooling Capacity		Btu/h	204,749	409,498	614,246
		kW	60.0	120.0	180.0
		kcal/h	51,600	103,200	154,800
Power Input		kW	21.9	43.8	65.7
COP		W/W	2.74	2.74	2.74
IPLV		W/W	4.60	4.60	4.60
Compressor	Type (Number)	-	Hermetically Sealed DC Scroll (1) + Constant (2)	Hermetically Sealed DC Scroll (2) + Constant (4)	Hermetically Sealed DC Scroll (3) + Constant (6)
	Oil Type	-	FVC68D(PVE)	FVC68D(PVE)	FVC68D(PVE)
	Oil Charge	cc	4,200	4,200*2	4,200*3
	Sump Heater	W	60 x 3	60 x 6	60 x 9
Refrigerant	Refrigerant Name	-	R410A	R410A	R410A
	Weight	kg	13	26 (13 x 2)	39 (13 x 3)
	Control	-	EEV	EEV	EEV
Fan	Type	-	Propeller Fan	Propeller Fan	Propeller Fan
	Motor Type	-	DC Inverter	DC Inverter	DC Inverter
	Motor output x Number	W	900 x 2	900 x 4	900 x 6
	Air Flow Volume	CMM	190 x 2	190 x 4	190 x 6
		CFM	6710 x 2	6710 x 4	6710 x 6
Evaporator	Type	-	Plate	Plate	Plate
	Water resistance loss	kPa	30	30	30
	Pressure Feed Refrigerant/Water	kg/cm^2	42 / 10	42 / 10	42 / 10
	Water inlet/outlet pipeline diameter	-	40A / 40A	65A / 65A	65A / 65A
	Water flow volume	LPM	155	310	465
Condenser	Type	-	Copper-fin-coil	Copper-fin-coil	Copper-fin-coil
	Number	EA	2	4	6
Net Weight		kg	570	1,070	1,538
		lbs	1,256	2,359	3,391
Gross Weight		kg	600	1,114	1,600
		lbs	1,323	2,456	3,527
Dimension (W x H x D)		mm	765 x 2,354 x 2,154	1,528 x 2,354 x 2,154	2,291 x 2,354 x 2,154
		inch	30.1 x 92.7 x 84.8	60.2 x 92.7 x 84.8	90.2 x 92.7 x 84.8
Protection Devices	High/Low Pressure Sensor & High Pressure Switch	-	O	O	O
	Frost protection Sensor	-	O	O	O
	Discharge Temperaure Sensor	-	O	O	O
	Over-heat Protection (Compressor / Motor)	-	O	O	O
	Reversed Phase Detector	-	O	O	O
	Water Flow Switch	-	O	O	O
Remote Control Type		-	Modbus	Modbus	Modbus
Operating Range	Water Outlet Temperature	℃	5~15	5~15	5~15
	Outdoor air Temperature	℃	-5~48	-5~48	-5~48

Notes :

1. Due to our policy of innovation some specifications may be changed without prior notification
2. Slave Unit dons't have HMI, Only Main Unit have HMI.

Slave Model

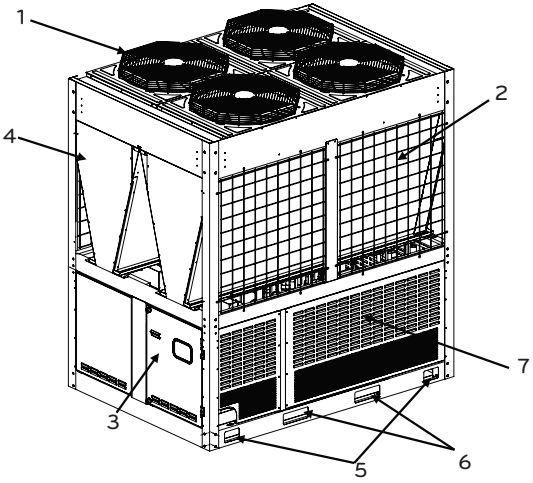
Model Name			ACAH040BCAM	ACAH060BCAM
Feature				
Power Supply		Ø, V, Hz	3, 208/230, 60	3, 208/230, 60
Cooling Capacity		Btu/h	409,498	614,246
		kW	120.0	180.0
		kcal/h	103,200	154,800
Power Input		kW	43.8	65.7
COP		W/W	2.74	2.74
IPLV		W/W	4.60	4.60
Compressor	Type (Number)	-	Hermetically Sealed DC Scroll (2) + Constant (4)	Hermetically Sealed DC Scroll (3) + Constant (6)
	Oil Type	-	FVC68D(PVE)	FVC68D(PVE)
	Oil Charge	cc	4,200*2	4,200*3
	Sump Heater	W	60 x 6	60 x 9
Refrigerant	Refrigerant Name	-	R410A	R410A
	Weight	kg	26 (13 x 2)	39 (13 x 3)
	Control	-	EEV	EEV
Fan	Type	-	Propeller Fan	Propeller Fan
	Motor Type	-	DC Inverter	DC Inverter
	Motor output x Number	W	900 x 4	900 x 6
	Air Flow Volume	CMM	190 x 4	190 x 6
		CFM	6710 x 4	6710 x 6
Evaporator	Type	-	Plate	Plate
	Water resistance loss	kPa	30	30
	Pressure Feed Refrigerant/Water	kg/cm^2	42 / 10	42 / 10
	Water inlet/outlet pipeline diameter	-	65A / 65A	65A / 65A
	Water flow volume	LPM	310	465
Condenser	Type	-	Copper-fin-coil	Copper-fin-coil
	Number	EA	4	6
Net Weight		kg	1,070	1,538
		lbs	2,359	3,391
Gross Weight		kg	1,114	1,600
		lbs	2,456	3,527
Dimension (W x H x D)		mm	1,528 x 2,354 x 2,154	2,291 x 2,354 x 2,154
		inch	60.2 x 92.7 x 84.8	90.2 x 92.7 x 84.8
Protection Devices	High/Low Pressure Sensor & High Pressure Switch	-	O	O
	Frost protection Sensor	-	O	O
	Discharge Temperaure Sensor	-	O	O
	Over-heat Protection (Compressor / Motor)	-	O	O
	Reversed Phase Detector	-	O	O
	Water Flow Switch	-	O	O
Remote Control Type		-	Modbus	Modbus
Operating Range	Water Outlet Temperature	°C	5~15	5~15
	Outdoor air Temperature	°C	-5~48	-5~48

Notes :

1. Due to our policy of innovation some specifications may be changed without prior notification
2. Slave Unit dons't have HMI, Only Main Unit have HMI.

Product configuration

This chiller model is configured as shown below.



Legend

1. Fan motor
2. Fin & tube heat exchanger
3. Controller box
4. Condenser cover
5. Rope support
6. Forklift groove
7. Side cover

Cooling cycle

ACAH Series uses the low pressure type scroll compressor, and the suction gas part is separated from the high pressure discharge part and the motor is installed on the low pressure gas part. Space for motor and storage for refrigerant is secured in the low pressure gas part to increase the reliability for the liquid compression.

Because the sucked refrigerant gas cools the motor and flows to the compressor, separate cooling device to cool the compressor is not required. Inside the system, oil to lubricate the compressor is mixed with the refrigerant to discharge both the oil and refrigerant during the operation. Because the oil discharged from the compressor can reduce the heat transfer efficiency when thick layer is built up on the inner walls of the condenser and evaporator, device to prevent the refrigerant and oil to be discharged together is added to prevent this issue.

This lubrication system ensures longer life for the compressor, improves the sealing of the compression space and provides low noise operation.

As the air cooled fin and tube type heat exchanger, the condenser is composed of heat exchanger in V shape, and the electronic expansion valve is used for efficient control in all load conditions. The controller used in the chiller is exclusively for LG and monitors various sensors installed on the product to protect the product.

For continuous supply of cold and hot water, the product is equipped with maximum continuous operational function and also provides precision control to supply accurate target amount of cold and hot water.

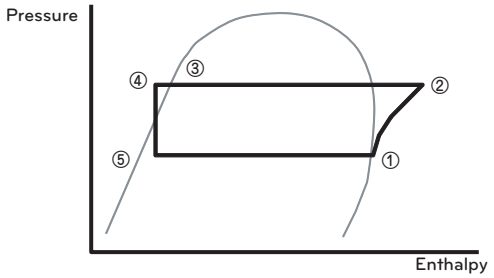
But the protective devices will immediately stop the product when the product reaches abnormal condition or area limit.

In case of an issue, the controller of the chiller will provide helpful diagnostic message to the administrator.

Description of cooling cycle

The cooling cycle of ACAH Series can be described using the following Pressure – Enthalpy chart.

①,②,③,④ and ⑤ in the following chart shows the conditions of the refrigerant. The refrigerant comes into the compressor motor and cools the motor, and becomes overheated and moves to the suction inlet of the compressor. The oil inside the compressor seals the gap between the compressor scrolls and provides lubrication for the bearing to help the compression of the refrigerant. During this time, the refrigerant is compressed and is discharged to the air cooled condenser. (②) The compressed refrigerant passes through the air cooled condenser and exchanges the heat with the outdoor air. The condensed refrigerant then passes the condenser to be overcooled. (②→③→④). The refrigerant that passed through the condenser expands in the electronic expansion valve to flow to the evaporator. (④→⑤). The refrigerant is evaporated in the plate type heat exchanger, the evaporator. (⑤→①) Liquid refrigerant of low temperature pressure passes through the evaporator to cool the water flowing into the evaporator and the refrigerant itself receives the heat to evaporate to gas condition. (①) The refrigerant continues to change the phase and continuously repeats the cooling cycle. For heating, the refrigerant flows in the reverse direction to provide hot water.



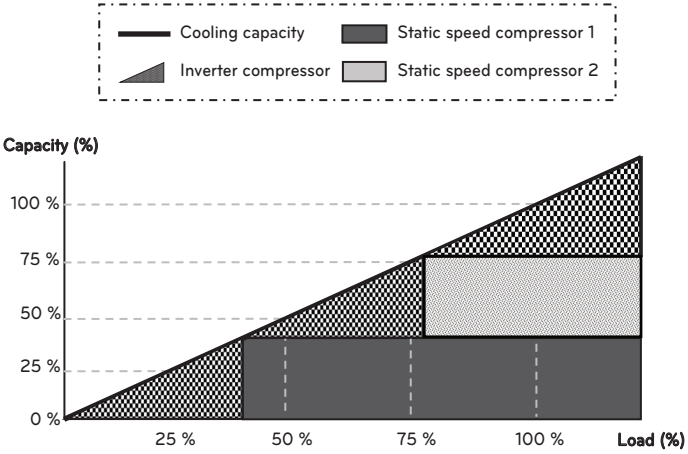
Lubrication system

Oil is efficiently separated inside the scroll compressor and even when the cycle operates, most of the oil remains inside the scroll compressor. Only part of the oil will be mixed with the refrigerant to be circulated within the cycle.

Partial load operation

Each cooling cycle operates independently and 1 cooling cycle is composed of 1 inverter compressor and 2 static speed compressors as shown below. When the load is less than 40%, it can be operated only with the compressor and when 1 static speed compressor and inverter compressor operates simultaneously, it can respond to about 80% of the load. Lastly, when 2 static speed compressors and inverter compressor all operate simultaneously, it can run up to maximum performance. Inverter compressor increases the RPM after staring to operate to gradually increase the cooling capacity. But when it reaches a specific RPM, the RPM is reduced to turn on 1 set of static speed compressor. After the static speed compressor is turned on, the inverter compressor increases the RPM again to increase the cooling capacity, and it repeats the same process to turn on another set of static speed compressor. When both static speed compressors are operating, the inverter compressor can increase up to maximum frequency.

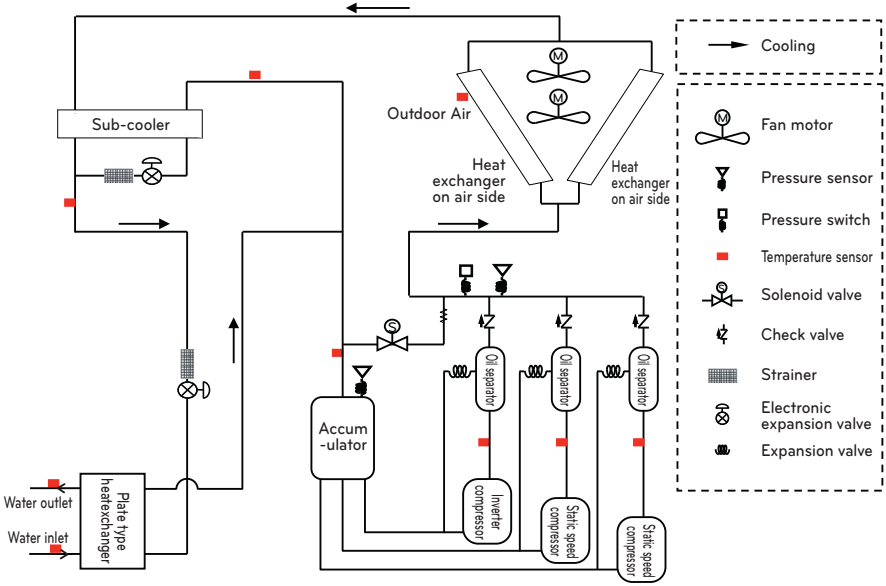
The user can operate the product smoothly at optimal condition by setting the cooling capacity based on the linear control of LG Chiller Controller and the product has efficient partial load performance at any load.



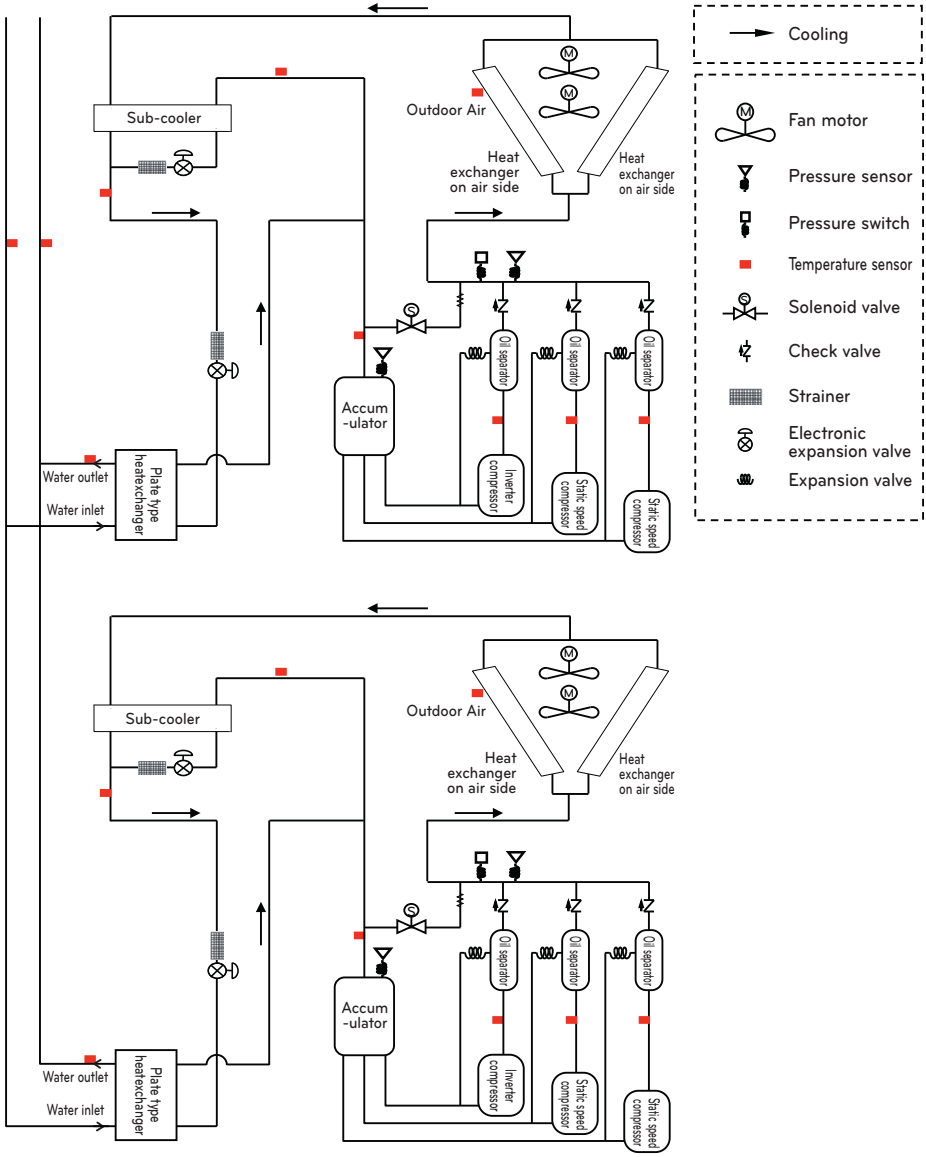
Cycle configuration and sensor location

This chiller model is configured as shown below.

20RT

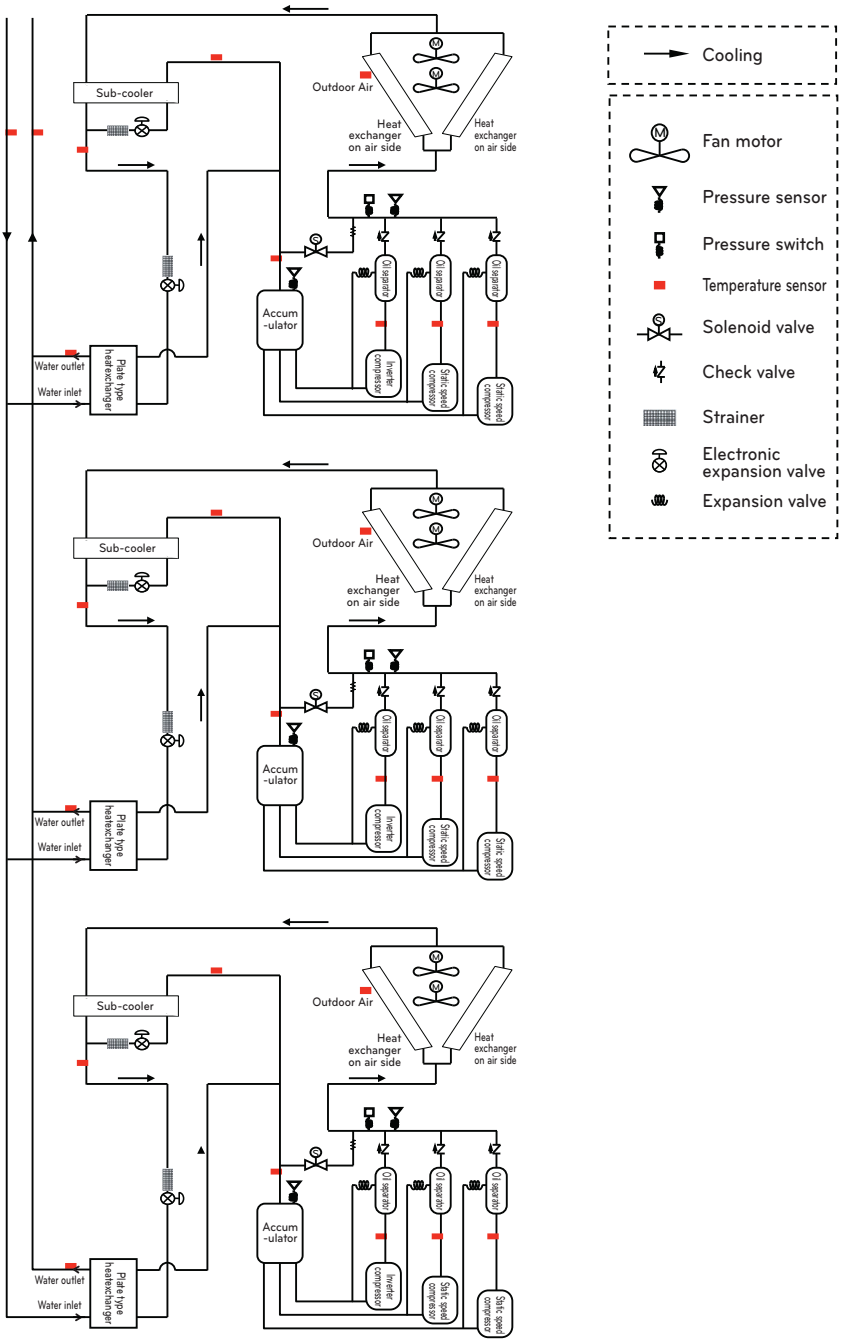


40RT


Cooling
Fan motor
Pressure sensor
Pressure switch
Temperature sensor
Solenoid valve
Check valve
Strainer
Electronic expansion valve
Expansion valve
Sub-cooler
Outdoor Air
Heat exchanger on air side
Heat exchanger on air side
Accum -ulator
Oil separator
Oil separator
Oil separator
Inverter compressor
Static speed compressor
Static speed compressor
Water outlet
Water inlet
Plate type heatexchanger
Sub-cooler
Outdoor Air
Heat exchanger on air side
Heat exchanger on air side
Accum -ulator
Oil separator
Oil separator
Oil separator
Inverter compressor
Static speed compressor
Static speed compressor
Water outlet
Water inlet
Plate type heatexchanger

ENGLISH

60RT



List of safety device and setting

No.	Safety device	Setting	Function
1	Flux switch	-30% of rated flux	Prevent evaporator from freezing (Detects appropriate flux of cold water and stops if there is any abnormal situation)
2	High pressure switch	4.1 Mpa	Stops operates when the setting is above the setting
3	Fuse	250 V 10 A (Main) 250 V 3.15 A (INV)	Disconnects current when it exceeds the normal value
4	Compressor circuit breaker	28 A	Measures and stops over-current per compressor
5	Fan motor circuit breaker	4 A	Measures and stops over-current per motor
6	Discharge temperature sensor	110 °C	Stops compressor in stages
7	High pressure sensor	3.6 MPa	Starts protective operation control to reduce the cycle pressure
8	Low pressure sensor	0.22 MPa	Starts protective operation control to raise the cycle pressure
9	Water pipe temperature sensor	4 °C	Prevent evaporator from freezing (Stops when cold water temperature is 4°C)
10	Reverse phase detector	-	Compares the current of each phase and stops when it is in reverse phase
11	Liquid compressor prevention	-	Discharge over-heating level goes up to prevent liquid compression
12	Compressor ratio limit	1.8	Compressor frequency is reduced when operating at Low compression ratio to prevent the internal parts within the compressor from being damaged

Operation range and limit

The following table shows the operation range of the product. Do not operate the product exceeding the following operation range.

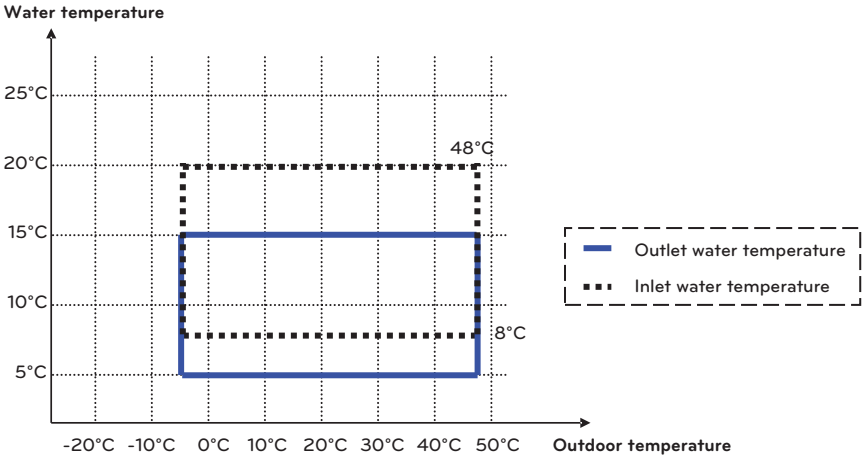
Operation range	Voltage		V	187 ~ 253
	Demand limit		%	10 ~ 140
	Cold water inlet temperature		°C	8 or above
	Cold water outlet temperature		°C	5 ~ 15
	Outdoor temperature	Cooling	°C	-5 ~ 48

(1) Product performance range at rated condition is 10-110%.
- Cooling rate condition: Outdoor temperature 35°C, outlet water temperature 12°C

(2) Demand limit setting target is the power consumption, and 100% reference is the rated power and the range of setting is 10-140%.

(3) When running heating operation with outdoor temperature is less than 7°C, the inlet water temperature must be 20°C or above.

Operation range of cooling mode



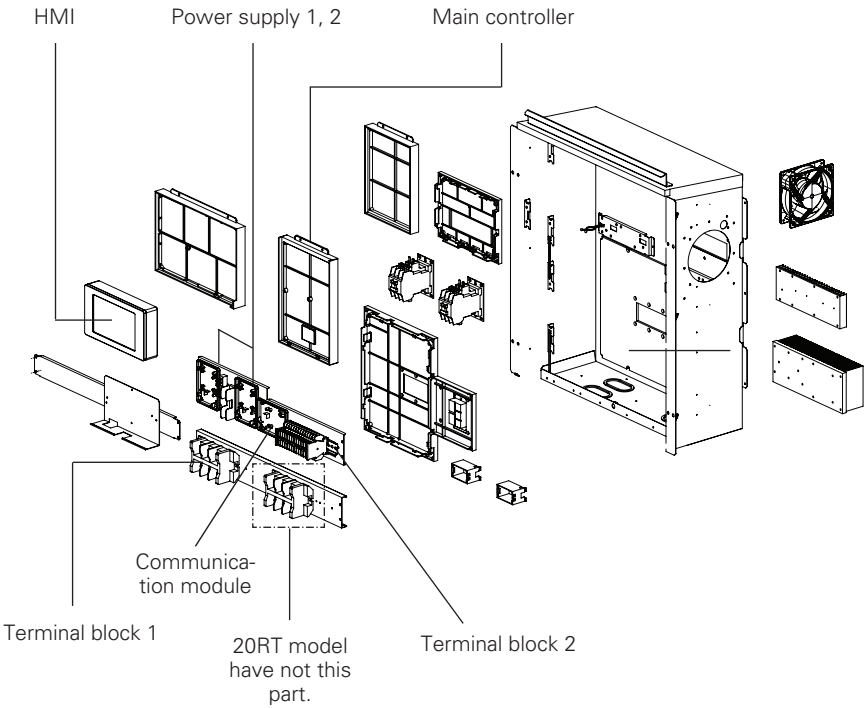
CAUTION

When running cooling operation with outdoor temperature is less than -5 °C, depending on inlet temperature, the product does not operate normally, or can take a long time for running.

In this case, Please running operation After raising the inlet temperature by circulating load water.

Control

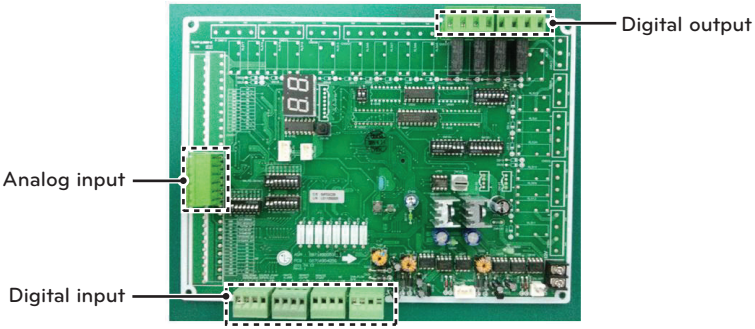
Control panel configuration



<Inside control panel>

- HMI (Human Machine Interlock)
  This is for basic product setting and command, and shows the information of product and each cycle.
- Main controller
  This controls the input/output port and the communication with each cycle.
- Power supply 1, 2
  This supplies the power to the main controller and HMI.
- Communication module
  This controls the communication between the main controller and each cycle.
- Terminal block 1
  This is the terminal block that receives the main power externally.
- Terminal block 2
  This is terminal block of which the input/output is connected to the chiller controller and is electrically wired internally within the panel.

The input/output port of the main controller of the chiller is configured as shown below. The functions are as shown below.

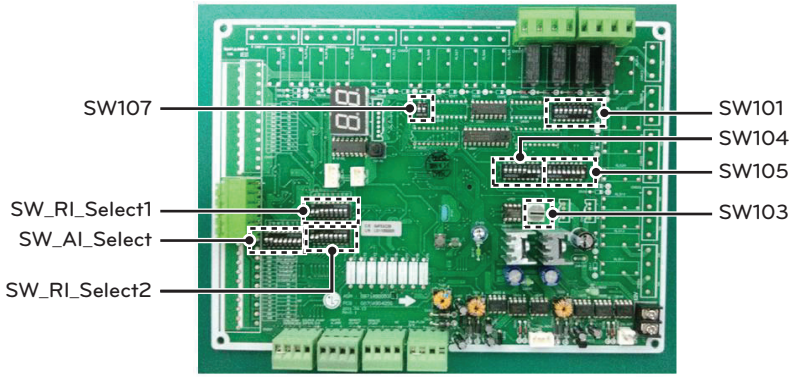


<Main controller of chiller>

Classification	Name	Number	Description
Analog input	TH_Water_In (L) (Common load inlet water)	CN_201	This receives the common load inlet water temperature value.
	TH_Water_Out (L) (Common load outlet water)	CN_201	This receives the common load outlet water temperature value.
			(Not used in 20RT model.)
	TH_Ambient (Outdoor temperature)	CN_201	This receives the outdoor temperature value.
Digital input	Flow Switch (L) (Load water flux switch)	CN_401	This receives whether the flux is formed for the load water.
	Remote Start (Remote operation)	CN_402	This receives the operation command from external controller and contact point.
	Remote Alarm (Remote alarm)	CN_403	This receives whether error occurs from the external controller and contact point.
	Pump Interlock (Load water pump interlock)	CN_404	This receives the operating condition of the pump after the pump operation output/
Digital output	Pump Output (Load water pump output)	CN_501	This gives the operation command for the load water pump.
	Thermal Heater (Heater output)	CN_501	This supplies the power to the heater.
	Alarm Lamp (Alarm Status)	CN_501	Current Alarm Status Non-Volt Relay Output
	Running Lamp (Running Status)	CN_501	Current Running Status Non-Volt Relay Output

Chiller controller rotary, dip switch setting

Switch location



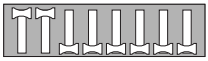
Chiller controller has the dip switch and rotary switch as shown below and the hardware porter input method and option can be set.

Input method setting dip switch

Each dip switch setting has the function to decide the input method of the hardware port and the air cooled chiller receives the temperature input of resistance type. Therefore the dip switch is set as shown below by default.

Do not change the default setting of the dip switch.

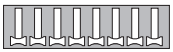
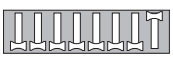
: Switch OFF : Switch ON

Name	Switch setting	Description
SW_AI Switch		#1 and #2 ON #3~#8 OFF
SW_RI 1 Switch		#1 and #2 OFF #3~#8 ON
SW_RI 2 Switch		#1 and #2 OFF #3~#8 ON

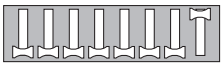
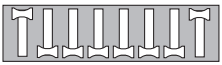
Option setting dip switch

Option setting dip switch can be additionally set when functions are added in the future, and it is set as shown below by default.

: Switch OFF : Switch ON

Name	Switch setting	Description
SW101	①②③④⑤⑥⑦⑧ 	Not used All OFF
SW104	①②③④⑤⑥⑦⑧ 	Not used All OFF
SW105	①②③④⑤⑥⑦⑧ 	#1-#7 OFF #8 ON
SW107	①② 	Not used All OFF

SW105 detail setting

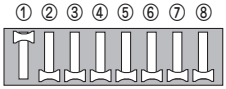
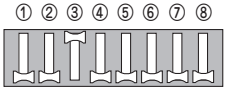
Name	Switch setting	Description
20RT cooling only		#1-#7 OFF #8 ON
20RT heat pump		#2-#7 OFF #1, #8 ON
40RT cooling only		#1-#3, #5-#7 OFF #4, #8 ON
40RT heat pump		#2-#3, #5-#7 OFF #1, #4, #8 ON
60RT cooling only		#1-#2, #4-#7 OFF #3, #8 ON
60RT heat pump		#2, #4-#7 OFF #1, #3, #8 ON

#8 dip switch of SW105 is set to ON in normal condition and is used as the dip switch for the service to upgrade the program. Generally in normal condition it should always be set to ON.

CAUTION

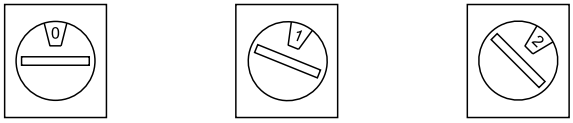
Default dip switch is set to factor default to fit the product. Resetting the dip switch may block the product from operating normally and can cause product failure. Therefore maintain the default setting while using the product.

: Switch OFF : Switch ON

Name	Switch setting	Description
Freeze protection option		#1 ON : Freeze protection option inactivation #1 OFF : Freeze protection option activation
Alarm automatic reset option		#3 ON : Alarm manual reset #3 OFF : Alarm automatic reset

Rotary switch

Rotary switch has the function to set the unique address value for communication with the main controller when multiple main controllers are installed, and is set as shown below.



[Default setting]

- SW103 Rotary Switch -

SW103 rotary switch is the switch to set the address of chiller PCB and the default value is “0”, and can be set from 0 to 2 based on the address condition. After changing the address, the power must be reset to apply the changed address.

CAUTION

The rotary switch of the chiller controller can be set from 0 to F and the default address is set to “0”.

When changing the address, it must be aligned to the address of HMI to operate normally. (For details on setting the address of HMI, refer to HMI address setting)

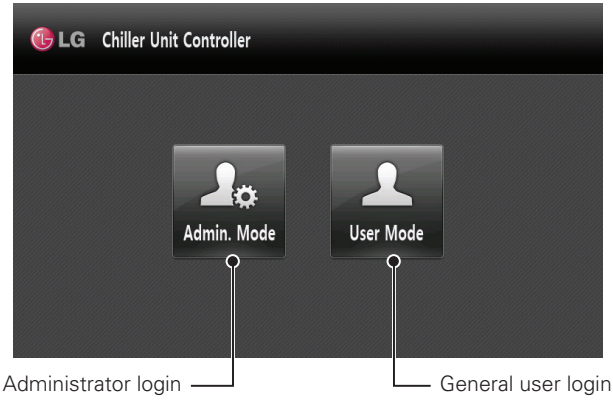
Logging in to HMI

This chapter describes how each screen of HMI is composed and what each function is and how to use the function.

When power is connected to HMI, HMI operates automatically.

When HMI runs, first the LG logo screen will be displayed, and then the following login screen will show up.

HMI can be logged in based on 2 different methods based on the administrator or general user authority.



- Administrator login
  When user logs in as the administrator, the user can use all the functions of HMI.

- General user login
  When the user logs in as general user, the user can use all functions excluding the schedule function and service setting function provided in the administrator login.

CAUTION

When HMI is installed indoors, the guaranteed communication distance is 500m.

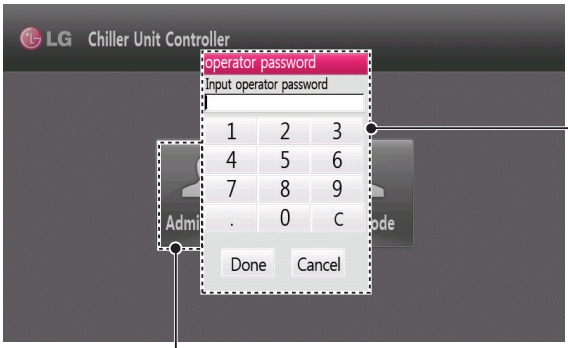
- Guaranteed communication distance of HMI: 500m
  (But, when connected indoor, the end resistance (100-200Ω) must be installed at the terminal connected to HMI for smooth communication. In this case, if the installation location of the Unit is different from that of HMI, the maximum permitted connection distance of the communication cable between the two locations is displayed.)

Logging in as administrator

To log in as administrator, proceed as shown below.

1 Press the “Administrator mode” button to display the password input screen.

2 Default password is not set, and press the “Done” button to enter the administrator mode.



Reference: Administrator login password

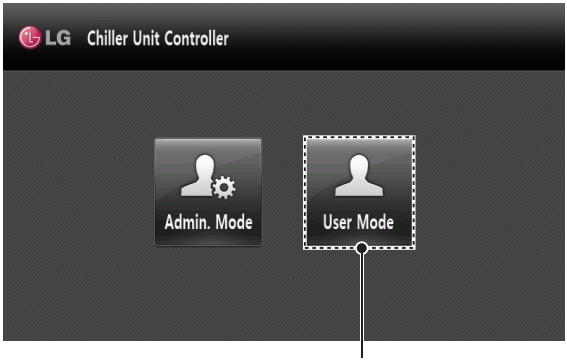
When initially logging into HMI in administrator mode, move to the “Configuration” menu to set the administrator password from user setting 2. If the default password is not set, it will directly move to administrator mode when the button is pressed.

3 After logging in, all functions of HMI are displayed on the screen and the administrator can use the menus.

Logging in as general user

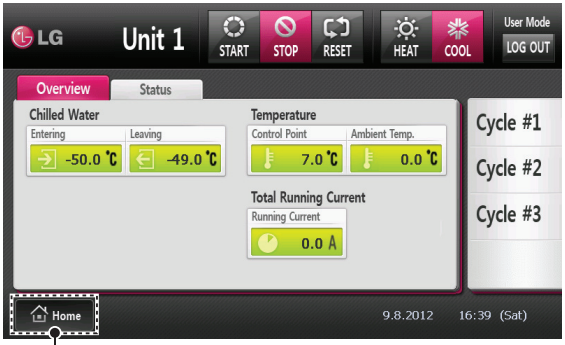
To log in as general user, proceed as shown below.

1 Press the “User mode” button to login directly to HMI without any password input.



Press the general user mode to login without any password input

2 The following main screen will be displayed after logging in.

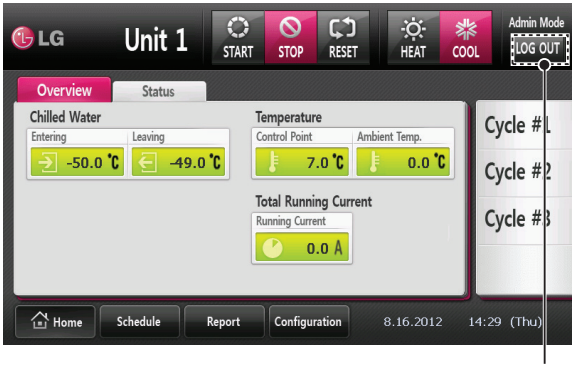


Only the menu buttons that can be accessed will be displayed.

Logging out

After logging in as administrator mode or user mode, proceed as shown below to login as different mode.

1 Press the "Log out" button on the top right corner of all screens after logging in to log out. It will move to the default log in screen.



Press the "Log out" button on the top right corner to move to the default login screen.

2 It moves to the default login screen.

HMI interlock control

This chapter describes the product interlock control of HMI.

HMI can interlock with maximum of 5 products, and maximum of 5 products can be controlled and monitored as if it is one product. When the number of installed products and capacity is set in the dip switch of the main controller of the Unit, the HMI automatically recognizes and displays the capacity and number of units on the screen. When you log in to the HMI, the main screen will be displayed as shown below based on the number of products set.

*When 2 or more products are installed

Move to detail information of product

Move to main screen of each Unit.

When 2 or more products are connected, press the "More Info" button on the main screen to move to the main screen of the applicable Unit.

Reference: Detail information

Press the detail information button to set and monitor the condition of each applicable product.

* When 1 product is installed

Starting/Stopping when 2 or more are interlocked

When 2 or more units are interlocked, functions to start/stop all units or start/stop individual unit are provided.

* Start/Stop all units

Press the start/stop button at the top to send the start/stop command to all units.

To send the start/stop command simultaneously to all units, press the start/stop button at the top of the menu screen. All units will start/stop.

* Start/Stop individual unit

Press the individual start/stop button of the applicable unit to respectively start/stop the unit.

To individually start/stop each connected unit, press the start/stop button of each applicable unit on the main screen.

Changing operating mode when 2 or more units are interlocked

When 2 or more units are connected, individual operating mode is not supported to prevent the units from operating in different modes respectively. Press the heat/cool button at the top menu to set the operating mode of all units.

* Start/Stop all units

To set the operating mode of all units, press the heat/cool button at the top menu.

Changing operating mode when 4 or more units are interlocked

When 2 or more units are connected, it can be switched the arrow button.

Reference: When the operating condition of each unit is different

Each unit can start/stop all together or individually and basically when the units are controlled with one HMI, all units are controlled as if one unit. When the operating condition of each unit is different, the start/stop button at the top menu will be deactivated to show overall condition.

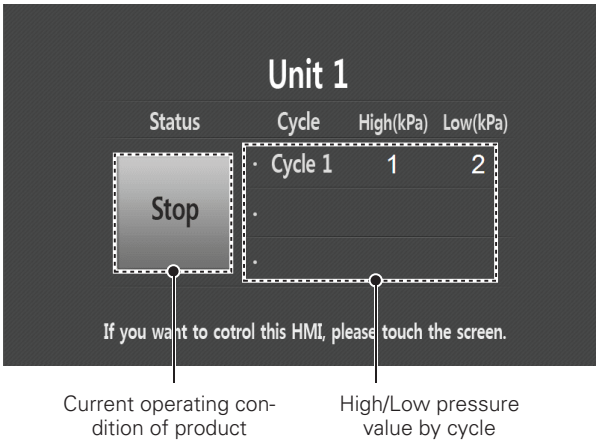
HMI standby screen

If there is no touch input for 10 minutes on the HMI, it will switch to HMI standby screen.

Standby screen will show the cycle number and number of units installed respectively.

This chapter describes how to switch to the HMI standby screen and details of the screen display.

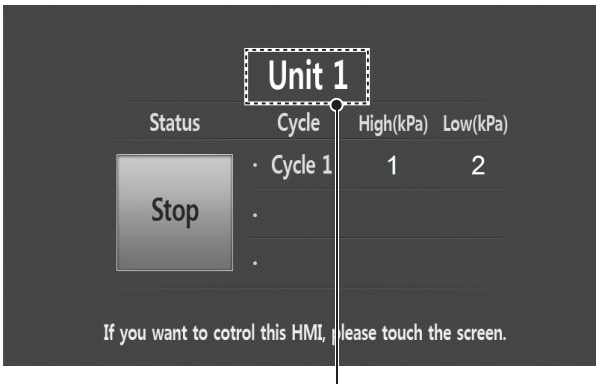
* Standby screen based on cycle number



- Product operating condition
  This displays the condition value of current applicable product.
  Operating, stop, alarm

- High/Low pressure condition by cycle
  This displays the current high/low pressure value of each cycle. Based on the setting of the dip switch of the main controller of the unit, only cycle 1 is shown for 20RT and cycle 1 and 2 are shown for 40RT and all details are shown for 60RT.

* When 2-5 units are installed



Information of unit

Installed unit product

When 2-5 units are installed, the stand screen mode will switch every 5 seconds for each unit.

Unit 1 ⟶ Unit 2 ⟶ Unit 3 ⟶ Unit 4 ⟶ Unit 5 ⟶ Unit 1

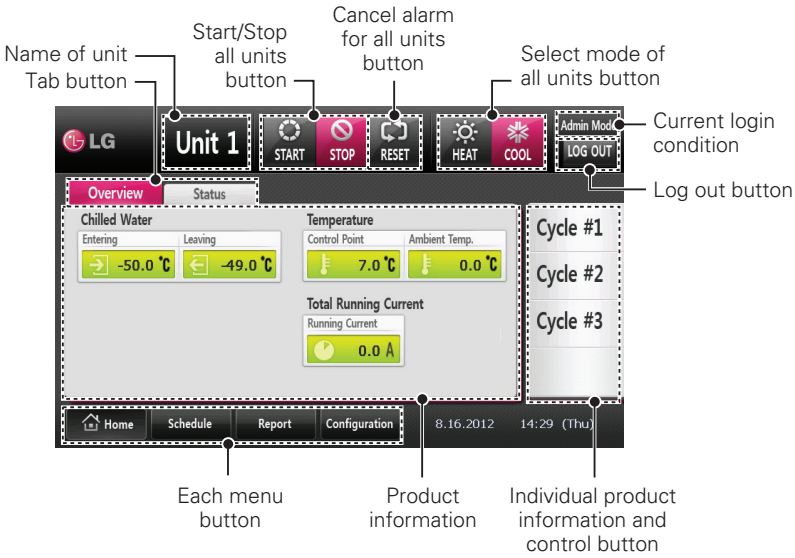
HMI automatically recognizes and shows the standby screen mode based on the cycle and number of units by each product.

Introduction to HMI menu

This chapter describes the HMI menus to know to operate the product and how the screen is configured.

HMI main screen configuration

After logging in to HMI, the system view screen that shows the common information of the product is displayed as shown below.



- Tab button
  This switches to the common information screen.
- Name of unit
  Name of installed units are displayed for maximum of 3 units as Unit 1, Unit 2 and Unit 3.
- Start/Stop button
  Press the start/stop button to send the start/stop command to the product.
- Cancel alarm button
  Press the cancel alarm button to cancel the alarm of the product.
- Select mode button (Applicable to heater pump model)
  This is fixed in the mode only for cooling. For heater pump model, the operating mode can be changed by switching between cooling and heating.
- Current login condition
  This displays the current login condition.
- Log out button
  Press the log out button to return to the default login screen.

- Menu button
  Press the button of each menu to move to the applicable menu screen.
- Product information
  This displays the current condition values of the product.
- Cycle information menu button
  This switches tot eh screen to check the condition information value by each cycle.

HMI common top/bottom menu configuration

This section describes the top/bottom button commonly shown in all screens.

The button and information of each button shown on the top/bottom (Common area) and the right side are as shown below.

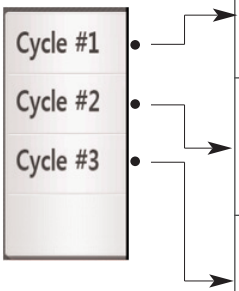
* Top common area

Icon	Description
START	Press this button to send the start command to the product.
STOP	Press this button to send the stop command to the product.
RESET	Press this button to delete and cancel the current alarm window.
HEAT COOL	Press this to set the mode of the product. - For product for cooling only, it is fixed. - For heater pump model, it can be switched between cool and heat.
Admin Mode User Mode	This shows the current login mode condition. Administrator mode: Administrator mode login condition User mode: General user mode login condition
LOG OUT	Press the “Logout” button to return to the default login screen.
Unit 1	This displays the name of the currently selected unit. (Unit 1-Unit3)

* Bottom common area

Icon	Description
Home	Press this button to switch to view system screen.
Schedule	Press this button to switch to main schedule screen. (This button is only activated in administrator mode login)
Report	Press this button to switch to record screen. (This button is only activated in administrator mode login)
Configuration	Press this button to switch to the setting screen to set the values necessary to operate the product. (This switches to the last previous screen in setting area.) (This button is only activated in administrator mode login)
8.16.2012 14:42 (Thu)	This displays the current year, month, date, hour, minute and day of week.

* Menu button to move to cycle information



Icon	Description
Cycle #1 Cycle #1	This switches to view cycle #1 screen. This shows that it is currently at #1 cycle screen.
Cycle #2 Cycle #2	This switches to view cycle #2 screen. (This is shown when dip switch of freezer main controller is set to 40RT.) This shows that it is currently at #2 cycle screen.
Cycle #3 Cycle #3	This switches to view cycle #3 screen. (This is shown when dip switch of freezer main controller is set to 60RT.) This shows that it is currently at #3 cycle screen.

Overview,Status screen configuration

The screen to show the common information of the product is composed of system view and condition 1 screen. You can switch over to each screen by using the tab button.

The respective information of the screen is as shown below.

* Overview screen

Icon	Description
Overview	Press the “Overview” button to switch over to system view screen.
Entering -50.0 ℃	This displays the inlet water temperature value of common load water.
Leaving -49.0 ℃	This displays the outlet water temperature value of common load water.
Control Point 7.0 ℃	This displays the temperature value of current cooling setting.
Ambient Temp. 0.0 ℃	This displays current outdoor temperature value.
Running Current 0.0 A	This displays overall operating current value of operating compressor.

* Status screen

Icon	Description
Status	Press the “Status” tab button to switch to the condition screen of the system.
Left to Start time	This displays the time of standby condition prior to the starting the product.
Flow Switch	This displays the flux switch condition value of current load water. (When the product is operating, it must be maintained to “ON”, and if not, it will generate an alarm.)
Pump Interlock	Load water pump output condition receives the contact point of the external signal of the pump. (When the product is operating and the pump output is “ON”, the input must always be maintained to “ON” condition, and if not, it will generate an alarm.)
Chilled Water Pump Output	When the product is operating it is always ON and when the product stops, the anti-freeze mode applies as shown below. Load water pump repeats ON and OFF based on the outdoor temperature condition. Outdoor temperature < 1°C → Always “ON” 1°C<=Outdoor temperature<5°C → 2 minutes “ON” and 18 minutes “OFF” Outdoor temperature >= 5°C→ Operation “OFF” Anti-freeze mode is applied when the pump is interlocked. To interlock the pump, connect the pump output terminal and to check whether the pump is operating, the pump interlock terminal must be connected. (Refer to the wiring diagram on how to connect to the terminal.)

Cycle information screen configuration

To switch to the screen to view the cycle information, press the button from cycle #1 to cycle #3 located on the right side of the screen to view all system.

* View cycle

Icon	Description
Cycle #1	This displays the currently selected cycle.
Cycle #3	The cycle buttons not selected are shown in standby condition.
Compressor #1	This displays the current operating condition value of #1 static speed compressor.
Compressor #2	This displays the current operating condition value of #2 static speed compressor.
Inv. Compressor	This displays the operating frequency value of the inverter compressor.
Hot Gas Sol. Valve	This displays the hot gas solenoid valve condition.
High Pressure	This displays the current high pressure value.
Low Pressure	This displays the current low pressure value.
EEV Status	This displays the current EEV pulse signal value.
Fourway Coil	This displays the condition value of the 4 way valve when switching over between cooling and heating mode. (This item only applies to the M unit model for both cooling and heating mode.)

* Cycle temperature

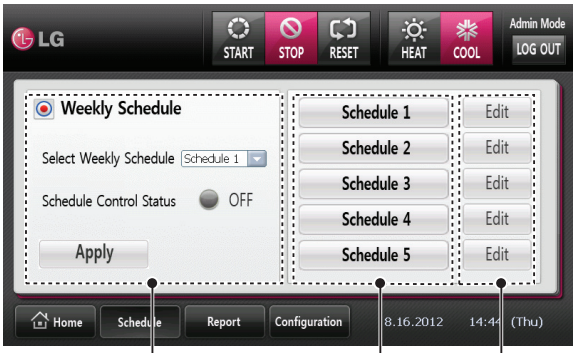
Icon	Description
Chilled Water Outlet	This displays the currently selected cycle.
Condensor	This displays the current operating condition value of #1 static speed compressor.
Evaporator	This displays the current operating condition value of #2 static speed compressor.
Liquid	This displays the operating frequency value of the inverter compressor.
Comp. Suction	This displays the hot gas solenoid valve condition.
Inv. Comp. Discharge	This displays the current high pressure value.
Comp. #1 Discharge	This displays the current low pressure value.
Comp. #2 Discharge	This displays the current EEV pulse signal value.
HEX	This displays the condition value of the 4 way valve when switching over between cooling and heating mode. (This item only applies to the M unit model for both cooling and heating mode.)

Introduction to schedule menu

This chapter describes the schedule menu you should know to operate the schedule of the product and how the screen is configured.

View schedule main screen

Press the "Schedule" button at the bottom of the full screen to switch over to the schedule main screen as shown below.



- Schedule information
  Select the product to apply the schedule and check whether the schedule mode is applied.
- Applied schedule pattern
  Switch over to the screen to check the weekly schedule saved condition of each pattern.
- Edit schedule pattern
  Switch over to the screen to edit the weekly schedule of each pattern.

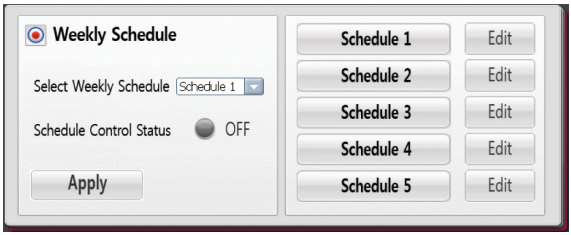
Reference: Applying schedule when 2 or more units are installed

When 2 or more units are installed and they are controlled with one HMI, the schedule is applied as if it is one product and the same schedule will be applied to all installed units.

To apply independent schedule for each unit, individual HMI must be installed.

View details of schedule main screen

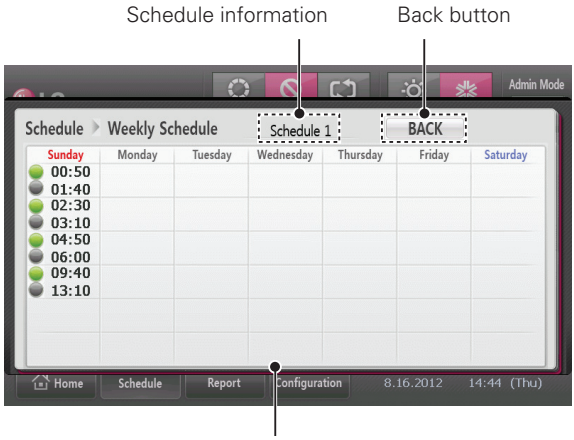
Each setting and monitoring values in the schedule main screen are as shown below.



Icon	Description
Select Weekly Schedule	Select the schedule to apply to all products.
Schedule Control Status	This displays whether the current control mode has entered the schedule condition. OFF : Not entered schedule mode (Gray) ON : Entered schedule mode (Green)
Apply	This applies the currently selected setting.
Schedule 1	Press each schedule button to switch over to the screen to view the weekly schedule currently set.
Edit	Press each “Edit” button to switch over to the screen to edit each applicable pattern.

Schedule monitoring screen

Each setting and monitoring values in the schedule main screen are as shown below.

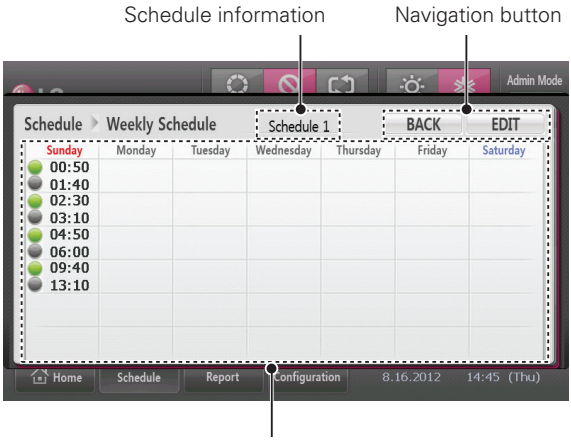


- Schedule information
  This displays the information of the currently selected schedule.
- Back button
  This switches from the current screen to schedule main screen.
- Weekly schedule information
  This displays the currently set weekly schedule information.

Icon	Description
Schedule 1	This displays the information of the currently selected schedule.
BACK	Press this button to switch from the current screen to the schedule main screen.

Weekly schedule screen configuration

Press the Edit button to switch over to the screen to check the weekly schedule condition of the applicable pattern and the edit screen to move to the daily schedule setting screen to set the weekly schedule will be displayed.

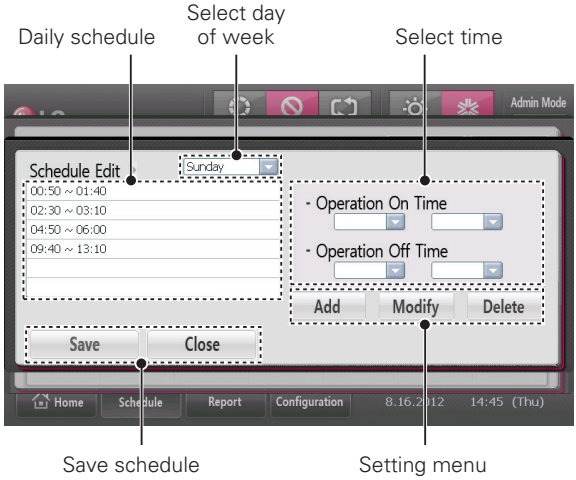


- Schedule information
  This displays the information of the currently selected schedule.
- Navigation button
  This is the button to navigate to the previous or sub setting screen from the current screen.
- Weekly schedule information
  This displays the currently set weekly schedule information.

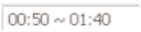
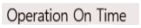
Icon	Description
Schedule 1	This displays the information of the currently selected schedule.
BACK	Press this button to switch from current screen to the schedule main screen.
EDIT	Press this button to switch from current screen to time setting screen.

Schedule pattern edit screen configuration

Press the "Edit" button from the weekly schedule monitoring screen to switch over to the pattern edit screen.



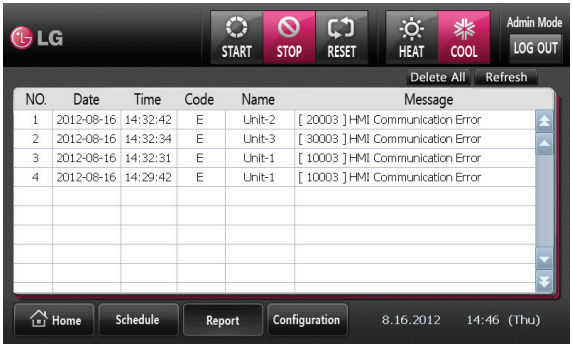
- Select day of week
  Select the day of week to edit.
- Daily schedule
  This displays the daily schedule of the selected day of week.
  Maximum of 6 daily schedules can be set/edited to be added.
- Save schedule
  This switches to the previous screen after saving or not saving the added or edited schedule.
- Select time
  Select and set the start and stop time of the operation schedule.
- Setting menu
  Add, delete or edit the set time.

Icon	Description
	Select the day of week to set in the daily schedule.
	This displays the operation start and stop time of the product. Maximum of 6 can be added.
	Operation start time can be set by hour and minute (10 minute unit).
	Operation stop time can be set by hour and minute (10 minute unit).
	Daily pattern can be added after setting the operation start and stop time.
	After selecting the daily pattern to edit, set the operation start and stop time to edit the pattern of.
	Delete selected daily pattern.
	Switch to previous screen after saving the set schedule pattern.
	Switch to previous screen without saving the set schedule pattern.

Introduction to record menu

This chapter describes how to check the record of the events that triggers the alarm.

History screen configuration

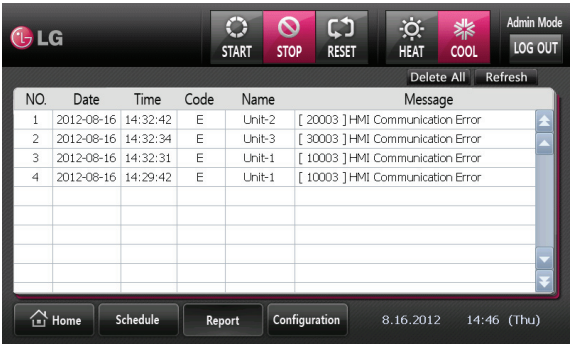


The events are sorted in the order of occurrence.

Icon	Description
Delete All	Delete all records.
Refresh	Refresh current screen with latest information.

Understanding record

Event record is saved in the order of occurrence.



Delete record

- Press the delete all button on the top right corner to delete all the saved records.
- Events that occurred within the last 30 days will be saved and all records beyond 30 days will automatically be deleted.
- If the number of record exceeds 3000, it will automatically be deleted starting with the oldest record.

Introduction to setting menu

This chapter describes the screen of the setting menu required to operate the product and how to set the details.

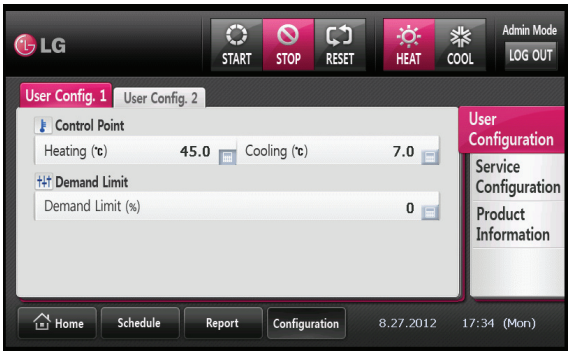
Setting screen configuration

Press the “Configuration” menu button at the bottom of the screen to switch over to the setting screen and the following screen will be displayed.

- Tab button
  Press the tab button to switch to user setting 1 or user setting 2 screen.
- Information setting
  Set and monitor the values required to operate the product.
- Setting and product information selection button
  Press each applicable button to switch to the setting screen and product information screen.

User setting screen detail view

Detail information of the User config.1 screen is as shown below.



Icon	Description
User Config. 1	Switch over to User config.1 screen.
Heating (℃)	This sets the target heating temperature value during cooling operation. (5.0~15.0 °C)
Cooling (℃)	This sets the target heating temperature value during heating operation. (35.0~55.0 °C)
Demand Limit (%)	Demand control is the function to save energy by limiting the operation capacity as much as the control rate set by the user. (Setting range : 0% ~ 140%) If the demand control is not used, set the demand control rate to 0%. Demand control rate can be set in 10% increments.

Detail information of the User config.2 screen is as shown below.

Icon	Description
User Config. 2	Switch over to User config.2 screen.
Control Mode	Select the basic mode to control the product. - Local: Manual mode of HMI - Remote: Remote control mode When entering the remote control mode, the start/stop at the top menu of HMI is disabled and the operation can only be started and stopped based on the external contact point or modebus communication. - Schedule: When setting the schedule mode, the manual and remote control does not work and the product can only be started and stopped based on the schedule.
Remote Mode	This is activated only when the control mode is set to remote. Contact point: The product can be started/stopped based on the “Remote Start” signal from the unit controller. Modebus : The product can only be started/stopped based on the external modebus communication.
English	Select the language to use. Only English is available in Operating System using English language.
Admin. Password Change	The administrator password can be changed. Press the button to display the input screen to change the password.
Calibration	Screen calibration is the function to calibrate the touch area when the touched part of the screen does not align to the area the user touches. Press the button to switch to the screen to calibrate the screen.
S/W Upgrade	This is the button to upgrade the program. Press the button to switch to the screen to upgrade the program.

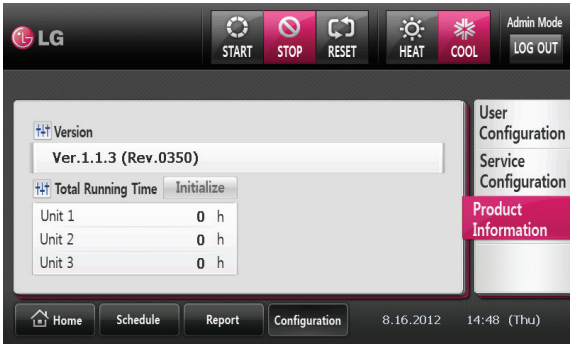
Service setting screen configuration and detail view

The detail information of the Service configuration screen is as shown below.

Icon	Description
Unit Type	This displays the type of currently installed product based on the dip switch setting of unit main controller. - Air cooled cooling only - Air cooled heating/cooling both
Unit Capacity	This displays the operation capacity value of the currently installed product.
Unit Quantity	Set the number of units to manage with the current HMI.
Start Delay	This displays the delay time to operating the next product after stopping the product. (120-600 sec: Basic 180 sec)
Stop Delay	Set the delay time for the load water pump to stop after stopping the product. (10-120 sec: Basic 10 sec)
Flow Delay	Set the delay time for flux switch to operate after the load water pump output. (20-200 sec: Basic 120 sec)
Unit Address	Set the address value of each unit.

Product information screen configuration and detail view

The detail information of the product screen is as shown below.



Icon	Description
Version	This displays the program information applied to current product.
Total Running Time	This displays the accumulated operating time of each product in hour unit.

Operating the product

Setting schedule

The schedule screen can be accessed after logging in as administrator mode.
To set the schedule, proceed as shown below.

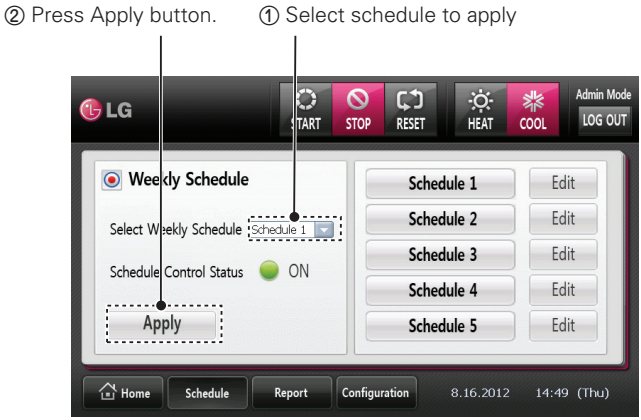
1 To use the schedule, set the control mode of user setting 2 to “Schedule”.

Select control mode to “Schedule”.

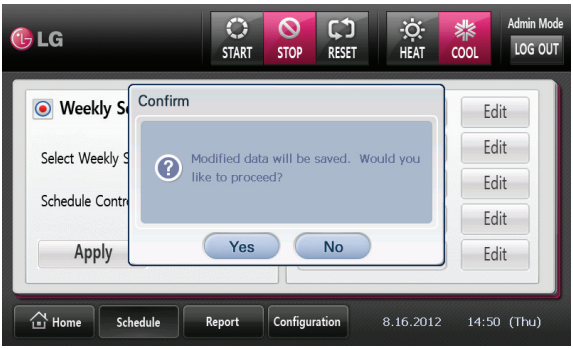
2 After setting the control mode, check the “Schedule Control Status” in the schedule main screen.

Check the green lamp and “ON” condition of the schedule applied condition.

3 Press the Apply button after selecting the schedule to apply to apply the selected pattern to the product.



4 Press the Apply button to display the following screen to confirm.



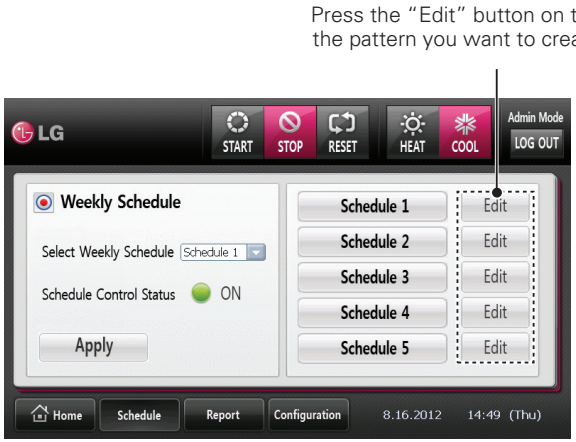
5 Press OK on the confirm window, and then the progress will be displayed as shown below.

Progress bar is displayed to show the progress of applying the pattern.

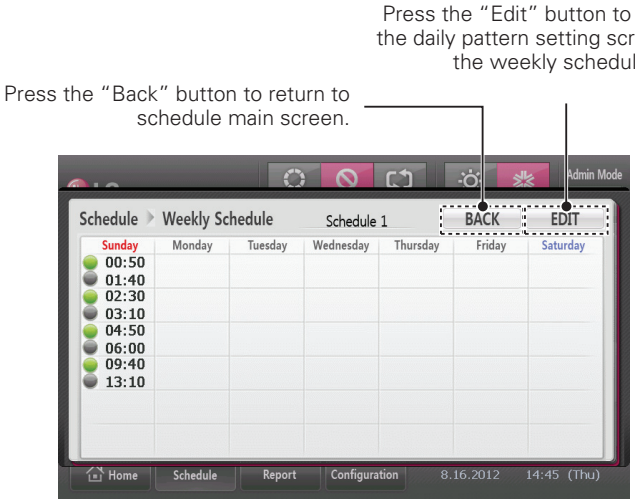
Creating & editing the schedule pattern

To create/edit the schedule pattern, proceed as shown below.

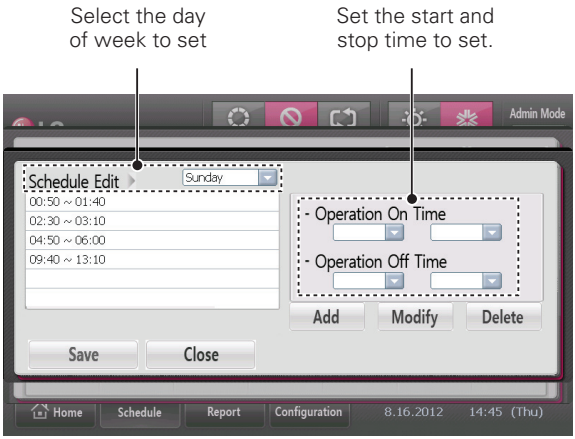
1 Enter the schedule main screen and press the "Edit" button located on the right side of the pattern you want to create or edit.



2 Press the "Edit" button to switch to the weekly schedule screen of the schedule you want to set. Press the "Edit" button in the weekly schedule screen to switch to the time setting screen. Press the "Back" button to return to the schedule main screen.

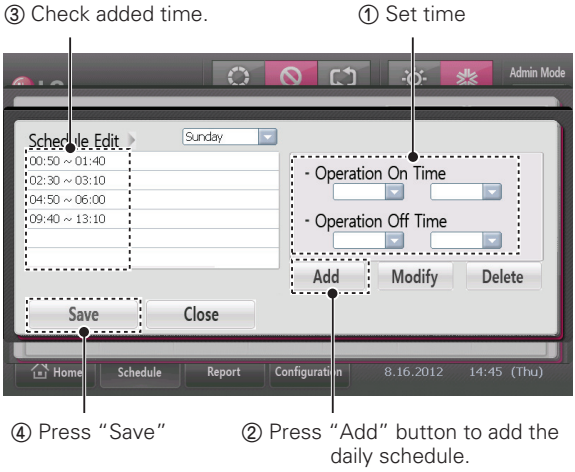


3 After selecting the day of week to edit the schedule pattern, add, delete or edit the daily schedule pattern.

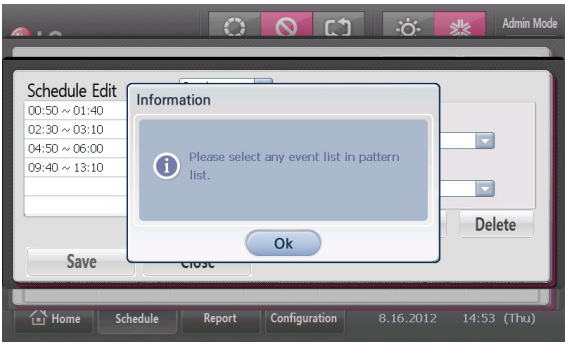


* Add daily schedule

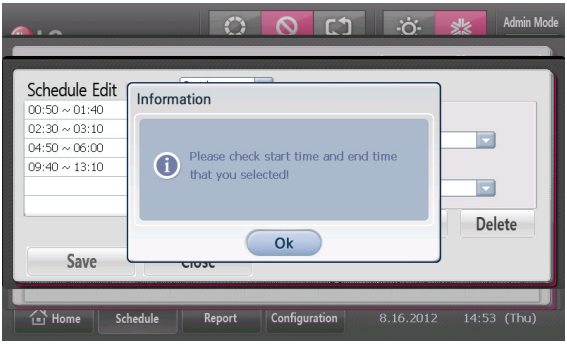
To add daily schedule, follow the order of 1-4 as shown below.
Maximum of 6 daily schedules can be set.



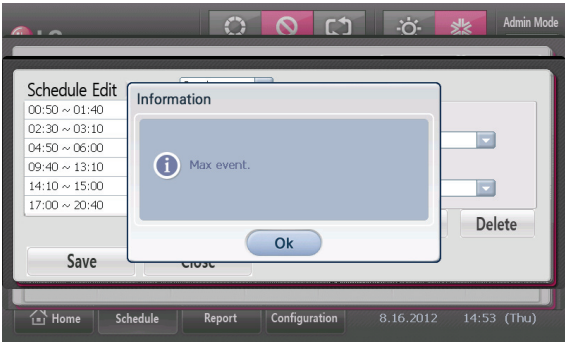
If you press the “Add” button without setting the time, it will open a warning window.



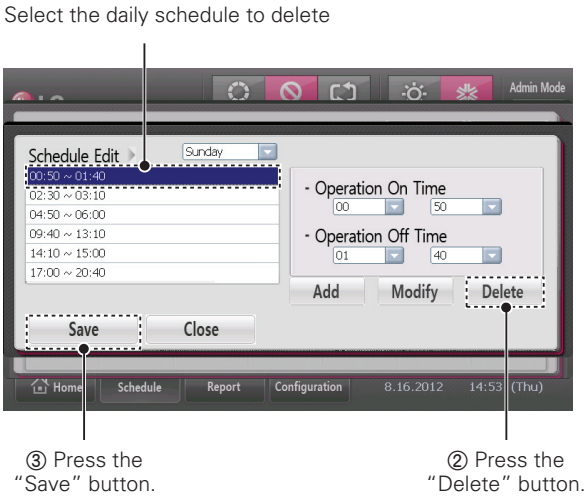
If the start and stop time of the operation is not set to all, it will open a warning widow as shown below.



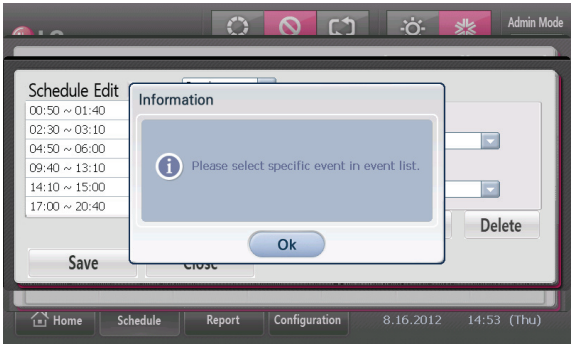
When more than 6 daily schedule patterns are added, it will open a warning window as shown below.



* Delete daily schedule
  Delete the daily schedule by following the order of 1-3 as shown below.

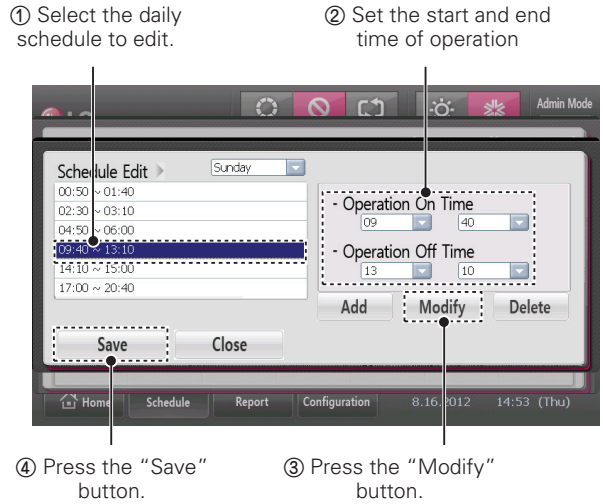


If you press the "Delete" button without selecting the daily schedule pattern, it will open a warning window as shown below.

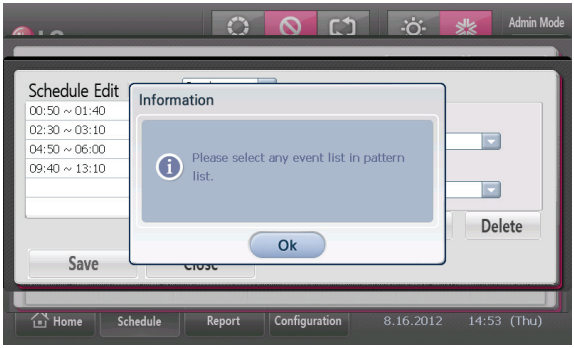


* Edit daily schedule

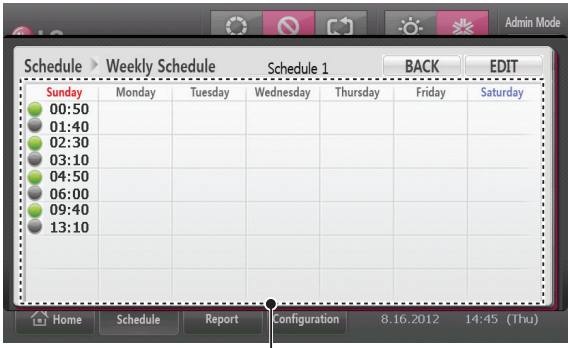
Edit the daily schedule by following the order of 1-4 as shown below.



If you press the "Edit" button without selecting the daily schedule pattern, it will open a warning window as shown below.

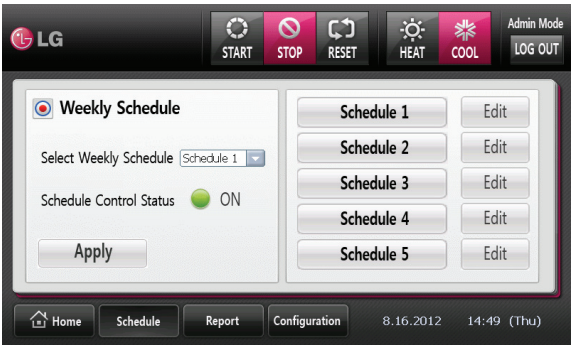


Add, delete or edit the daily schedule for the selected day of week to set the weekly schedule, and then press the “Save” button to switch to the weekly schedule screen.

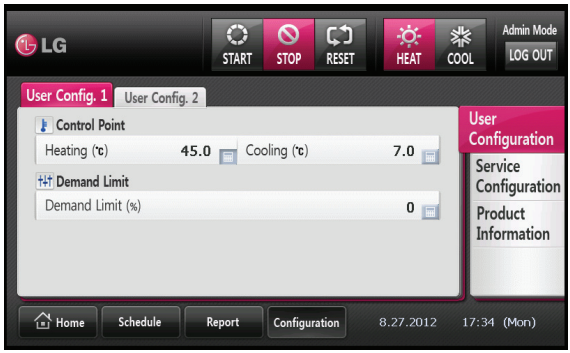


Set weekly schedule

After checking the weekly schedule, press the “Back” button to switch to the schedule main screen, and then set the weekly schedule for each pattern based on the above method.

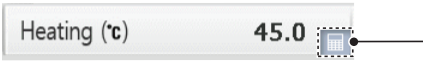


Setting User config.1 screen

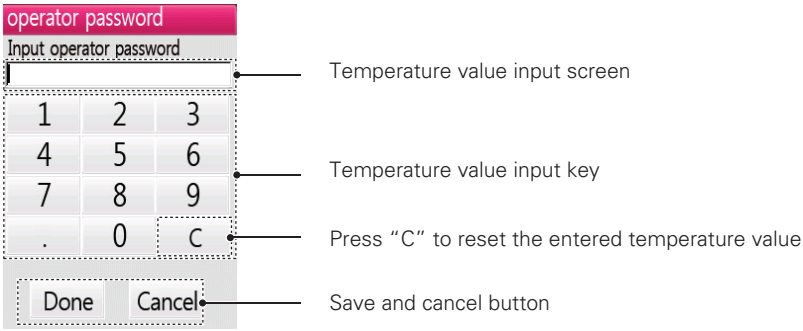


* Setting heating target temperature

1 To set the heating target temperature, press the temperature value setting button as shown below.



2 Press the setting button to display the input screen for setting as shown below.

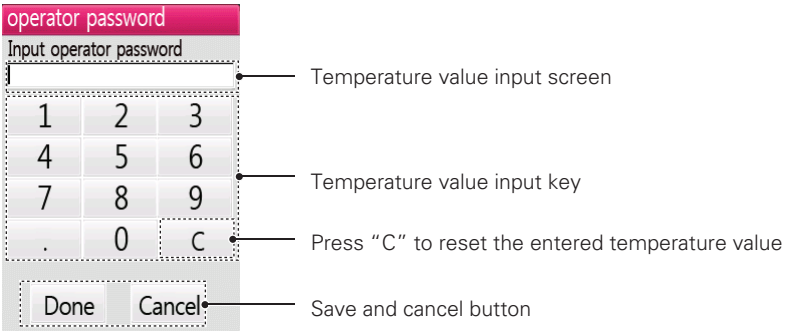


3 Heating temperature setting range is 35.0-55.0°C.

* Setting cooling target temperature setting

1 To set the cooling target temperature, press the temperature value setting button as shown below.

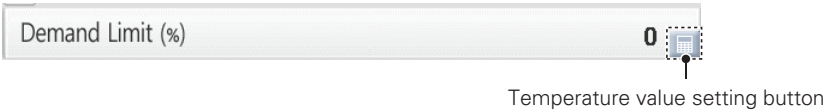
2 Press the setting button to display the input screen for setting as shown below.



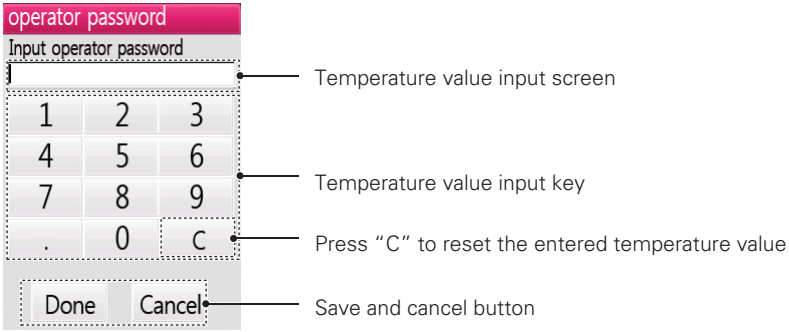
3 Cooling temperature setting range is 5.0-15.0°C.

* Setting demand control rate

1 To set the demand control rate, press the setting button as shown below.



2 Press the setting button to display the input screen for setting as shown below.



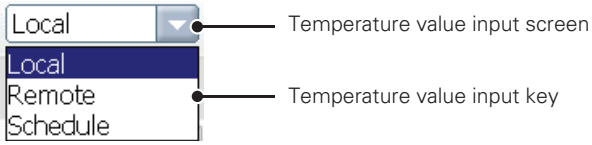
3 Setting range of demand control rate is 0-140%.

Setting User config.2 screen

* Setting control mode

1 To set the control mode, press the Select button as shown below.

2 Press the Select button to display the control mode that can be selected.

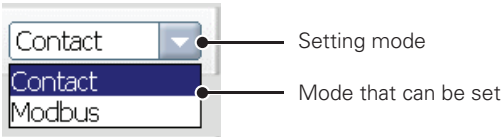


3 Select the control mode and when the setting mode is set, the control mode will be applied.

* Setting remote mode
  When the control mode is set to the remote mode, the remote mode is activated.

1 To set the remote mode, press the Select button as shown below.

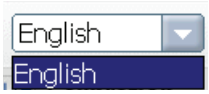
2 Press the Select button and the remote mode is displayed as shown below.



3 Select the remote mode and when the remote mode is set, the remote mode will be applied.

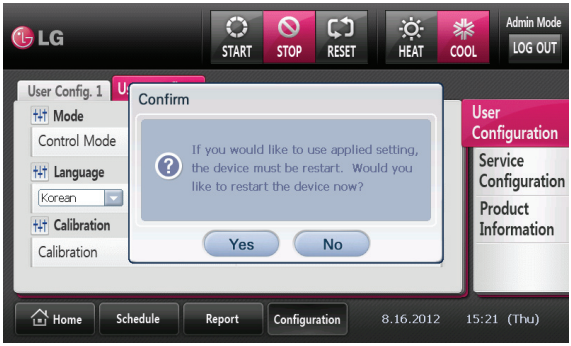
* Selecting language
  HMI supports English(English O/S), they can be Set as shown below.

1 Press the setting button and the selection screen will be displayed as shown below.



*HMI can select only English language

2 If you select the language to use and press the Apply button, it will open an information widow as shown below.



3 After rebooting the system, the selected language will be applied to HMI.

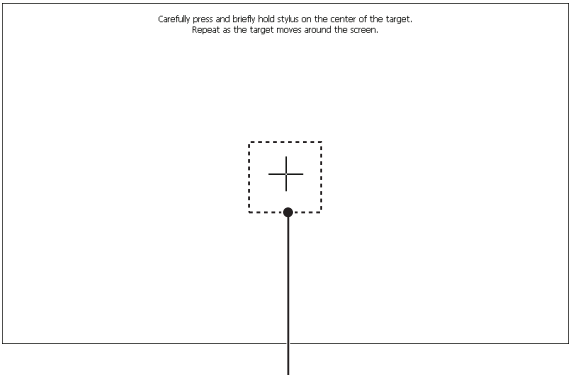
* Screen calibration

The screen can be calibrated in HMI through the screen calibration button as shown below.

1 Press the “Screen calibration” button of user setting 2 screen and the following screen will be displayed.

Press the “Recalibrate” button and it will switch to the screen calibration screen.

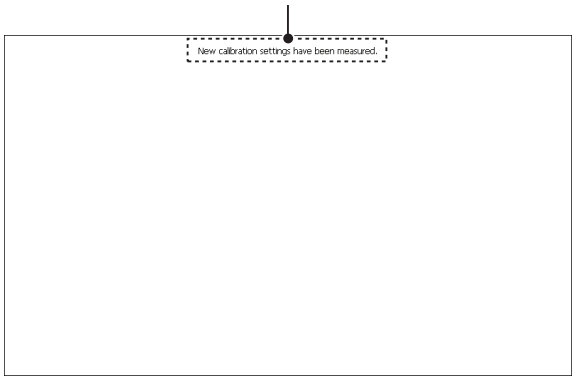
2 Press the “Recalibrate” button from the stylus attribute screen and it will switch to the screen to calibrate the screen as shown below.



Press the cross shown on the screen to perform the calibration.

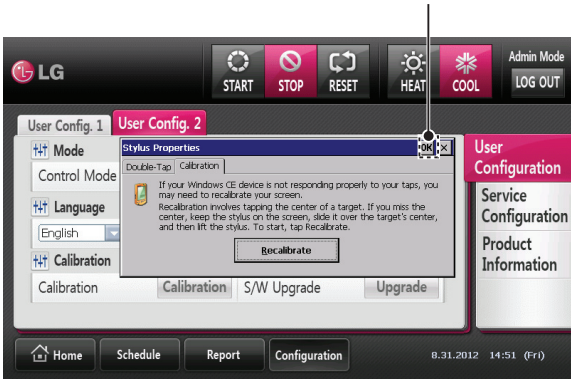
3 Follow the cross shown on the screen to complete the calibration. After the crosses disappear, press the screen to exit the calibration screen.

When the screen calibration is completed, message saying “New calibration is completed” will be displayed. Touch the screen to exit the calibration screen.



4 After exiting the screen calibration screen, press the “OK” button to complete the screen calibration.

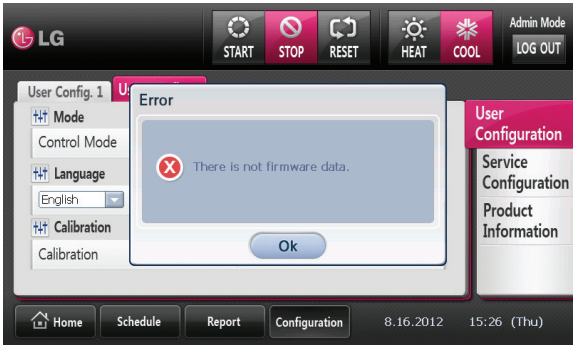
Press the “OK” button to complete the screen calibration.



* S/W upgrade

HMI can be conveniently upgraded through the S/W upgrade function in HMI.
Proceed in the following process to upgrade the software.

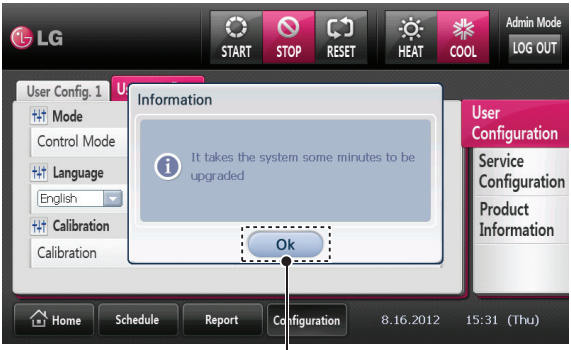
1 Before pressing the "S/W upgrade" button of user setting 2, the user must insert the USB storage device with the file to upgrade into the USB port of HMI. If the USB storage device is not inserted, it will open an error window as shown below.



2 If the USB storage device is inserted to the port normally, it will open a confirmation window checking whether to proceed with the upgrade as shown below.

Press "Yes" to move to the next stage for upgrade.

3 Press the “OK” button and it will open the information window showing that the system must be rebooted after the upgrade.

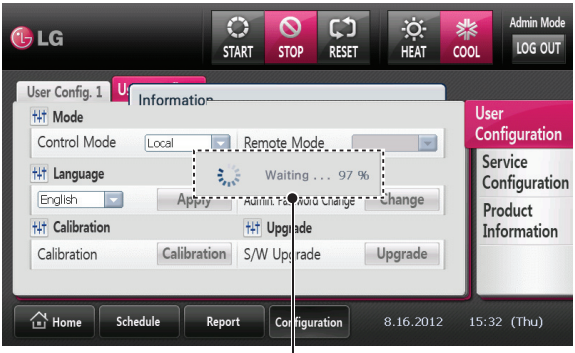


Press the “OK” button to move to the next stage for upgrade.

4 Press the “Yes” button and it will open the information window showing the time required as shown below.

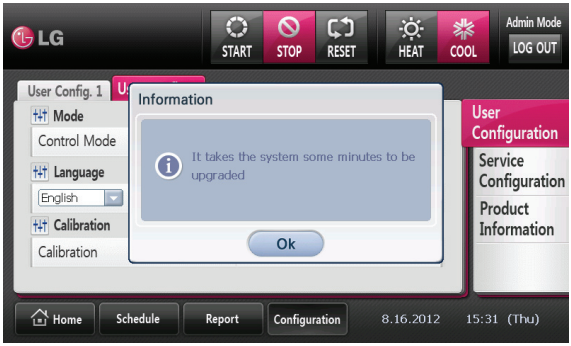
Press the “Yes” button to start the upgrade.

5 While the upgrade is in progress, the details of the information about the upgrade progress are displayed on the screen.



Upgrade progress is displayed.

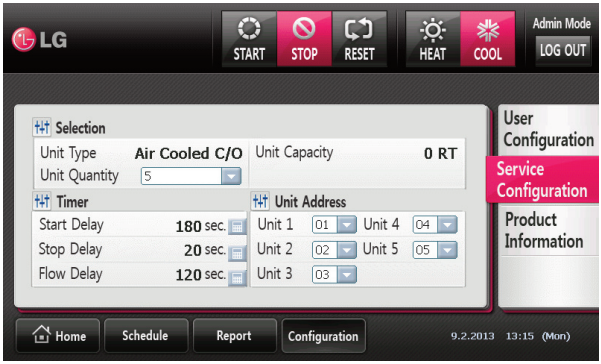
6 Press the “OK” button and it will open the information window showing that the system must be rebooted after the upgrade.



7 When the system restarts, it will switch to the default login screen.

Setting Service configuration

Each setting value in the user setting screen can be edited as shown below.



* Device type
This displays the installed product type according to the setting of the main controller of the unit as shown below.

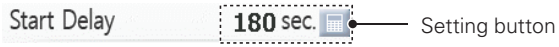
- Air cooled cooling only

* Device capacity
This displays the operational capacity value of the current product according to the setting of the main controller of the unit.

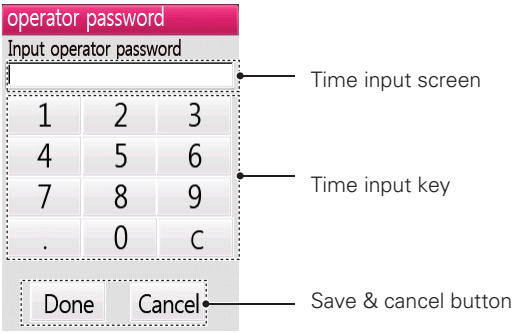
* Setting number of units
Enter the number of units to set the information for the number of product installed with HMI. This can be set in the range of 1~5 units.

* Setting delay time for starting

1 Press the setting button to set the delay time for starting as shown below.

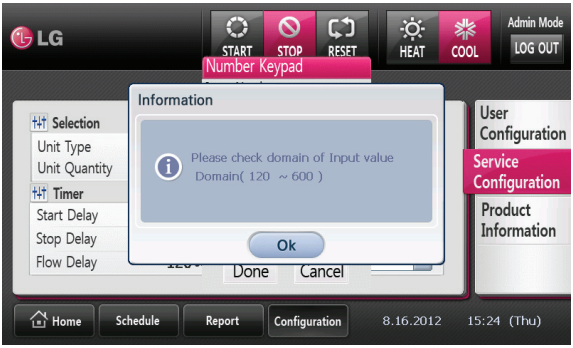


2 When the setting button is pressed, the input screen for the setting is displayed as shown below.



3 The range of the delay time for starting is 120-600 seconds. Default value is 180 seconds.

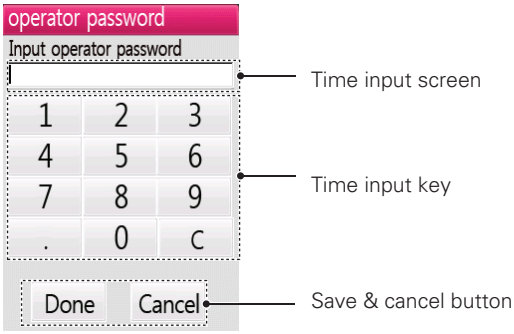
4 If the input value exceeds the input range, the following warning window will be displayed.



* Setting delay time for stopping pump

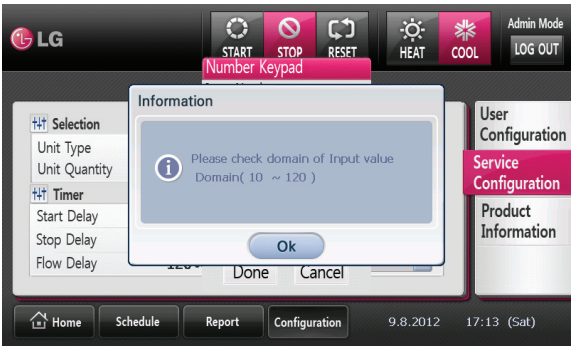
1 Press the setting button to set the delay time for stopping pump as shown below.

2 When the setting button is pressed, the input screen for the setting is displayed as shown below.



3 The range of the delay time for stopping is 10-120 seconds.

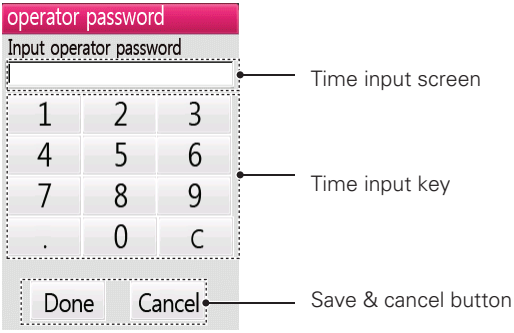
4 If the input value exceeds the input range, the following warning window will be displayed.



* Setting delay time for flux

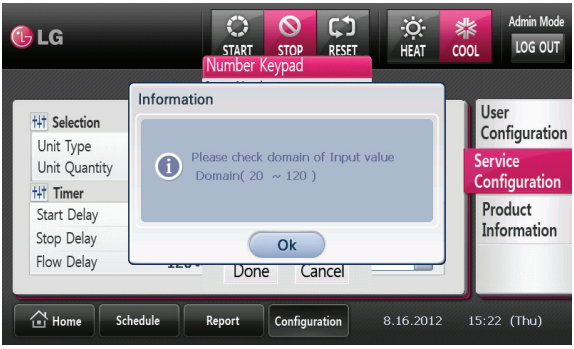
1 Press the setting button to set the delay time for starting as shown below.

2 When the setting button is pressed, the input screen for the setting is displayed as shown below.



3 The range of the delay time for flux is 20-200 seconds.

4 If the input value exceeds the input range, the following warning window will be displayed.



* Setting product address

  The product address must be in both main PCB of unit and HMI. If the two addresses are not the same, there will be an error in HMI communication.

* Setting address of main PCB of unit

  Turn the rotary switch of SW103 of the main PCB of the unit to set the address value.
  Address used in the product can be set in the range of 0-4.
  After the address setting has been changed, the power of the main PCB of the unit must be reset to apply the changed address.

* Setting HMI address

  The address of unit 1 can be changed in the HMI service setting in the range of 1-16.
  When changing the address from HMI, the changed address will be applied immediately.
  Address of main PCB of unit and address of the HMI communicate as shown below.
  When resetting the address, refer to the address to reset.

Address	Main PCB of unit	HMI
Address1	Rotary switch: 0	01
Address2	Rotary switch: 1	02
Address3	Rotary switch: 2	03
Address4	Rotary switch: 3	03
Address5	Rotary switch: 4	04

* To set the control box address of the outdoor unit, refer to the "Setting control box address" of installation part.

CAUTION

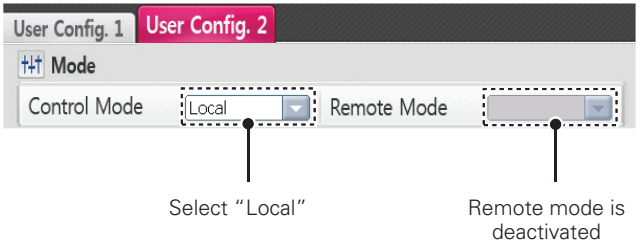
If you reset the address in HMI while the product is operating, it will cause a communication error and stop the product. Always reset the address after the product has stopped completely.

Operating the control mode

Because the user operating the product varies based on the mode setting item of the user setting, set up and operate the product as shown below.

Operating in local mode

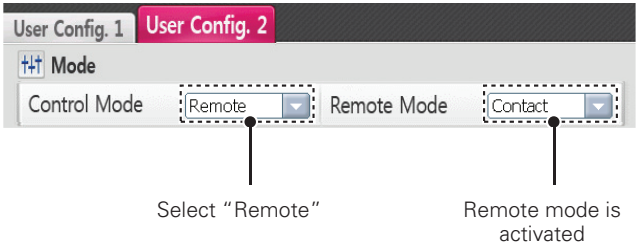
To enter the local control mode, select “Local” from the control mode of the mode setting item of Setting User config.2 as shown below.



When set to the local mode, the remote mode is deactivated, and everything can be controlled via HMI. The product will not respond to the signals generated to externally interlocked devices.

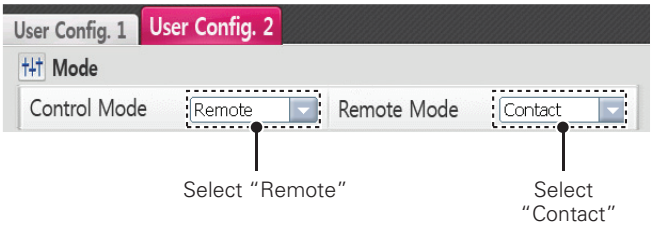
Operating remote mode

To enter the remote control mode, select “Remote” from the control mode of the mode setting item. When set to remote control mode, the remote mode is activated and “Contact” and “Modebus” can be selected.



* Contact point remote mode

When contact point is selected in remote mode, the product can only start/stop through the "Remote Start" input from the input port of the unit PCB to send the start/stop command. For the input information of the "Remote Start", refer to the internal wiring diagram.

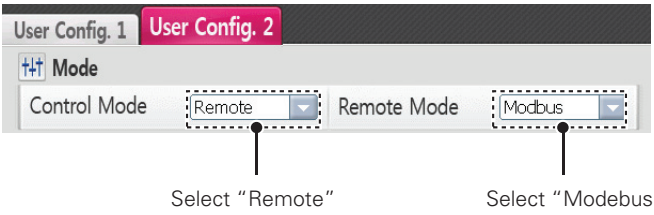


CAUTION

If the control mode is changed from "Local" to "Contact Point Remote" mode while the product is operating, the product will stop.
When changing the mode, always make sure stop the product first before doing so.

* Modebus remote mode

When modebus is selected in remote mode, the product can start/stop or can be reset only through the external controller connected through external modebus communication to send the start/stop command. In the modebus remote mode, all setting values are not set in HMI.



CAUTION

If the product enters the modebus remote mode, all the information can only be monitored via HMI, and the actual operation of starting/stopping or changing the set temperature can only be done through the external controller.
To make changes to control from HMI, change the control mode to "Local".

CAUTION

CH10009 remote communication error will occur when the communication is disconnected between the two controllers. When the communication is recovered, it will automatically resume. If the remote modebus connection is not used, reset the power of the main PCB of the unit to cancel the alarm.

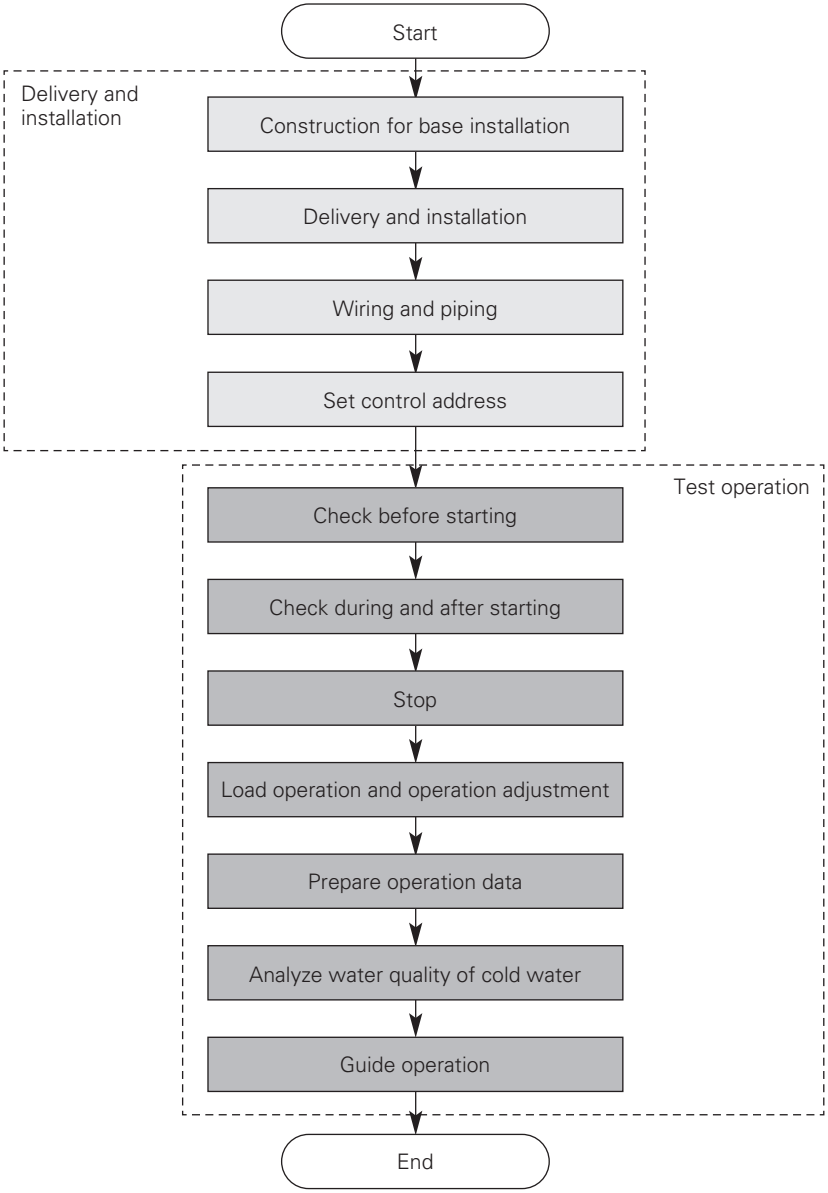
The protocol details provided for modebus interlock of external device are as follows.
- Physical Layer : RS-485 Serial Line
- Mode : MODBUS RTU Mode
- Baud Rate : 9600
- Parity : None Parity
- 1 Stop Bit
- Applied Function Code

Function Code	Sub Function	Function Name	Start Address form Master Device
0x01	None	Read Coil Register	Address-1
0x02	None	Read Discrete Input	Register Address-10001
0x03	None	Read Holding	Register Address-40001
0x04	None	Read Input	Register Address-30001
0x05	None	Write Single Coil	Register Address-1
0x06	None	Write Single Holding	Register Address-40001
0xF1~FF	Reserved for Exception Code		

Refer to the modebus protocol in the Appendix for the protocols provided.

FROM INSTALLATION TO TEST RUN

Flowchart from installation to test run



INSTALLATION

Selecting installation location

Because the user operating the product varies based on the mode setting item of the user setting, set up and operate the product as shown below.

Details to consider when selecting the installation location

Select the location that fits the following conditions to install the product.

- Location without direct heat from other heat source
- Location where noise of the chiller does not have negative impact to the neighbors
- Check the installation direction of the unit for the seasonal wind during the winter.
  Install the product so that the seasonal wind does not affect only one side of the product.
- Location not exposed to strong winds
- Location that can support the weight of the chiller
- Location with space for air flow and service
- Install the boundary sign, danger sign or barricade, if necessary.
- It is recommended to install a fence around chiller so that people or animals will not be able to access the area.
- When installing the product in areas with high humidity during the winter (Coast, seaside, lakeside), install the product where it is well ventilated and has plenty of exposure to sunlight. (Ex: Roof top with sunlight)
- If the product does not run during the winter, establish a plan to use the anti-freeze for the water supply.
- To prevent the condensed water from flowing, insulate the connected evaporator and pipe.
- To smoothly drain the condensed water, establish an inclined structure.
- Avoid installing the product at locations with the following conditions.
  - Location with corrosive gas such as acid or alkali gas.
    (Coolant can leak from the corroded pipes.)
  - Location with electromagnetic wave.
    (It can cause the product to malfunction from defective parts.)
  - Location where flammable gas is generated or flows to prevent fire.
  - Location with high level of carbon fiber or dust
  - Special location exposed to oil, steam or emulsified gas

Precaution for seasonal wind and winter season

In areas with heavy snow or in extremely cold areas, sufficient planning is required for the product to run smoothly.
Even in other areas, planning is required for seasonal wind during the winter season.

- Snow can go into the air discharge outlet of the condenser to freeze inside the chiller. Therefore install a large cover over the chiller for areas with heavy snowfall to prevent the snow from accumulating on the top.

- The chiller can freeze inside when the air inlet is clogged with snow. Therefore install the chiller on the base with at least twice the height of the average snow accumulation.
  (Default height of base: 300mm)
- If there is more than 100mm of snow on top of the chiller, always operate the unit after cleaning the snow.
- Do not install the product where there could be negative impact from snow in areas with heavy snowfall. Decide the installation direction of the chiller so that the side of the air heat exchanger does not face the direction of the snow.
  (Make the side of the air heat exchanger parallel to the direction of the snowfall.) Install a blocker with the height of the snow accumulation to avoid the snow around the chiller from being sucked into the coil side.
  (Prepare on site)
- If the wind comes in one direction of the unit where the seasonal wind is strong, there is a high chance that it can lead to issue with product capacity or imbalance of load. Therefore install the product so that it has consistent effect on the product cycle. If that is not possible, consider using a wind blocker or other devices. In areas with strong seasonal wind during the winter, apply the wind blocker hood, especially near the coastal area, without blocking the suction inlet of the chiller considering the direction of the wind. If the chiller is directly exposed to the seasonal wind during the winter, separately install a wind buffle. (Prepare on site)

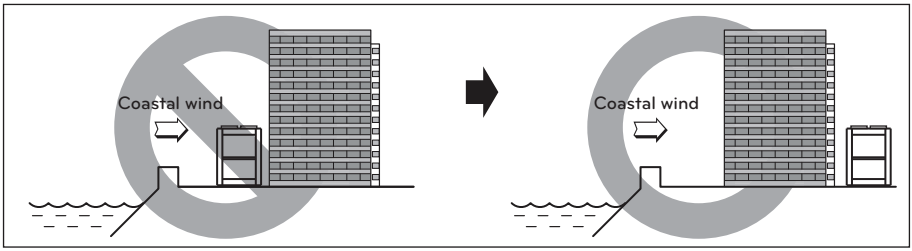
Details to consider when installing on the coast

CAUTION

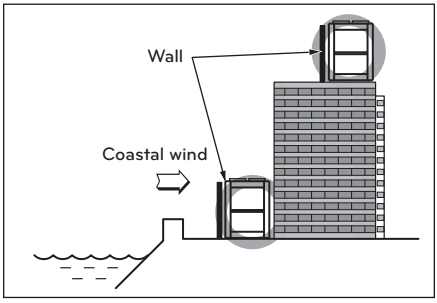
- When installing the chiller near the coast, make sure that it is not directly exposed to the coastal wind.
- When installing the chiller directly exposed to the coastal wind, separate anti-corrosive treatment must be done on the condenser of the chiller.

* Selecting location of chiller

Install the chiller where the building can block the coastal wind.



If the product has to be installed inevitably facing the coast, install a wall around the outdoor unit.



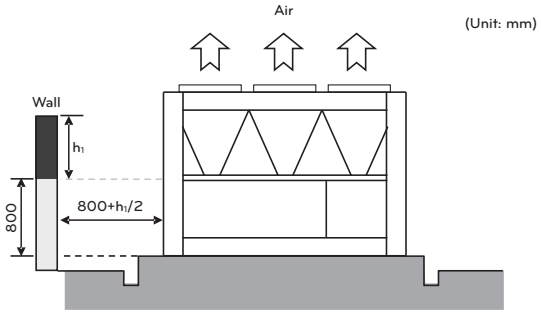
The wall must be made of sufficiently strong material such as concrete to block the coastal wind and must be 1.5 times larger than the size of the product to protect the product 1000mm apart. There must be 1000mm of clearance between the wall and the chiller for smooth circulation of air.

Install the product where the drainage is smooth.

Basic installation space

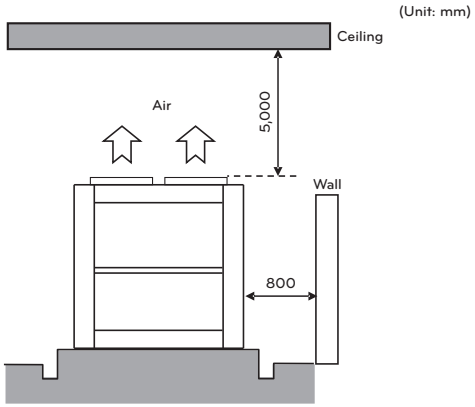
When installing the product, secure minimum space as shown below considering the service, suction and discharge of air flow.

* Consider the ventilation condition.
  The air cooled chiller must be installed on open space or must have appropriate ventilation.
  When installed along the wall, there must be sufficient space for ventilation.



Reference

If the side of the chiller is near the wall and the height of the wall is less than 800mm, the distance between the wall and the chiller must be at least 800mm. If the side of the chiller is near the wall and the wall is 800mm or higher, space of half of h1 must additionally be secured on top of the 800mm for the distance between the wall and the chiller.



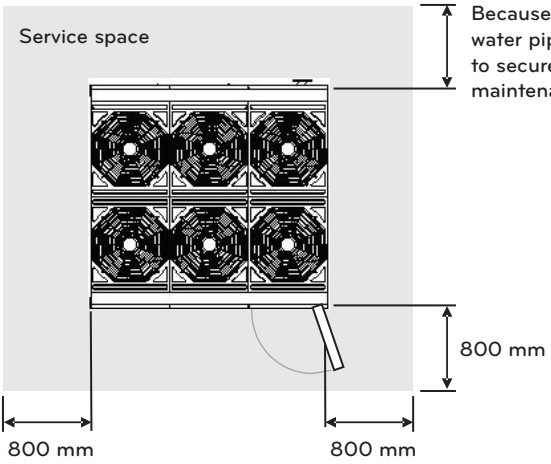
Reference

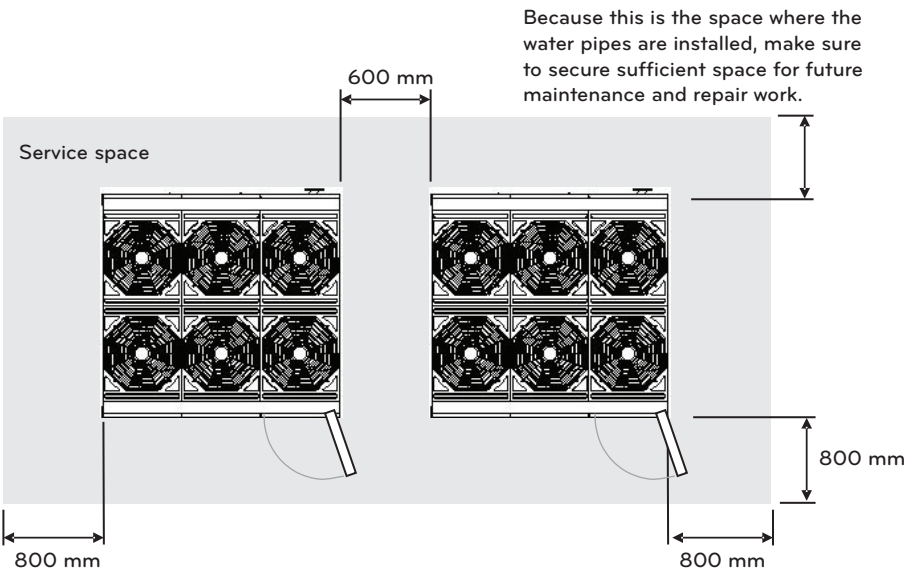
If there is a ceiling on the top part of the chiller, the distance from the chiller to the ceiling must be 5000mm or above.

If the front or rear side of the chiller is close to the wall, the distance from the wall to the chiller must be 800mm or above.

Consider the service space.

There must be sufficient space for maintenance and repair work around the chiller.



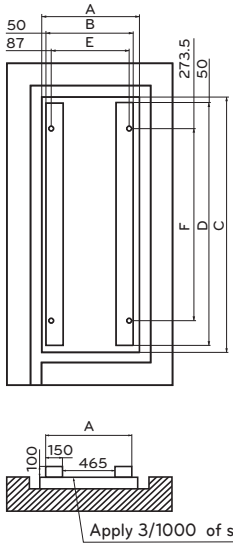


Details to consider when installing the base

- The base must be able to withstand concentrated load.
- The base must be installed with maximum gradient of 1/300.
- The height of the base must be higher than the surface of the water and drain holes must be installed around.
- Set the height of the base according to the installation environment so that the product is not submersed in water. The default height of the base is 200mm and it must be at least doubled in areas with double the snowfall of 100mm or above.
- Install the drain pipe in the drain hole.
  The drainage must be finished so that particles around the drainage do not clog the pipes.
- LG is not responsible for product failure or damage from incorrectly designed or manufactured base.

⚠ CAUTION

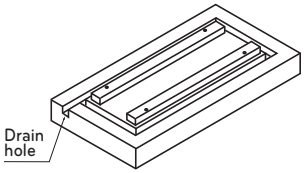
- For the frame, use strong material such as steel angle so that it does not slip from the wind or snow.
- Never install the product so that the suction inlet and the discharge output of the chiller faces the seasonal wind.
- When making the base platform, pay special attention to the strength of support, drainage and direction of pipe and wiring.

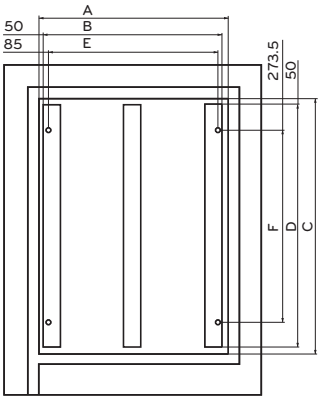


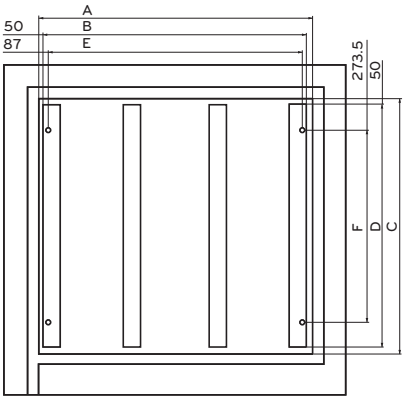
<20RT Drawing of base>

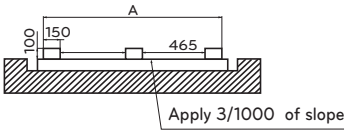
* Location of anchor bolt

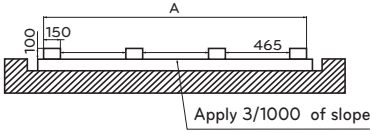
Classification	20 RT	40 RT	60 RT
A	865	1,628	2,391
B	765	1,528	2,291
C	2,254	2,254	2,254
D	2,154	2,154	2,154
E	691	1,456	2,217
F	1,707	1,707	1,707

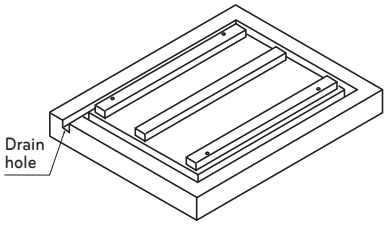


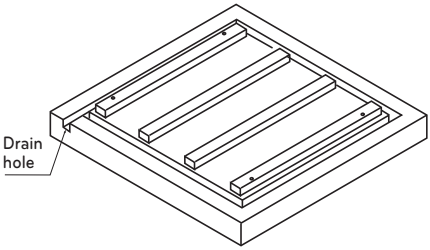












<40RT Drawing of base>

<60RT Drawing of base>

Transportation method and precaution

CAUTION

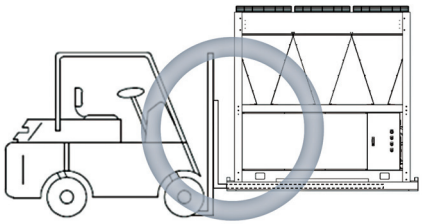
Be very careful when transporting the product.

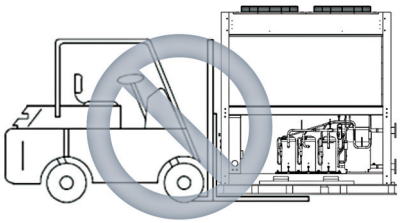
- When transporting the product, use the forklift or spreader bar and follow the directions in the manual.
- Do not touch the heat exchanger pin with bear hands. It is very sharp and can cause an injury.
- Cut and dispose the plastic (vinyl) bag used for packaging so that children do not play with the bags. If not, it can cause suffocation when put over the head.
- Always transport the chiller by supporting 4 points. 3 point support is unstable and the product may fall over.
- When transporting the product with the forklift, be careful not to drop the product.
- Use a long belt at least 8m long.

Precaution when moving the forklift

- Level the chiller as much as possible while moving it.
- When moving the chiller using the forklift, check the weight and use the forklift with the sufficient capacity to handle the weight.
- When moving the chiller using the forklift, check the transportation groove at the bottom of the chiller and use the fork that fits the grooves.
- The forklift cannot lift the product from front or rear side. Always lift the product up from the side where the grooves are to move the product.

* The side with the control box is the front side.

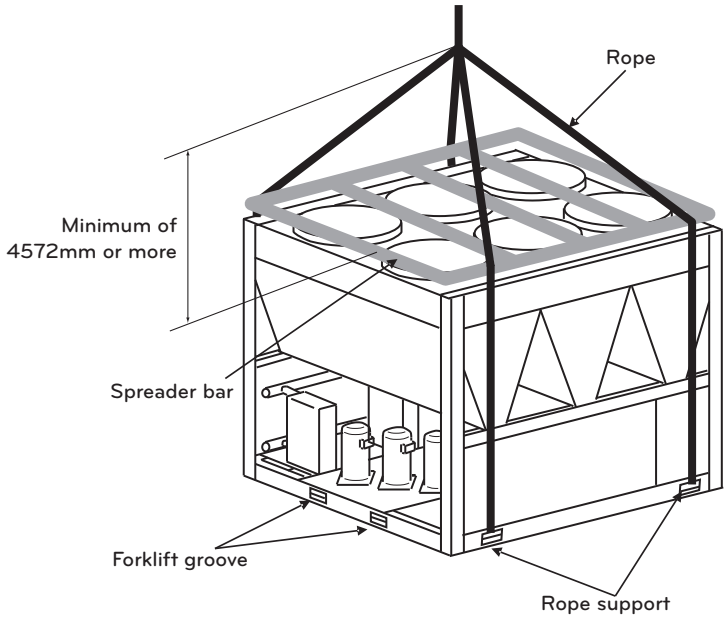




Precaution when hanging the product

- When moving the chiller, make sure to level the product as much as possible.
- When hanging the chiller, pass the rope through the two supports located at the bottom of the front and rear side.
- Always connect the rope to the 4 supports when lifting up the product so that the impact may not be applied.
- Use the steel spreader bar to use the tension of the ropes to avoid the damage to the product.
- When hanging the chiller, do not tilt the chiller by more than 15 degrees.

* Spreader bar is the tool to avoid the rope from contacting the product to minimize the damage to the top and the coil.
- Spreader bar is not supplied.
- Spreader bar must be larger than the size of the chiller.
- Even when the spreader bar is close to the top of the product, it must not contact the product.



Storage

If the product must be stored before being installed or used, make sure not to expose the product to dirt and humidity in the construction site. Put a protective cover on the product until it is ready to be installed.

Installing chiller

As soon as the product is delivered, check for any damages. If there are damages, immediately contact the shipper.

Precaution when installing the chiller

- Secure air flow, wiring, piping and sufficient space for service.
- Check whether the surface is flat and can withstand the operating weight and vibration/noise of the device.
  (For the part to lift up the product, installation and operating weight, refer to the specification, external diagram and basic diagram.)
- Set the device so that the air flow does not get limited to the suction inlet side only.
- Secure sufficient space to provide service and remove the product.
  (The air flow and service space various based on the model. Refer to the drawing in the Appendix.)
- Check the base before installing the product and install the product only when there is no issue. If there is any issue, contact the contractor to resolve the issue.
  (For checkpoints related to the base, check the details when installing the base.)

⚠ WARNING

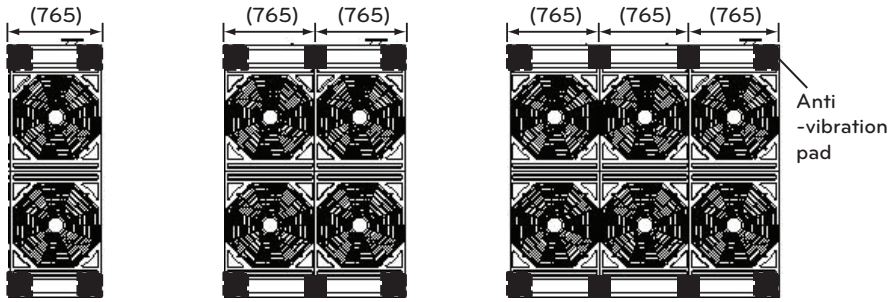
- Install the product where the weight of the chiller can be sufficiently supported. If the product is installed at a location that cannot support the weight, the chiller can fall down to cause an injury.
- Install the chiller so that it does not fall over even from strong wind and earthquake. IF there is any defect in the installed condition, it can fall over to cause an injury.

Installing anti-vibration pad

- Anti-vibration pad is the part to absorb the vibration that occurs during the product operation and must be installed before placing the product on the base. Anti-vibration pad is not provided along with the product and must be supplied on site.
- After installing the anti-vibration pad, loosely tighten the anchor bolts. Tightening the anchor bolts too tightly will reduce the anti-vibration effect.

• Locate the anti-vibration pad shown as below and lay 2 layers of 10mm or above.

Unit:mm



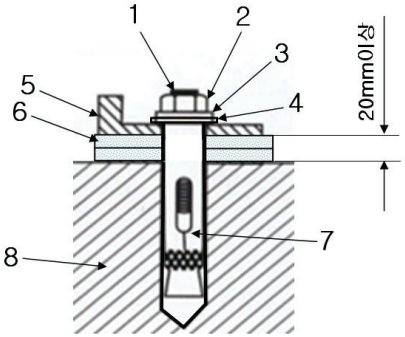
20 RT 40 RT 60 RT

Installing anchor bolt

CAUTION

- Wooden frame at the bottom of the base frame must be removed before tightening the anchor bolts for the chiller.
- When installing the chiller where it is directly affected by the coastal wind, additional anti-corrosive treatment must be applied to the condenser.

- Tighten the bolts so that the chiller does not fall over from the earthquake or strong wind as shown below.
- Depending on the installed condition, the vibration can be transferred to the installed part to transfer the noise and vibration to the floor or wall. Therefore make sure to use the anti-vibration material.
- Anti-vibration spring can be additionally installed on top of the anti-vibration pad. Check the external diagram and the weight of the product to set the specification for the anti-vibration spring.
- When combining multiple chillers, make sure to level the height of each chiller so that the water pipes can be easily connected.
- Use the anchor bolts to firmly fixate the chiller. The anchor bolt must be inserted at least 65mm.

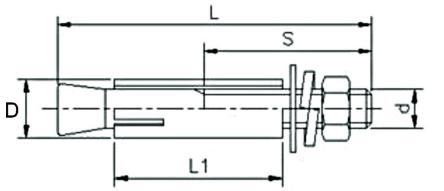


No.	Name
1	Anchor bolt(M16)
2	Nut
3	Spring washer
4	Flat washer
5	Bottom of product
6	Anti-vibration pad
7	Cap
8	Base surface

* Above parts are not included in the product.

Shape of anchor bolt

(Unit : mm)



Specification of anchor bolt

Screw size (d)	L	S	D	L1	Used drill	Drill depth (mm)	Pull-out load(N)
5/8″ (M16)	125	70	22	65	22	65	42,140

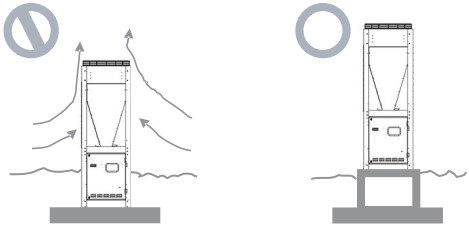
Snow protection

Areas with heavy snowfall require snow protection plan. For the air cooled scroll cooling only and heating/cooling chiller, the snow protection plan ensures sufficient performance.

Design of snow protection plan

When establishing the snow protection plan, the fan level from the chiller must be at least to some level.

- If the fan level is below a certain level, it triggers the high pressure limit within the circuit to cause an issue in the operation.
- Because the outdoor unit can be frozen inside due to the clogged air inlet from snow, make the arrangement so that the outdoor unit does not directly contact the inlet and install the hood to avoid the effect of the heavy snow.
- Always install the base so that the chiller can be installed higher than the accumulated snow and the default eight of the base is 200mm. IF the snowfall is 100mm or above, raise the base to more than double the height. (300mm maximum snowfall)
- The height of the base must not exceed the width of the product.
- If there is 10m or more snow piled on top of the product, make sure to clean the snow off before operating the chiller.



Installation considering the snow protection

- Do not install the chiller near the edges of the rooftop.
  (Snow can fall down to the chiller and push off the chiller off the roof. If snow is accumulated between the building wall and product, it can cause issues with the product.)
- Raise the base higher than the snow accumulation.
  (Make sure to secure the path near the heat exchanger of the chiller in case of snow)
- Avoid installing the product where the snow is accumulated.

Water pipe connection

Water pipe construction is a very important part of the design or construction of the cooling system. Any defect in any location of the pipe can disable the applicable unit from performing sufficiently. Perform the design and construction considering the check service.

Water pipe system diagram

Water circulation that has temperature difference of 3°C-8°C between the outlet water temperature of the hot and cold water is required. If the water circulation is insufficient, the product will not be able to perform properly and will have negative impact on the life of the product, as well as other issues with the product.
Make sure to secure water circulation in accordance with the specification.
Also even when the water circulation is secured in accordance with the specification, bypass circuit must be installed on the 1st side for the water pipe system of the chiller. Therefore if the water flow is reduced during low load, it can cause issues such as excessive and frequent operation of compressor and freezing during stopped condition or cooling operation.
Water circulation must maintain constant flow as much as possible.

* For the parts used in the cold water pipe system, make sure to use the parts that comply with designed water pressure or higher.

Expansion tank

Expansion tank is the device that discharges the expanded water and at the same time, removes the air within the water pipe circuit.
Set the capacity of the expansion tank to 2-2.5 qo of the water expansion amount.
(Generally it is 3-5% of the entire amount within the water pipe circuit.)

Pipe slope and air vent

If air remains within the pipe, the resistance of the water pipe circuit increases or the circulating amount of water is reduced significantly. If air remains in the pump during the operation, it can cause several issues to disable the operation.
Install the air vent valve where there is a chance of air remaining within the entire water pipe circuit and apply 1/200 of slope to the air vent valve side to avoid the air from remaining in the pipe.

Water pipe system diagram

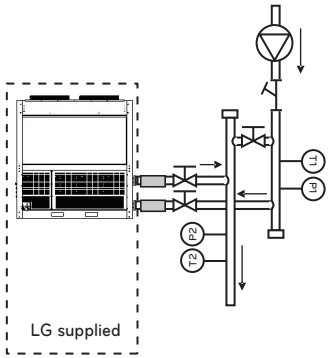
- Connect the pipe so that the entrance of the cold (hot) water pipe is correct.
- Permitted water pressure resistance of cold water pipe system is 1MPa
- To prevent any external heat loss or dew drops forming during the cooling operation on the water pipe system, apply thermal insulation treatment.
- Install the air vent at the output end of the water pipe. (Air vent)
- If the thermometer is installed on the inlet/outlet of the cold/hot water pipe, the operating condition of the chiller can be checked.
- Always install the strainer (50 Mesh or above) that can be cleaned on the water pipe inlet side to filter any alien particles from entering the heat exchanger.
- Always install the strainer on the leveled pipe. (If sand, trash or rust gets mixed to the cold water system, it can cause product failure due to corrosion of metallic parts.)
- Install the on/off valve on the cold water inlet/outlet and bypass pipe on the pipe direction of the device side.

- For the pipe system, it is recommended to install the bypass and clean the pipe before installing the product and during the annual pipe cleaning.
- On/Off valve blocks the old water to the chiller that is not operating to reduce the power of the pump. Therefore select whether to install to fit the need of the site.

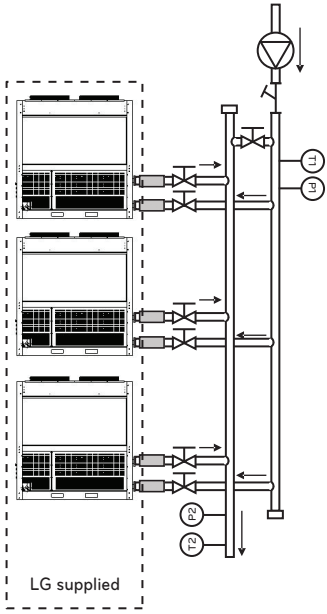
• Install the pressure gauge and thermometer on the inlet and outlet of the water pipe.
• Always install the flexible joint to reduce the vibration of the pipe and product.
- Vibration of water pipe system is absorbed to prevent water leakage.
• For the cold water system part, make sure to use the component that complies with designed water pressure or above.
• Before supplying cold water to the chiller, clean inside the pipe system to remove any negative impact of particles to the product.

Installation mode A (Recommended method)

* Independent product installation



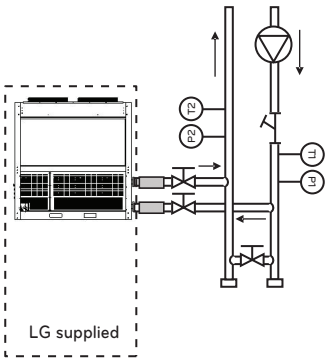
* Independent product installation



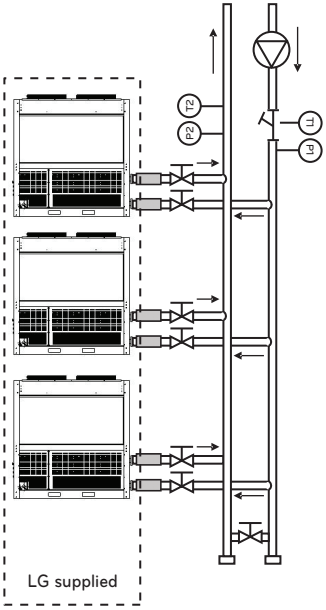
Symbol	Description	Symbol	Description
	Valve	T1	Temperature sensor (1: Inlet 2: Outlet)
	Strainer	P1	Pressure gauge (1: Inlet, 2 Outlet)
	Flexible joint		Cold water pump

Installation mode B

* Independent product installation



* Independent product installation



Symbol	Description	Symbol	Description
	Valve	T1	Temperature sensor (1: Inlet 2: Outlet)
	Strainer	P1	Pressure gauge (1: Inlet, 2 Outlet)
	Flexible joint		Cold water pump

Water pipe connection

⚠ CAUTION

- If the winter outdoor temperature is 0°C or below, take following measures to prevent the pipe from freezing as shown below.
  - If the outdoor temperature is low, the circulation water can freeze to damage the heat exchanger of the product when the product is stopped.
    If there is possibility of damage from low outdoor temperature, operate the pump to prevent the water from freezing.
  - If the product does not operate for a long period of time during the winter season, remove all the circulation water to prevent the damage of heat exchanger and pipe from freezing.
  - Add anti-freeze additive to prevent the circulation water from freezing during the winter season.
- Maintain the cold water flux within the designed flux to ensure appropriate chiller performance and reduce the tube damage from rusting, scaling and corrosion. LG is not responsible for any damage of chiller from poor water quality management or inappropriate processing water.

1 Water pipe installation

- Appropriate pressure of pipe connection is flange connection of 1 MPa or below.
- Size of the water pipe must be the same as that of the product or larger.
- If there is risk of dew drops forming, always install the thermal insulation material on the outlet pipe of the cold water.
- To avoid connected water pipe from creeping from the load, use appropriate hook for support.
- To prevent the pipe connected part from freezing during the winter season, always install the drain valve at the most bottom of the pipe system.
- Cold water inlet pipe is located at the bottom and the outlet pipe is installed on the top.
- When connecting several chillers, refer to the following for common pipe size.

Full product capacity		20RT	40RT	60RT	80RT	100RT	120RT	140RT	160RT	180RT
Common pipe size		40A	65A	65A	80A	80A	100A	100A	100A	125A
Product	20RT	●								
	40RT		●		●●	●		●●	●	
	60RT			●		●	●●	●	●●	●●●

2 Cold water pump control

- If the cold water pump is not operating for a long period of time or if the anti-freeze liquid is not used as the cold water, the anti-freeze pump control must be installed to prevent the pipe from freezing.
- The vibration of the pump can transfer to the pipe to cause noise indoors. As the plan to prevent the noise from spreading in the pump, install flexible joints at the inlet/outlet and use the anti-vibration amount for the pump support.

3 Cold water management

The water quality of the cold (hot) water is described as follows. The water quality must not fall below the following standard. If so, it can be judged to have risk within relatively short period of time.

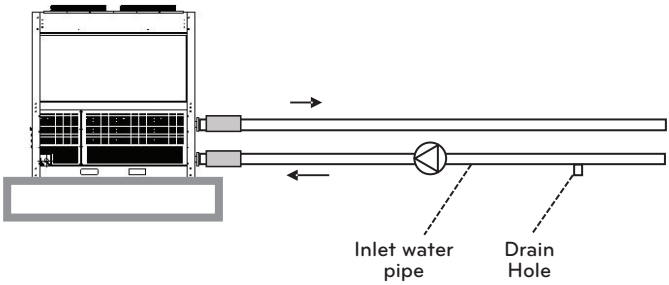
Item		Cold water	
		Circulation type cold water	Cold water
Reference	PH(25°C)	6.5 - 8.0	6.5 - 8.0
	Conduction rate (25°C s/cm)	500 or below	200 or below
	Alkali level (PPM)	100 or below	50 or below
	Hardness (PPM)	100 or below	50 or below
	Chlorine ion (PPM)	100 or below	50 or below
	Lactic acid ion (PPM)	100 or below	50 or below
	Iron (PPM)	0.1 or below	0.3 or below
	Sulfur ion (PPM)	Not detected	Not detected
	Ammonium ion (PPM)	0.5 or below	0.2 or below
	Silica (PPM)	50 or below	30 or below

Precaution to prevent freezing

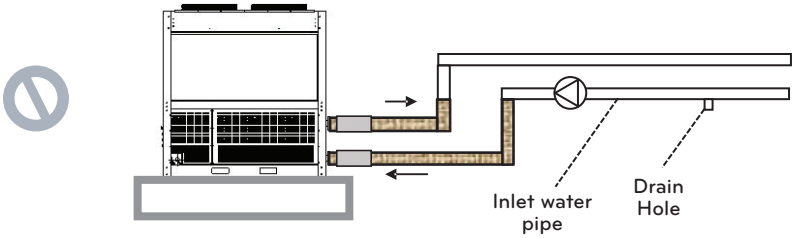
If the product does not run when the outdoor temperature is 0°C or below during the winter, the water must be drained or anti-freeze additive must be added to prevent the water from freezing.

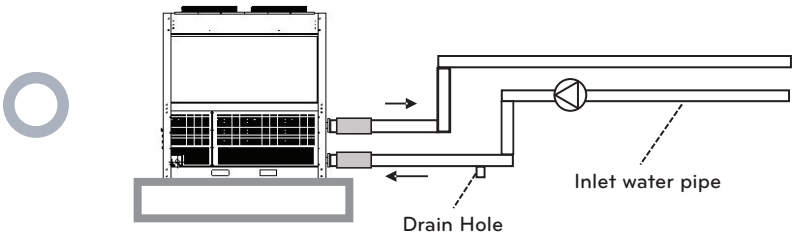
Input pipe must be installed to be leveled.

The pipe must be leveled and installed so that water does not remain in the inlet pipe connected to the product when draining the water through the drain hole.



If the inlet water pipe is installed in trap structure without being leveled, the water will remain in the inlet water pipe even when the pipe is drained and the inlet water pipe or the part within the chiller can be damaged from freezing. Therefore add a drain hole at the bottom of the pipe as shown below.





Electric specification

ACAH	Frequency (Hz)	Voltage (V)	RLA (A)	MCA (A)	MFA (A)	Inv. Comp		Const. Comp			Fan Motor	
						Q'ty	RLA	Q'ty	RLA	LRA	Q'ty	RLA
020BBAM	60	208/230	80	87	115	1	28	2	22	140	2	4
040BBAM 040BCAM	60	208/230	160	167	195	2	28	4	22	140	4	4
060BBAM 060BCAM	60	208/230	240	87	115	3	28	6	22	140	6	4
				167	195							

1 RLA is the current required when operated in the following condition.
Outdoor temperature: 35°C DB/24.0°C WB, cold water inlet/outlet temperature: 12/7°C

2 Voltage range
The chiller must be operated at the voltage within the upper and lower limit supplied from the power terminal to operate normally.

3 Maximum voltage variance permitted between phases is 2%.

4 MCA is the criteria of selecting the wiring standard.

5 MFA is used when selecting circuit breaker and grounding error circuit breaker (Electricity leakage circuit breaker).

NOTE

MCA: Minimum Circuit Ampere, A
MFA: Maximum Fuse Ampere, A
RLA: Rated Load Ampere, A
MSC: Maximum Start Current, A

WARNING

- Always use regulated wire so that the connector of the terminal does not fall off from external force. If the connector is not fixed firmly, it can cause heating, resulting in a fire.
- Always use appropriate over-current protection switch. Generated over-current includes low level of DC.
- Leakage current circuit breaker for grounding must be installed. If not installed, it can cause electric shock.
- Use only the circuit breaker and fuse of accurate capacity. Using fuse, wire or copper wire with excessive capacity can cause malfunction or a fire.
- Do not connect the 3 phase 3 wire type connection in reverse/missed phase.

Electric work

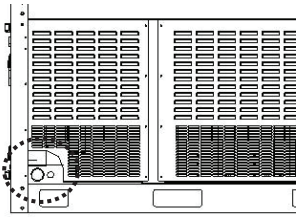
Precaution

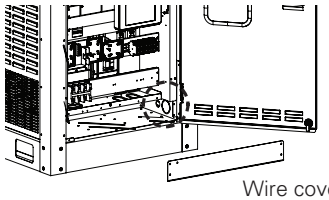
1 For regulation related to electric device and wire, follow the regulation of the technical standard and government organization and the guide of the power company.

⚠ WARNING

Electric work using special circuit based on the overall regulation and this manual must be done by qualified electrician.
If the capacity of the power supply circuit is insufficient or if there is a defect, it can cause electric shock or fire.

2 Power and communication cable can only be connected from one direction.
When viewed from the front, there is a connecting groove on the right side.
Remove the wire cover for conduit works





Wire cover

3 Separately install the communication and power cable of the chiller so that the communication cable is not affected by the electric noise generated from the power cable. (Do not pass through the same electric pipe)

4 Always ground the wires as indicated.

⚠ WARNING

Always ground the chiller. Do not connect the grounding wire to the gas pipe, water pipe, lightning rod or telephone grounding wire. If the grounding is unstable, it can cause electric shock.

5 Use 2-line shield cable as the communication cable. If 1 line shield cable is connected to another system, the communication quality of receiving and sending will be poor causing issues.

WARNING

- When connecting the power cable, always connect after connecting the ring terminal. It can cause fire and burn the electric part.
- The voltage imbalance rate between phases must not be higher than 5%. If higher than 5%, the product life may be shortened.
- Use 2 line shield cable
- Do not wire in parallel to the power cable.
- Do not use multiple lines.

6 For the communication terminal, use only the regulated communication cable.

Electric connection

WARNING

Electric shock may result in injury or death. The power must be completely turned off while installing the product.
Because there may be more than 1 switch, attach the warning label to all locations with the switch so that the power is not recovered until the work is fully completed.

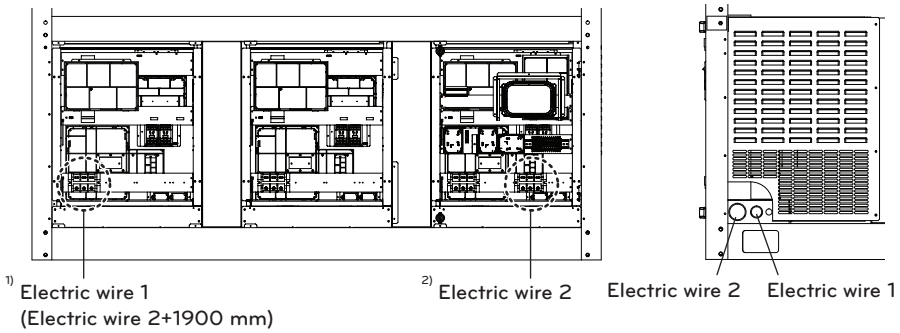
1 Power
The electric characteristics of the power must be aligned with plate of the device. Supplied voltage must be within labeled limit.

2 Power cable connection and wiring.
Refer to the wiring diagram to connect the power cable.
For the power cable, distinguish R,S and T to connect to the MAIN terminal block.
In case of 60RT, connect it with two electric wires. (Refer to 60RT Model diagram)

WARNING

Be careful not to connect it wrongly to holes for electric wire 1 and 2.
Electric wire 1 should be 1900 mm longer than electric wire 2.

All power wiring must comply with the regulation of the applicable area and nation. Refer to the wiring diagram and electric specification.
Do not turn off the power unless the chiller is not used for a long period of time.
If power is not connected to the oil heater on the bottom of the compressor, the chiller may be damaged or the system may stop.



<60RT Model>

3 Control power
When using the power, control power is supplied from the main power and separate power supply is not required.

4 Additional wiring
Refer to the wiring diagram for on-site wiring. On-site wiring is only required for main power panel. Control box is already fully wired out of the box.

* On-site wiring location

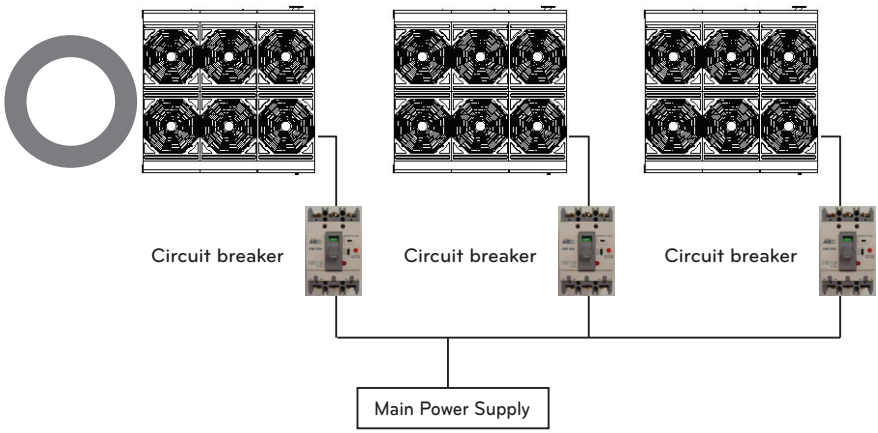
- Pump output : 1A, 1B
- Modbus : 2A, 2B
- Pump interlock: 6A, 6B
- Remote alarm: 7A, 7B
- HMI power: 8A, 8B
  (When installing outdoor, use separate power cable for indoor installation)
- Remote operation: 9A, 9B
- HMI communication: 11A, 11B

NOTE

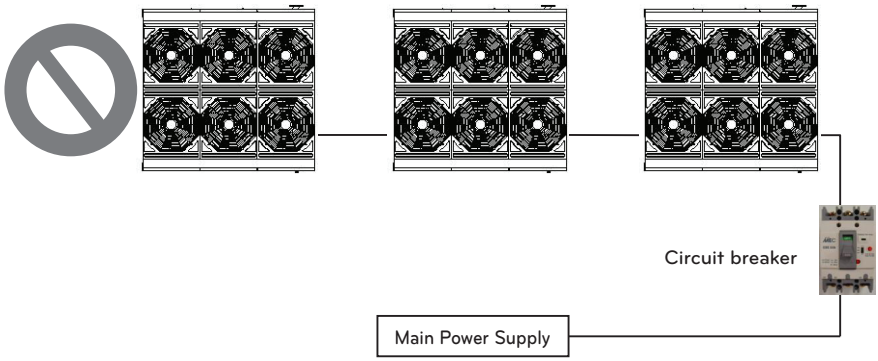
1). Electric wire 1 : MCA = 87 A, MFA = 115 A
2). Electric wire 2 : MCA = 167 A, MFA = 195A

5 Circuit breaker and power cable connection
Maximum of 3 chillers can be connected.
When installing the power cable, jump one power cable and do not connect to other chiller.
Always distinguish chiller for installation.
When installing several chillers, install the circuit breaker by each chiller.
Refer to the general data of the product information when selecting the capacity for the circuit breaker.

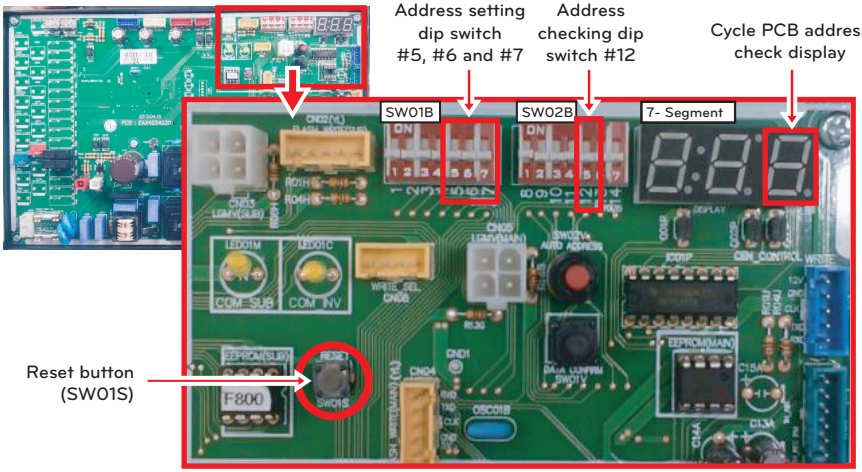
Correct installation



Incorrect installation

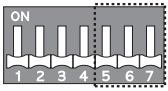
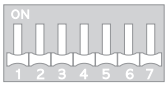
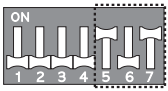
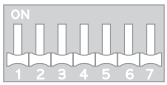
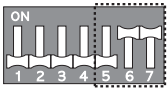
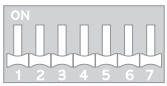


How to set control box address (Set cycle PCB address)



1 Select the address by turning the dip switch #5, #6 and #7 on the top right corner of PCB ON/OFF.

* If there is only 1 cycle PCB connected to the main controller of the chiller, use the address #1 only and if there are 2 cycle PCBs, use only #1 and #2 to select the address.

Cycle address: 1 (Dip switch: #5, #6, #7 OFF)	SW01B 	SW02B 
Cycle address: 2 (Dip switch: #6 OFF / #5, #7 ON)	SW01B 	SW02B 
Cycle address: 3 (Dip switch: #5 OFF/ #6, #7 ON)	SW01B 	SW02B 

2 After selecting the cycle address with the dip switch, always press the Reset button to complete the setting.

3 Check the address of the currently set cycle PCB by checking the numbers displayed in last 7-segment when the dip switch #12 is turned ON. (Current PCB address flashes)

* Because the product information is displayed for 80 seconds after resetting or connecting the power, the address of cycle PCB cannot be checked.

4 After checking the cycle PCB address, the dip switch #12 must be turned OFF to change to the condition to display the error.

⚠ WARNING

- If there is only 1 cycle PCB connected to the main controller of the chiller, use the address #1 only and if there are 2 cycle PCBs, use only #1 and #2 to select the address. Or else the product will not operate.
- When replacing the cycle PCB of the control box, always run an automatic address setting again.
  This must be performed with all cycle PCB and HMI PCB connected. If not, it will result in operation error.
- When setting the address, check and change other control box PCB address within the chiller. PCB address for replacement is set to 1. If control box PCB address is duplicated, the product will not operate.
  Control box PCB address is set to 1, 2 and 3 in order as factory default.

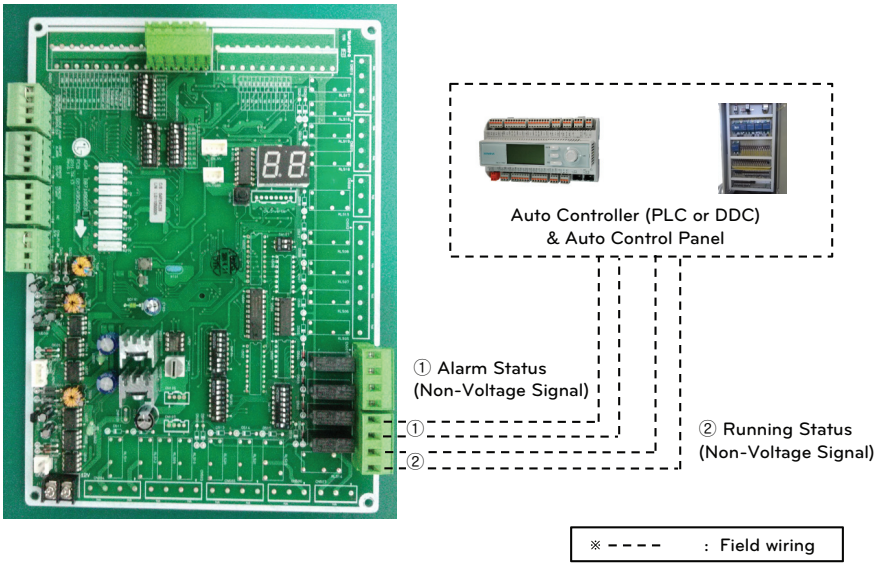
Provide running & alarm status (with External Auto Control)

Chiller PCB provide 2 digital output, one is running status of unit ,the other is alarm status of unit. Two digital output are non-voltage signal.

Connection of between Chiller PCB and auto control is as below.

1 Alarm Status Signal
When alarm of unit is occur, signal of alarm status is short, otherwise is open.

2 Running Status Signal
When alarm of unit is occur, signal of alarm status is short, otherwise is open.



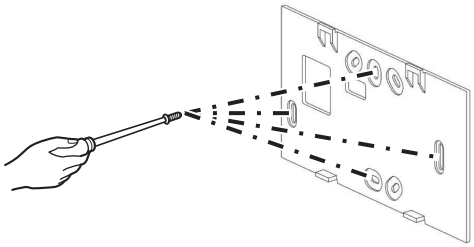
How to install HMI indoors

CAUTION

- HMI is designed to basically be installed and used on the wall.
- This example describes how to install HMI on the wall.
- If the wall is firm, prior work is required to drill the screws.
- Communication cable for indoor installation is not included in the components.
- It is recommended to use communication cable of 0.75 square or above.

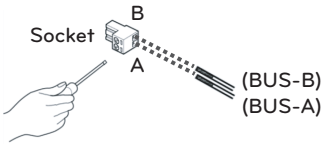
Decide the space to install HMI. Before fixating the HMI, check whether it is an appropriate location to connect the communication cable and power cable to HMI.

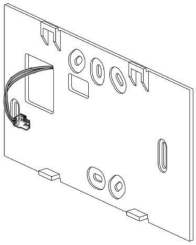
Use the drier and M4 screw on the top wall of the communication cable to fixate the rear panel of HMI. It can be fixated as shown below depending on the installed location.



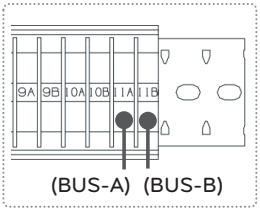
Separate the socket to assemble the communication cable from the rear side of HMI.

Pull out the communication cable through the hole on the rear side of the panel to connect to the socket. Use the driver to connect the two communication cables as shown in the picture. (Connect the cable connect to A part of socket to the 11A on the control box terminal and B to 11B.)





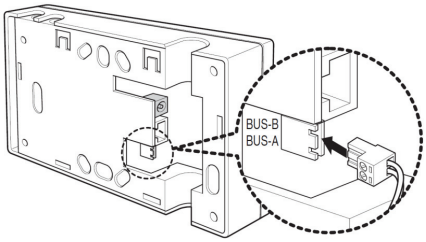
[Reference for wiring on control box terminal side]



CAUTION

- Because different polarities exist on the communication cable, make sure not to mix them.
- To prevent incorrect wiring, it is recommended to mark A and B on the communication cable.
- Use the ring or Y terminal for connecting to the control box terminal of the communication cable.
- Refer to page 16 "Internal configuration of control panel" for location of control box terminal.

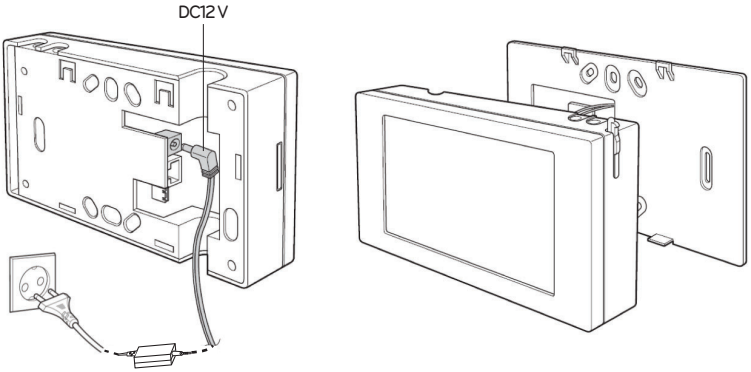
Connect the socket to the communication port located on the rear side of the HMI.



Connect the power adapter (Component) to the power terminal located on the rear side of the HMI.

Assemble the main unit of HMI to the rear panel installed on the wall. After hanging the hole of the top of the main unit to the top of the rear panel, push the bottom of the unit to assemble it.

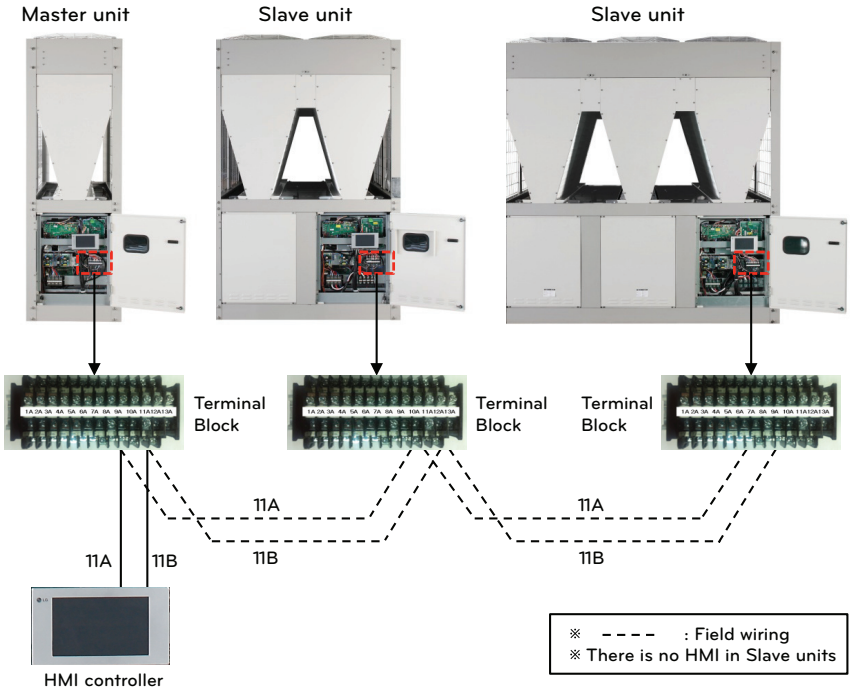
Connect the power cord of the power adapter to the power plug.



CAUTION

If the power cord of power adapter and power cord must be buried due to short distance, it requires space of 120mmx80mmx80mm to arrange the power adapter and power cord.

Unit Combination



WARNING

Electric work using special circuit based on the overall regulation and this manual must be done by qualified electrician.
If the capacity of the power supply circuit is insufficient or if there is a defect, it can cause electric shock or fire.

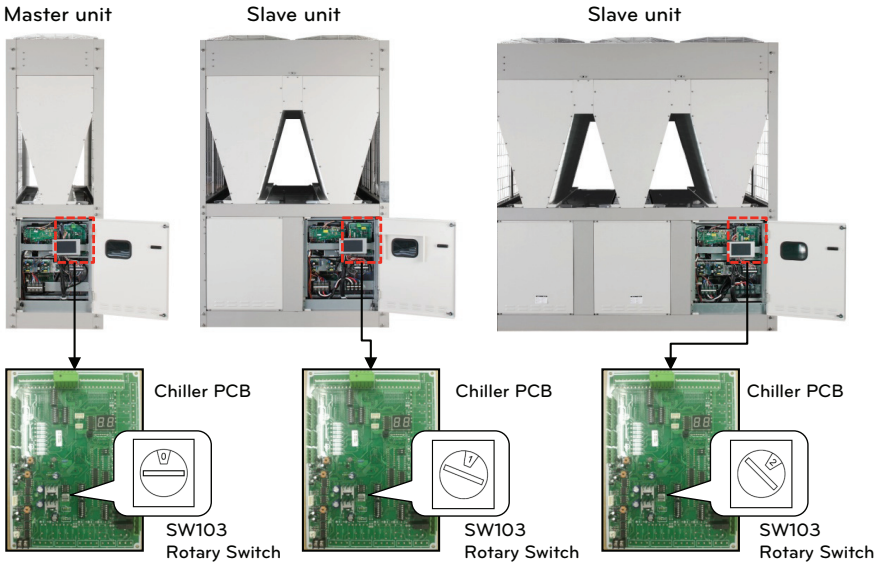
1 Communication cable connection
Refer to the above figure to connect the communication cable
For the communication cable, distinguish 11A and 11B to connect to the slave units.

2 Use 2-line shield cable as the communication cable.

3 Separately install the communication and power cable of the chiller so that the communication cable is not affected by the electric noise generated from power cable. (Do not pass though the same electric pipe)

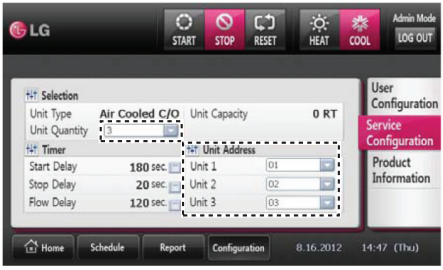
4 Unit combination is able to connect up to 3 units

How to set control box address (Set Chiller PCB address)



SW103 rotary switch is the switch to set the address of chiller PCB and the default value is “0”, and can be set from 0 to 2 based on the address condition. After changing the address, the power must be reset to apply the changed address.

How to set control box address (Set HMI)



1 Set the number of units to mange with the current HMI.
2 Set the address value of each units.

For detail information of setting HMI
Please refer to User setting screen detail view in this manual.

How to set control box address (Setting Value)

Case 1 : 2 Units Combination

Setting value		Master unit with HMI (Unit 1)	Slave unit (Unit 2)
Switch/Icon	Location on		
SW103 Rotary Switch	Chiller PCB	0	1
Unit Quantity	HMI	2	-
Unit Address	HMI	Unit1 → 01 Unit2 → 02	-

Case 2 : 3 Units Combination

Setting value		Master unit with HMI (Unit 1)	Slave unit (Unit 2)	Slave unit (Unit 3)
Switch/Icon	Location on			
SW103 Rotary Switch	Chiller PCB	0	1	2
Unit Quantity	HMI	3	-	-
Unit Address	HMI	Unit1 → 01 Unit2 → 02 Unit3 → 03	-	-

CAUTION

- After selecting the chiller PCB with the dip switch and HMI, always press the Reset button to complete the setting.
- The address of Chiller PCB can be set from 0 to 2, but the address of HMI can be set from 01 to 03

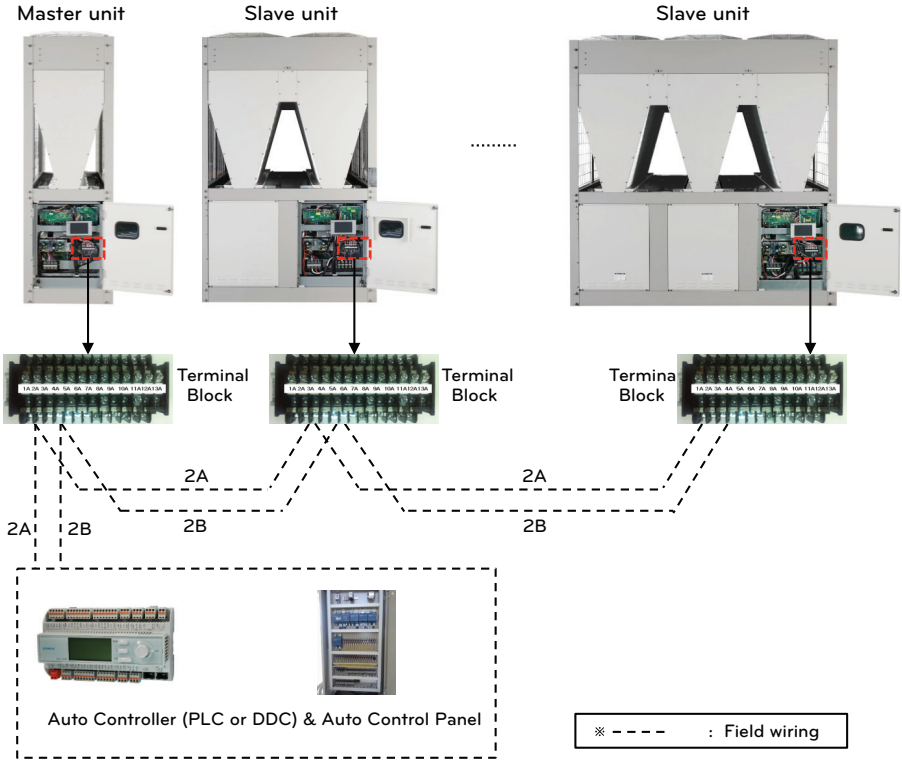
HMI Function table (in case of unit combination)

When 2 or more chillers interlocked, functions of the HMI can be used individually or in totally. The Following table shows available control type of each function.

Function	Individual	Total
Start	●	●
Stop	●	●
Reset	●	●
Schedule On/Off	-	●
Target temp	-	●
Demand limit	-	●
Control mode	-	●
Remote control mode	-	●
Start delay	-	●
Stop delay	-	●
Flow delay	-	●
Initializing running time	-	●

In case of unit combination

Unit Combination (with External Auto Control)



1 Communication cable connection
Refer to the above figure to connect the communication cable
For the communication cable, distinguish 2A and 2B to connect to the slave units.

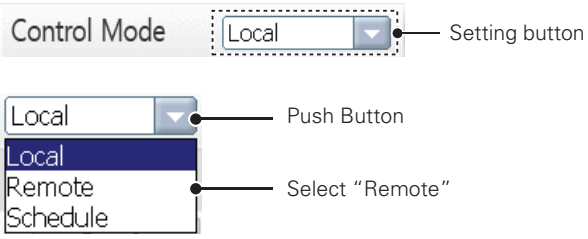
2 Use 2-line shield cable as the communication cable.

CAUTION

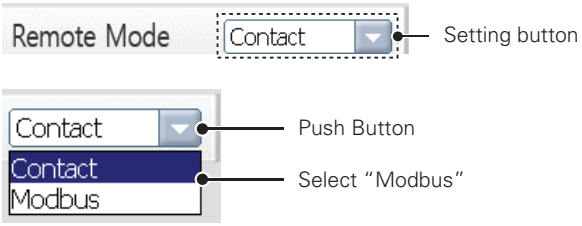
- Chiller PCB Address must be match with HMI Address, otherwise communication error will be occur. (Address setting is refer to unit combination)
- If communication is not work for 30second, Chiller PCB and automatic control will be communication error occurs.
- In possible up to 16 automatic interworking between Control and Unit but each unit is not work for 30second, will be communication error occurs.
- The protocol used communication refer to Manual of Appendix.

How to HMI setting for use Unit Combination with external auto control

1 Set "Remote" of Configuration's Control Mode.



2 Press the Select button and the remote mode is displayed as shown below.



TEST RUN/ADDITIONAL FUNCTION

Test run

Checkpoint before test run

Start the chiller after checking the following.

- Before starting the chiller, check the supplementary devices such as cold water circulation pump, AHU or other devices. Refer to the directions from the manufacturer. If all equipped parts are installed on the device, check whether all parts are installed appropriately and accurately and check whether the wiring is done correctly. Refer to the wiring diagram of the product.
- Check the flux switch for appropriate operation of the product. Check whether the sensor is operating properly.
- For cooling, fill up cold water circuit with clean water or other non-corrosive liquid and purge the air so that there is no air remaining inside the cold water circuit. If the outdoor temperature is expected to drop below 0°C, add anti-freeze additive to the cold water circuit to prevent the water from freezing. Cold water circuit must be cleaned before connecting to the product.
- Check and inspect all water pipes. Check whether the direction of the water flowing is correct and whether properly connected to the evaporator. Open all flow valves to the evaporator side.
- Turn on the cold water pump and measure the overall water pressure reduction of evaporator to check whether the flux is accurate compared to the designed flux rate.
- Check all electric connections within the control panel and whether all parts are tightly assembled with good contact conditions. Though the connecting part is checked from the factory but it can be loosened during the transportation from the vibration.
- Check and inspect all fuses. All fuses within the power panel and control panel must be installed at appropriate location.

Starting procedure

The chiller can be started as follows.

- Check whether the load is operating on the air processing device or other device on the side of the water that supplies the water to the chiller. If the temperature of the cold water is too high, the start of the load device on the water side can be delayed.
- If auto control does not work from the chiller, check whether the water circulation pump is operating.
- Voltage variance must be within 10% and check that the phase voltage imbalance does not exceed 5% between phases. Check whether the power and capacity is appropriate for processing the load.
- Check the order of the power phase.
- Check and inspect the voltage monitoring meter within the power panel. The meter should not show any error code.
- Use the HMI device to check the cold water outlet temperature and cooling water output temperature setting.
- Set the start menu of HMI device to start the system. Water circulation flux must be within the permitted range to control the temperature appropriately.

Check during start

After the above procedure, start the chiller to check whether everything works normally.
If there is any issue, immediately stop the product and follow the "Troubleshooting" process.
Refer to the Appendix for the criteria of each detail.
Follow the below procedure for checkpoints when starting the chiller.

- Check the rotating direction of the condenser fan motor. Place newspaper or tissue to check whether the air flow is normal around the motor.
- Check whether the cold water outlet temperature is the same as the setting.
- Through HMI device, check whether all sensors show effective values. Temperature sensor detects the compressor discharge temperature, compressor suction temperature, condenser outlet temperature and cold water inlet/outlet temperature.
- Check whether the operating current, operating noise and vibration is the same as the product specification.

Stop

After completing to check based on the above procedure, stop the product.
After the above procedure, start the chiller to check whether everything works normally.
If there is any issue, immediately stop the product and follow the "Troubleshooting" process.
Refer to the Appendix for the criteria of each detail.
Follow the below procedure for checkpoints when stopping the chiller.

- Press the stop button from HMI.
- Measure the stopping time of the actual product after pressing the stop button.
- Stop the cold water pump.

Load operation and operation adjustment

After starting and stopping the product, check the product function by operating the load and adjusting the operation.
Adjust the cold water outlet temperature setting to adjust the load to check the product while changing the operating condition.

Prepare operation data

Always record the operating condition when operating the chiller to check whether it is operating normally compared to the specification.
Refer to 'the standard operation record' page of Appendix.

Analyze water quality of cold water

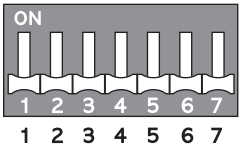
Analyze the water quality during the test run and secure the data.
Compare the water quality analysis result after a certain period of time (monthly check is recommended) against that of test run to decide the period to change the water.

Additional function

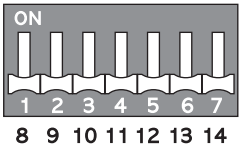
Dip switch setting

The dip switch setting of the control box for additional function is as shown below.
Change the dip switch setting of individual cycle control box PCB to select the functions in the following table.

SW01B



SW02B



Function	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Inverter backup			●											
Night low noise operation												●	X	●

⚠ CAUTION

- "X" sign on the table means that the dip switch must be pulled down. If not, the function may not work properly. Blank does not have any effect. Therefore multiple functions can be selected.
- If the applicable dip switch is not set correctly, the product may not operate correctly.

Night low noise function

This function judges the hottest day time during the cooling operation to reduce the fan noise of the outdoor unit at night time with low cooling load by running the outdoor unit fan at low RPM.

* How to set maximum RPM

Applicable dip switch ON for each cycle

↓

Reset power of cycle main board

↓

Continue to press the black button until the applicable step is displayed + press red button 1 time (More than 1 sec) to set the step.

1. STEP 1-3Maximum RPM = 900
2. STEP 4-6Maximum RPM = 800
3. STEP 7-8Maximum RPM = 780

* Refer to right table for standby time/operating time by step

↓

Reset power of cycle main board

Start night low noise function
(When setting step 1)

After maximum chiller temperature is detected, it operates at 900 (Set) RPM after 8 hours (Standby time)

Stop night low noise function
(When setting step 1)

After running night low noise function, it is automatically canceled after 9 hours (Operation time)

* RPM/Time setting

Step		Maximum fan RPM	Standby time (Hr)	Operation time (Hr)
1	①	900(59 dB)	8	9
2			6.5	10.5
3			5	12
4	②	800(56 dB)	8	9
5			6.5	10.5
6			5	12
7	③	780(53 dB)	8	9
8			6.5	10.5
9			5	12

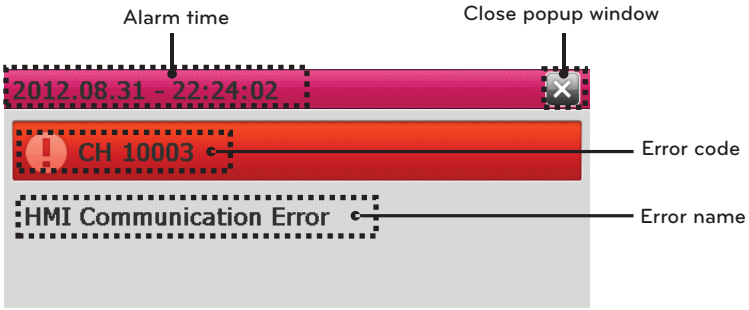
⚠ CAUTION

- Reset the main board of the cycle control box before running this function.
- Request the function setting to the installation expert after installing the chiller.
- If the function is not used, turn the dip switch OFF and reset the power.
- If chiller RPM is changed, the cooling capacity may be reduced.

SELF DIAGNOSIS FUNCTION

Self diagnosis function

This function self diagnose the product and displays the error type.
Error is displayed in the popup window as shown below in HMI and if the error is resolved, press the “Reset” button on HMI to close the error window.



- Alarm time

  This displays the time the alarm occurred. This displays year, month, date, hour, minute and second in order.

- Close popup window button

  This is the button to close the alarm popup window.
  Alarm popup window is closed for user convenience from the screen but the current alarm status is maintained.

- Error code

  Error code is configured as follows.

CH x x xxx

- xxx: This displays the alarm code
- x: This displays the alarm cycle number. (0-3)
  0: Common alarm
  1: Alarm of cycle 1
  2: Alarm of cycle 2
  3: Alarm of cycle 3
- x: This displays the unit number and current product is fixed to 1.

Process alarm (error)

- Common alarm (error)

  CH10XXX error basically stops the product and the start delay time is displayed on the start delay time.

- Alarm (Error) by cycle

  When the alarm occurs by cycle, applicable cycle is maintained at stopped condition and normal cycles operate normally.

If the alarm from the cycle is canceled, it resumes normal operation.

⚠ CAUTION

When composed of 3 cycles, overall product condition maintains the operating condition even when 2 cycles are in error condition, and the overall product will stop only when all 3 cycles are in error condition.

Cancel alarm (error)

- Flux switch, pump interlock alarm

  Press the "Reset" button on the following top menu to cancel the flux switch and pump interlock alarm.

- Other alarm

  Other alarms are automatically canceled when returning to normal condition.

Reset alarm (error)

- Press the "Reset" button on the top menu finally to finally cancel from HMI.
  If the "Reset" button is pressed without resolving the alarm, alarm popup window will be displayed again.
- Only when the "Reset" button is pressed finally after the existing alarm returns, the following alarm popup window is displayed.
- Alarm is saved in the history in chronological order.

HEAT SOURCE WATER MANAGEMENT

Heat source water management

- Maintain the supplied heat source water temperature in the boundary of 10 °C ~ 45 °C. Otherwise, it may cause product failure.
- The flow speed of the supplied heat source water shall be adjusted adequately. Otherwise, it may cause abnormal noise, pipe vibration, or pipe contraction or expansion by temperature. Use the heat source water pipe with the size of the same diameter of the product connection or bigger.
- Refer to the following table for the heat source water pipe gauge and flow speed. As the flow speed is faster, the noise, corrosion, and inflow of air bubbles increase.

Diameter (mm)	Speed Boundary (m/s)
< 50	0.6 – 1.2
50 - 100	1.2 – 2.1
100 <	2.1 – 2.7

- Caution is required for water quality management. Otherwise, it may cause heat source water pipe corrosion and product failure.
- If the water temperature is 40 °C or higher, corrosion may occur, so it is better to add anti-corrosion solution.
- Install the pipe, valve, gauge, and sensor where the maintenance is easy. Install the heat source water pipe valve at a low position for draining when it is necessary.
- Be careful not to have inflow of air. Air makes the flow speed unstable during the circulation of the heat source water and may degrade pump efficiency and generate heat source water pipe vibration. Therefore, install air purge at appropriate places where air generations are expected.
- Use the following methods to prevent freezing. Otherwise, there is a risk of freezing in the winter.
  * When the temperature drops, before the freezing, circulate the water with pump.
  * Operate boiler to maintain room temperature.
  * If it is not operated for a long period of time in the winter, drain the cooling tower water.
  * Use freezing prevention solution.
  * Refer to the following table for minimum addition amount of freezing prevention solution for each freezing temperature.

Types of freezing prevention solution	Minimum temperature (°C) to prevent freezing					
	0	-5	-10	-15	-20	-25
Ethylene glycol (%)	0	12	20	30	-	-
Propylene glycol (%)	0	17	25	33	-	-
Methanol (%)	0	6	12	16	24	30

* If freezing prevention solution is added, it may cause increased heat source water system pressure drop or product performance degradation.

CAUTION

- Sealed type cooling tower is recommended.
  - If open type cooling tower is applied, use middle heat exchanger to make the heat source water supply system to be sealed type.
  - If middle heat exchanger is not used and open type cooling tower is directly connected to the product, product may be severely damaged by foreign object, etc., and in such case, free repair will not be possible.

Heat source water quality management standard table

Water with a lot of foreign object causes corrosion or scale generation in the condenser and pipe and may affect the performance and lifespan.
Use heat source water suitable for [Environment Policy Basic Act Enforcement Ordinance Environment Standard].
If water other than tab water is used in the cooling tower water supply, make sure to have water quality inspection.
- Heat source water quality management shall follow the standard table below.
  If heat source water is not managed according to the water quality standard table, it may cause air conditioner performance degradation or severe product problem.

Category	Sealed type system		Influence	
	Heat source water	Supplementary water	Corrosion	Scale
Basic category				
pH [25 °C]	7.0 8.0	7.0~8.0	O	O
Electrical conductivity [25 °C](mS/m)	30 or less	30 or less	O	O
Chloride ion(mg Cl- /*l*)	50 or less	50 or less	O	-
Sulfate ion(mg SO_4^{2-}/*l*)	50 or less	50 or less	O	-
Acid consumption [pH 4.8] (mg $CaCO_3$/*l*)	50 or less	50 or less	-	O
Total hardness (mg $CaCO_3$/*l*)	70 or less	70 or less	-	O
Calcium hardness (mg $CaCO_3$/*l*)	50 or less	50 or less	-	O
Ion-silica (mg SiO_2/*l*)	30 or less	30 or less	-	O
Reference category				
Iron (mg Fe/*l*)	1.0 or less	0.3 or less	O	O
Copper (mg Cu/*l*)	1.0 or less	0.1 or less	O	-
Sulfate ion(mg S^2/*l*)	Shall not be detected	Shall not be detected	O	-
Ammonium ion(mg NH_4^+/*l*)	0.3 or less	0.1 or less	O	-
Remaining chlorine (mg Cl/*l*)	0.25 or less	0.3 or less	O	-
Free carbon dioxide (mg CO_2/*l*)	0.4 or less	4.0 or less	O	-
Stability index	-	-	O	O

[Reference]

(1) O mark in the corrosion and scale field means the possibility of generation.

(2) If the water temp. is 40 °C or higher, the iron without protective coating may have corrosion when it is exposed to water, and addition of anti-corrosion solution or air purge may have a good effect.

(3) In the sealed type circuit using sealed type cooling tower, coolant and supplementary water shall satisfy the water quality standard of the sealed type system in the table.

(4) You shall supply tab water, industrial water, or underground water, excluding purified water, neutral water, and soft water, for supplementary water and supplied water.

(5) The 15 categories in the table are the general causes of corrosion and scale generation

Water pipe side strainer

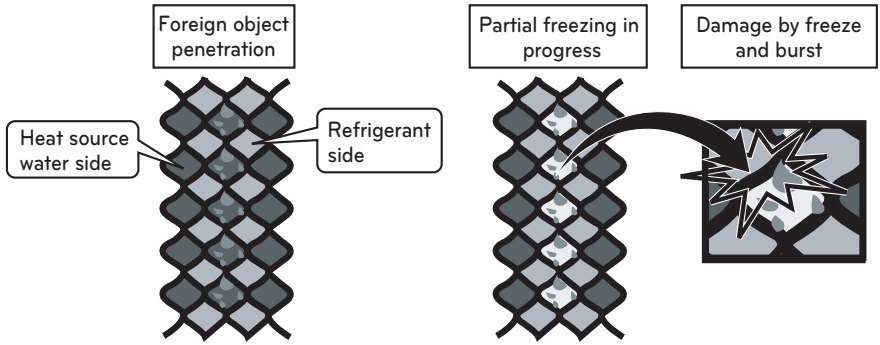
For the protection of the water cooling type product, make sure to install strainer of 50 Mesh or more in the heat source water side pipe.

Otherwise, heat exchanger may be damaged by the following conditions.

1 The heat source water side in the plate type heat exchanger is formed by several small flow paths.

2 If strainer of 50 Mesh or more is not used, foreign object may block some flow paths.

3 As a result of the heat exchanger damage by freeze burst, the refrigerant is mixed with the heat source water and the product becomes unusable.



Actions for problems in the test operation

Category	Status	Cause	Inspection and Action
Whether heat source water is supplied	CH 13	It is the error detected with regards to the heat source water during the flow switch connection, and heat source water does not flow, or flow amount is insufficient. (All operation conditions)	Check if heat source water supply pump works.
			Check blocking of the heat source water pipe. (Strainer cleaning, valve locked, valve problem, air in the pipe, etc.)
			Check flow switch problem. (Flow switch disorder, unauthorized handling, disconnection, etc.)
	CH 180	Heat source water does not flow, or flow amount is insufficient.	Check if heat source water supply pump works
			Check blocking of the heat source water pipe. (Strainer cleaning, valve locked, valve problem, air in the pipe, etc.)

Plate type heat exchanger maintenance

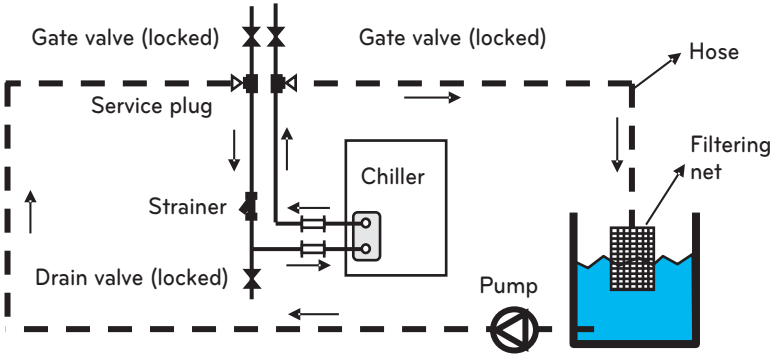
As scale generation is accumulated, plate type heat exchanger efficiency may be decreased or damage may occur by freeze and burst with decreased flow amount.

For such reasons, it is necessary to have periodical management to prevent scale generation.

1 Before entering the usage season, check the following items. (Period: 1 time per year)
   1) Perform water quality inspection to see if it is within the standard condition.
   2) Perform strainer cleaning.
   3) Check if the flow amount is adequate.
   4) Check if operation environment is adequate. (Pressure, flow amount, water outlet temperature, etc.)

2 To clean the plate type heat exchanger, follow the procedures below. (Period: 1 time per year)
   1) Check if service port is mounted on the water pipe for chemical solvent cleaning. 5% diluted formic acid, citric acid, oxalic acid(water acid), acetic acid, phosphoric acid, etc. are suitable as the chemical solvent for scale cleaning. (* Hydrochloric acid, sulfuric acid, nitric acid, etc. have corrosive property, so they may never be used.)
   2) During the cleaning, make sure if water inlet and outlet pipe gate valve and drain pipe valve are properly locked.
   3) Connect the pipe for chemical solvent cleaning through water pipe service plug, fill the cleaning solvent of about 50 °C ~ 60 °C in the plate type heat exchanger, and circulate with pump for about 2 ~ 5 hours. The circulation time may be different according to the cleaning solvent temperature or amount of scale. Therefore, closely observe the chemical solvent color changes to decide the circulation time for scale removal.
   4) After the solvent circulation work, completely drain the chemical solvent in the plate type heat exchanger, fill 1~2 % concentration sodium hydroxide (NaOH) or hydrocarbon sodium ($NaHCO_3$) and circulate for about, 15~20 min. to neutralize the heat exchanger.
   5) After the neutralization work is completed, clean inside the plate type heat exchanger with clean water. By measuring the pH concentration of the water, you can verify if the chemical solvent is properly removed.
   6) If you use other type of chemical solvent in the market, make sure to check if there is any corrosive property against stainless or copper in advance.
   7) Receive consultation from the experts in the relevant industry for details of cleaning chemical solvent.

3 After cleaning work is completed, operate the product to see if it works properly once again.



[Plate type heat exchanger cleaning]

Daily inspection management

1 Water quality management

Plate type heat exchanger does not have the structure for disassembly, cleaning, or parts replacement. To prevent corrosion or scale accumulation in the plate type heat exchanger, you have to take a special caution for water quality management. Water quality shall satisfy the minimum suggested water quality category standard. If corrosion prevention solution or corrosion restraining solution is added, you have to use ingredients with no corrosive property against stainless and copper. To prevent the contamination of the circulation water by external air, it is recommended to periodically drain the water inside the water pipe and fill water again even if the circulation water is not contaminated.

2 Flow amount management

If the flow amount is insufficient, freeze and burst may occur in the plate type heat exchanger. Check if strainer is blocked or filled with air, and check whether flow amount is insufficient by checking the difference of temperature or pressure between the outdoor unit inlet and outlet water pipe. If there is a difference of temperature or pressure above appropriate level, it shows that the flow amount is decreased, so immediately stop the operation and remove the cause before the re-operation. (* If there is an air, make sure to perform purge work. The air inside water pipe hinders the heat source water circulation to cause flow amount insufficiency, and it may also cause freeze and burst.)

3 Brine concentration management

If Brine(antifreeze) is used in the heat source water, use the designated type and concentration. Calcium chloride Brine causes corrosion of the plate type heat exchanger, so it may not be used. If the antifreeze is left alone, it absorbs moisture from the air and the concentration will decrease and may lead to freeze and burst of the plate type heat exchanger, so minimize the contact area with air and periodically measure the concentration of Brine, and maintain the concentration of Brine by adding Brine as necessary.

Inspection category \ Period (year)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Product operation status	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Heat exchanger cleaning	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Strainer cleaning	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Water quality inspection	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Refrigerant leakage inspection	●														●

⚠ CAUTION

- The above inspection table sets the minimum period, and more frequent inspections are necessary according to installation environment, operation condition / water quality condition.
- During the heat exchanger cleaning, you have to take off the parts such as pressure gauge or lock the valve so that chemical solvent may not enter.
- During the cleaning, check the pipe connection parts in advance to prevent leakage of the chemical solvent.
- Start the cleaning work after the chemical solvent and water are sufficiently mixed.
- It is better to perform the heat exchanger cleaning work in the early stage, and when the scale accumulation becomes severe, it becomes difficult to remove them.
- In the region with poor water quality, periodical cleaning works are necessary.
- Chemical solvent has strong acidic property, so it shall be completely washed with water.
- To verify if the inside became clean, remove the hose and check inside the pipe.
- Make sure to perform the air purge to remove air inside water pipe.
- After the inspection, make sure to check if the heat source water properly flows before restarting the product.

TROUBLESHOOTING

General error

CAUTION

If the product stopped from the safety device, identify and resolve the root cause before restarting.

Before introducing the special warning, this introduces the general issues and how to troubleshoot the issues.

When the chiller is not operating, check the power, refrigerant, configuration and alarm setting of the chiller.

Check the voltage connected to the terminal block inside the power panel to check the power.

If there is no power, check whether the power circuit breaker is down.

If the power is properly connected, check the cycle pressure of the chiller to check whether it is within the normal range.

If the pressure exceeds the normal range, check for leakage by using the soap bubble.

Before starting the chiller, return to the default setting.

Lastly check the alarm setting. Alarm can be checked through the HMI device.

If the alarm is turned on, follow the troubleshooting method for specific alarm.

Symptom	Potential cause	Potential solution
Device does not start.	Check power of the device	Check over-current protection device Check if fuse is disconnected Resume power to device
	Incorrect or inaccurate device configuration	Check device configuration Check if wiring is incorrect
	Alarm is on	Check alarm condition Check for separate alarm troubleshooting process and resolve the issue Follow the direction Check the HMI input channel to check the alarm condition input
	Entering delay time	Check whether compressor entered start delay time

Symptom	Potential cause	Potential solution
Evaporation pressure is low and the product constantly stops.	Insufficient refrigerant	Check for leakage and refill refrigerant
	Insufficient cold water	Check cold water system (Ensure rated flux) - Is the valve of cold water system closed? - Is the pressure difference between inlet and outlet of cold water system appropriate? - Is the air of cold water system cold?
Condensation pressure is high and the product constantly stops.	Outdoor temperature is high	Check whether outdoor temperature is within operating range
	Alien particles accumulated on the condenser	Clean condenser
	Fan defect	Replace fan
Product vibrates loudly.	Fan-motor connecting bolt is loose	Check assembly condition and tighten bolt
	Motor-mount motor assembly is loose	Check assembly condition and tighten bolt
	Fan is not balanced	After checking fan rotation range, replace fan
	Compressor assembly bolt is loose	If the assembly bolt/nut is loose, tighten it.
	Frame assembly bolt is loose	Check assembly condition and tighten bolt
	Motor bearing is burnt	Check for abnormal noise in motor (Noise in multiple of RPM) and replace motor
Resonance sound	Rubber fixed condition of motor mount is defective	Replace motor mount
	Pipe vibration defect around compressor	Replace anti-vibration rubber attached on pipe
High frequency wave noise from front side of product	Defect in heat emitting fan in control box	Clean part around heat emitting fan
Constantly hunting for cold water temperature	Insufficient cold water	Check cold water system (Ensure rated flux) - Is the valve of cold water system closed? - Is the pressure difference between inlet and outlet of cold water system appropriate? - Is the air of cold water system cold? - Is the cooling load within appropriate range?
Evaporation pressure is high	Temporary rise in cold water temperature due to abnormal increase in load	It is not abnormal. But, check if it is within operating range.

Alarm

The description of the alarm is as follows.

Error code	Error name	
	Error condition	
	Control during error	Cancel condition
CHxx001	Outdoor temperature sensor error	
	Outdoor temperature sensor is open/short	
	Stop product	Automatically return to normal condition
CHxx002	Common load inlet water temperature sensor error	
	Common load inlet water temperature sensor is open/short	
	Stop product	Automatically return to normal condition
CHxx003	HMI communication error	
	When communication between HMI and chiller controller is disconnectedv for more than 30 seconds	
	Stop product	Automatically return to normal condition
CHxx005	Cycle control box communication error	
	When communication between chiller controller and cycle control box is disconnected for more than 30 seconds	
	Stop product	Automatically return to normal condition
CHxx006	Common load outlet water temperature sensor error	
	Common load outlet water temperature sensor is open/short	
	Stop product	Automatically return to normal condition
CHxx009	Remote communication error	
	When the mode bus communication with the external device is not established for more than 30 seconds after the initial communication with the remote modebus condition is established	
	Stop product	Automatically return to normal condition
CHxx011	Load water pump interlock error	
	When the load water pump is turned off for 3 seconds when starting or during the operation for more than 3 times within 1 hour When turned off more than 9 seconds within 1 hour	
	Stop product	Press the HMI Reset button
CHxx013	Load water flux switch error	
	When the load water flux switch is turned off for 3 seconds when starting or during the operation for more than 3 times within 1 hour When turned off more than 9 seconds within 1 hour	
	Stop product	Press the HMI Reset button
CHxx015	Remote alarm	
	When the contact point signal of hardware wiring is short when entering the remote control mode	
	Stop product	Automatically return to normal condition

Error code	Error name	
	Error condition	
	Control during error	Cancel condition
CHxx021	Inverter compressor IPM fault	
	Inverter compressor drive IPM defect/Inverter compressor defect	
	Stop applicable cycle	Automatically return to normal condition
CHxx022	Inverter compressor input over-current	
	Inverter compressor input over-current	
	Stop applicable cycle	Automatically return to normal condition
CHxx023	Inverter compressor DC link low pressure	
	DC voltage charge defect	
	Stop applicable cycle	Automatically return to normal condition
CHxx024	Cycle high pressure switch operation	
	High pressure switch operates due to abnormal high pressure	
	Stop applicable cycle	Automatically return to normal condition
CHxx025	High/Low voltage of input voltage	
	Over/Under permitted voltage of input voltage, N	
	Stop applicable cycle	Automatically return to normal condition
CHxx026	Inverter compressor start failure error	
	Initial start failure from compressor defect	
	Stop applicable cycle	Automatically return to normal condition
CHxx027	PSC/PFC fault error	
	PSC/PFC fault error	
	Stop applicable cycle	Automatically return to normal condition
CHxx028	Inverter DC link high voltage error	
	Defect from DC voltage and over-charge	
	Stop applicable cycle	Automatically return to normal condition
CHxx029	Inverter compressor over-current	
	Exceed limit	
	Stop applicable cycle	Automatically return to normal condition

Error code	Error name	
	Error condition	
	Control during error	Cancel condition
CHxx030	Surge in static speed #2 compressor discharge temperature	
	Surge in static speed #2 compressor discharge temperature	
	Stop applicable cycle	Automatically return to normal condition
CHxx032	Surge in inverter compressor discharge temperature	
	Surge in inverter compressor discharge temperature	
	Stop applicable cycle	Automatically return to normal condition
CHxx033	Surge in static speed #1 compressor discharge temperature	
	Surge in static speed #1 compressor discharge temperature	
	Stop applicable cycle	Automatically return to normal condition
CHxx034	Surge in high pressure	
	Surge in high pressure side	
	Stop applicable cycle	Automatically return to normal condition
CHxx035	Surge in low pressure	
	Drop in low pressure side	
	Stop applicable cycle	Automatically return to normal condition
CHxx036	Low compression rate error	
	Low compression rate error	
	Stop applicable cycle	Automatically return to normal condition
CHxx039	Communication error between PFC circuit and inverter board	
	Communication error between PFC circuit and inverter board	
	Stop applicable cycle	Automatically return to normal condition
CHxx040	Inverter compressor CT sensor error	
	Inverter compressor CT sensor is short/open	
	Stop applicable cycle	Automatically return to normal condition
CHxx041	Inverter compressor discharge temperature sensor error	
	Inverter compressor discharge temperature sensor is short/open	
	Stop applicable cycle	Automatically return to normal condition

Error code	Error name	
	Error condition	
	Control during error	Cancel condition
CHxx042	Low pressure sensor error	
	Low pressure sensor is short/open	
	Stop applicable cycle	Automatically return to normal condition
CHxx043	High pressure sensor error	
	High pressure sensor is short/open	
	Stop applicable cycle	Automatically return to normal condition
CHxx044	Chiller air temperature sensor error	
	Chiller air temperature sensor is short/open	
	Stop applicable cycle	Automatically return to normal condition
CHxx045	Heat exchanger temperature sensor error	
	Heat exchanger temperature sensor is short/open	
	Stop applicable cycle	Automatically return to normal condition
CHxx046	Suction temperature sensor error	
	Suction temperature sensor is short/open	
	Stop applicable cycle	Automatically return to normal condition
CHxx047	Static speed #1 compressor discharge temperature sensor error	
	Static speed #1 compressor discharge temperature sensor is short/open	
	Stop applicable cycle	Automatically return to normal condition
CHxx048	Static speed #2 compressor discharge temperature sensor error	
	Static speed #2 compressor discharge temperature sensor is short/open	
	Stop applicable cycle	Automatically return to normal condition
CHxx049	IPM temperature sensor error	
	IPM temperature sensor is short/open	
	Stop applicable cycle	Automatically return to normal condition
CHxx050	Chiller 3 phase power missing phase	
	Chiller 3 phase power missing phase	
	Stop applicable cycle	Automatically return to normal condition

Error code	Error name	
	Error condition	
	Control during error	Cancel condition
CHxx052	Communication error with inverter controller	
	Communication error with inverter controller	
	Stop applicable cycle	Automatically return to normal condition
CHxx054	Chiller 3 phase power reverse phase / S phase power missing phase	
	Chiller 3 phase power reverse phase / S phase power missing phase	
	Stop applicable cycle	Automatically return to normal condition
CHxx057	Communication error with inverter controller	
	Communication error with inverter controller	
	Stop applicable cycle	Automatically return to normal condition
CHxx059	Chiller installation error	
	Chiller installation error	
	Stop applicable cycle	Automatically return to normal condition
CHxx060	Inverter PCB EEPROM error	
	Inverter PCB EEPROM error	
	Stop applicable cycle	Automatically return to normal condition
CHxx062	Surge in inverter board IPM temperature	
	Surge in inverter board IPM temperature	
	Correspond cycle stop	Automatic return to a normal condition
CHxx067	Fan lock	
	Fan locked	
	Stop applicable cycle	Automatically return to normal condition
CHxx069	Static speed #1 CT sensor error	
	Static speed #1 CT sensor is short/open	
	Stop applicable cycle	Automatically return to normal condition
CHxx070	Static speed #2 CT sensor error	
	Static speed #2 CT sensor is short/open	
	Stop applicable cycle	Automatically return to normal condition
CHxx071	PFC CT sensor error	
	PFC CT sensor is short/open	
	Stop applicable cycle	Automatically return to normal condition

Error code	Error name	
	Error condition	
	Control during error	Cancel condition
CHxx073	Inverter compressor PCB instant over-current (Peak)	
	Inverter compressor PCB instant over-current (Peak)	
	Stop applicable cycle	Automatically return to normal condition
CHxx074	Inverter PCB phase imbalance	
	Phase imbalance	
	Stop applicable cycle	Automatically return to normal condition
CHxx075	Fan CT sensor error	
	Fan CT sensor is short/open	
	Stop applicable cycle	Automatically return to normal condition
CHxx076	Fan DC link high voltage error	
	Fan DC link high voltage	
	Stop applicable cycle	Automatically return to normal condition
CHxx077	Fan over-voltage error	
	Fan over-voltage	
	Stop applicable cycle	Automatically return to normal condition
CHxx078	Fan hall sensor error	
	Fan hall sensor is short/open	
	Stop applicable cycle	Automatically return to normal condition
CHxx079	Fan start failure error	
	Fan start failure	
	Stop applicable cycle	Automatically return to normal condition
CHxx086	Main PCB EEPROM error	
	Main PCB EEPROM access error	
	Stop applicable cycle	Automatically return to normal condition
CHxx087	Fan PCB EEPROM error	
	Fan PCB EEPROM access error	
	Stop applicable cycle	Automatically return to normal condition

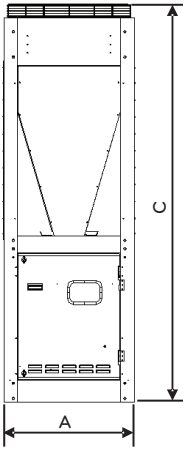
Error code	Error name	
	Error condition	
	Control during error	Cancel condition
CHxx088	PFC PCB EEPROM error	
	PFC PCB EEPROM access error	
	Stop applicable cycle	Automatically return to normal condition
CHxx104	Communication error between cycles	
	Communication error between cycles	
	Stop applicable cycle	Automatically return to normal condition
CHxx105	Fan board communication error	
	Fan board communication error	
	Stop applicable cycle	Automatically return to normal condition
CHxx106	Fan PCB IPM fault	
	Fan PCB IPM fault	
	Stop applicable cycle	Automatically return to normal condition
CHxx107	Fan DC link low voltage error	
	Fan DC link low voltage	
	Stop applicable cycle	Automatically return to normal condition
CHxx113	Liquid pipe temperature sensor error	
	Liquid temperature sensor is short/open	
	Stop applicable cycle	Automatically return to normal condition
CHxx115	Sub cooling outlet pipe temperature sensor error	
	Sub cooling outlet pipe temperature sensor Short/Open	
	Correspond cycle stop	Automatic return to a normal condition
CHxx151	4 way valve switch over error	
	Mode switch over error	
	Stop applicable cycle	Automatically return to normal condition
CHxx153	Heat exchanger left side temperature sensor error	
	Heat exchanger left side temperature sensor is short/open	
	Stop applicable cycle	Automatically return to normal condition
CHxx154	Heat exchanger right side temperature sensor error	
	Heat exchanger right side temperature sensor is short/open	
	Stop applicable cycle	Automatically return to normal condition

Error code	Error name	
	Error condition	
	Control during error	Cancel condition
CHxx173	Static speed #1 over-current/under-current	
	Defect from static speed #1 compressor burnt, locked or over-current	
	Stop applicable cycle	Automatically return to normal condition
CHxx174	Static speed #2 over-current/under-current	
	Defect from static speed #2 compressor burnt, locked or over-current	
	Stop applicable cycle	Automatically return to normal condition
CHxx180	Plate type heat exchanger frozen	
	When the load outlet water temperature is maintained at 3°C or below after the compressor started or if the low voltage is maintained at less than 660kPA after the compressor started	
	Stop applicable cycle	Automatically return to normal condition
CHxx182	Sub MICOM communication error	
	When the communication with sub MICOM is disconnected for more than 30 seconds	
	Stop applicable cycle	Automatically return to normal condition
CHxx188	Load water temperature sensor error	
	Load sensor is short/open	
	Stop applicable cycle	Automatically return to normal condition
CHxx190	Surge in inverter board heat emitting plate temperature	
	Surge in inverter board heat sink temperature	
	Stop applicable cycle	Automatically return to normal condition
CHxx191	Inverter board heat emitting plate temperature sensor error	
	Inverter board heat emitting plate temperature sensor is short/open	
	Stop applicable cycle	Automatically return to normal condition
CHxx193	Surge in fan board heat emitting plate temperature	
	Surge in fan board heat sink temperature	
	Stop applicable cycle	Automatically return to normal condition
CHxx194	Fan board heat emitting plate temperature sensor error	
	Fan board heat emitting plate temperature sensor is short/open	
	Stop applicable cycle	Automatically return to normal condition

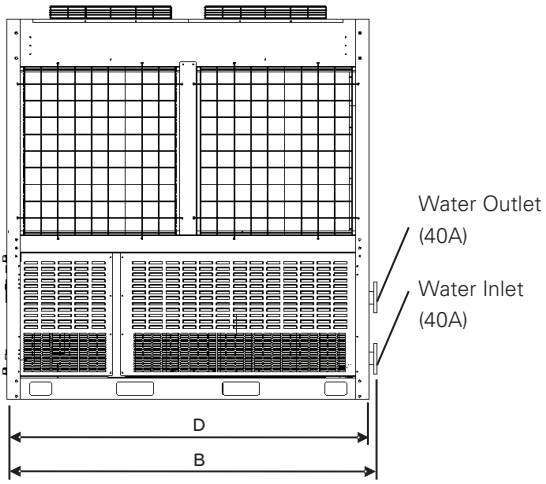
APPENDIX

External diagram

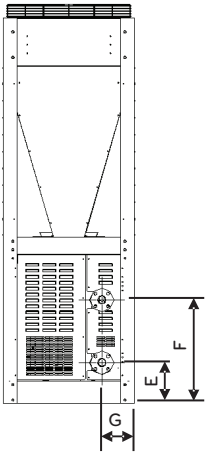
• Model name:ACAH020BBAM



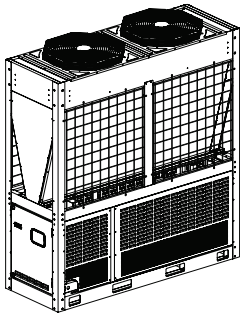
Front view



Side view



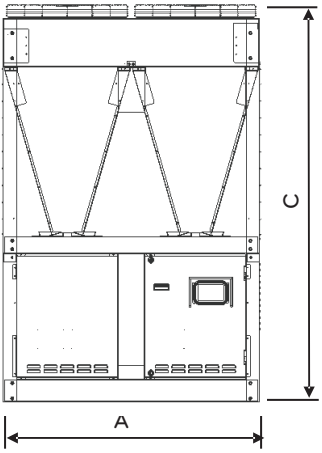
Rear view



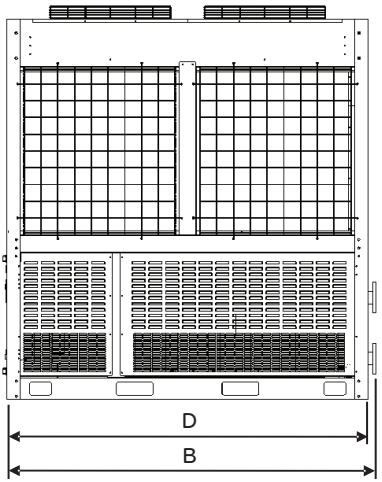
(Unit : mm)

Classification	Dimension
A	765
B	2,198
C	2,354
D	2,154
E	200
F	660
G	206

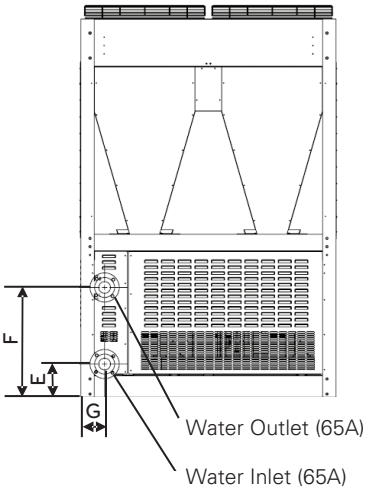
• Model name: ACAH040BBAM / ACAH040BCAM



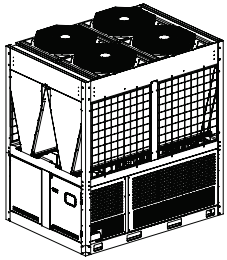
Front view



Side view



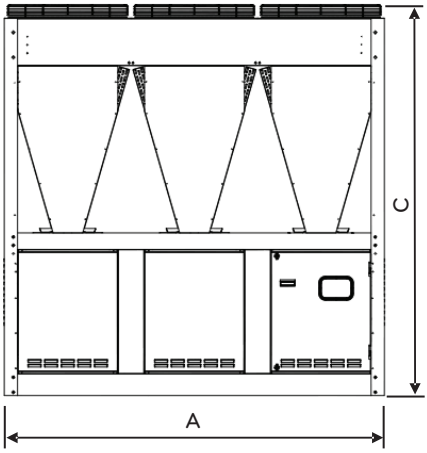
Rear view



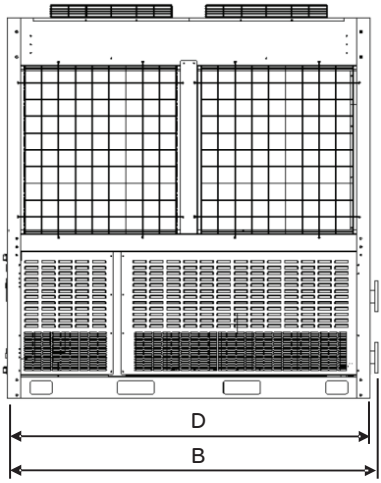
(Unit : mm)

Classification	Dimension
A	1,528
B	2,198
C	2,354
D	2,154
E	200
F	660
G	142

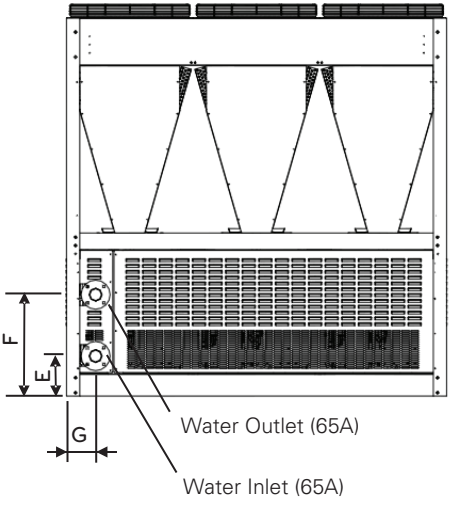
• Model name: ACAH060BBAM / ACAH060BCAM



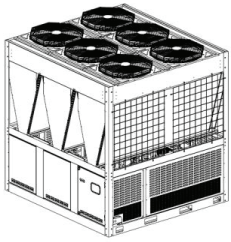
Front view



Side view



Rear view



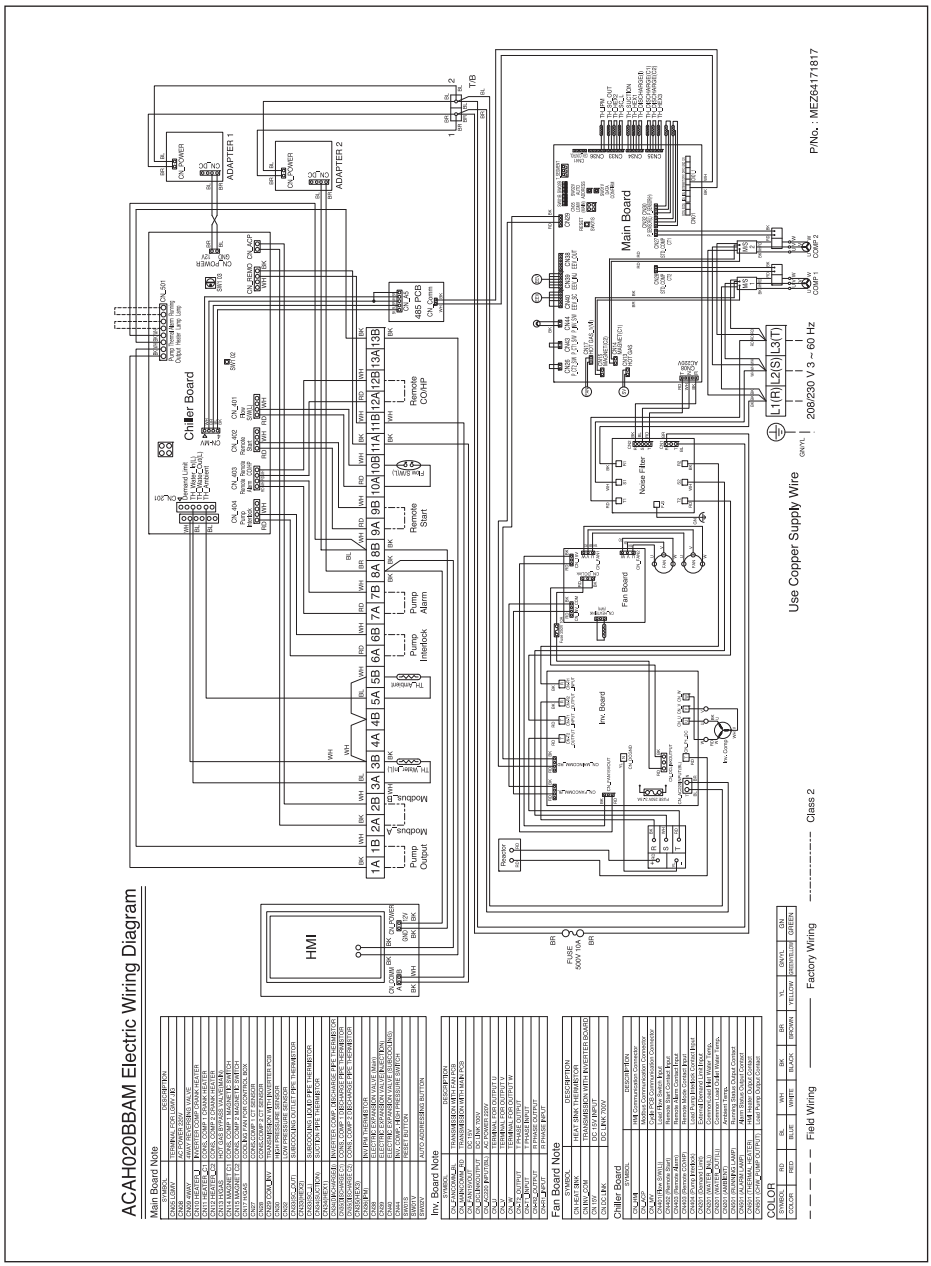
(Unit : mm)

Classification	Dimension
A	2,291
B	2,198
C	2,354
D	2,154
E	200
F	660
G	142

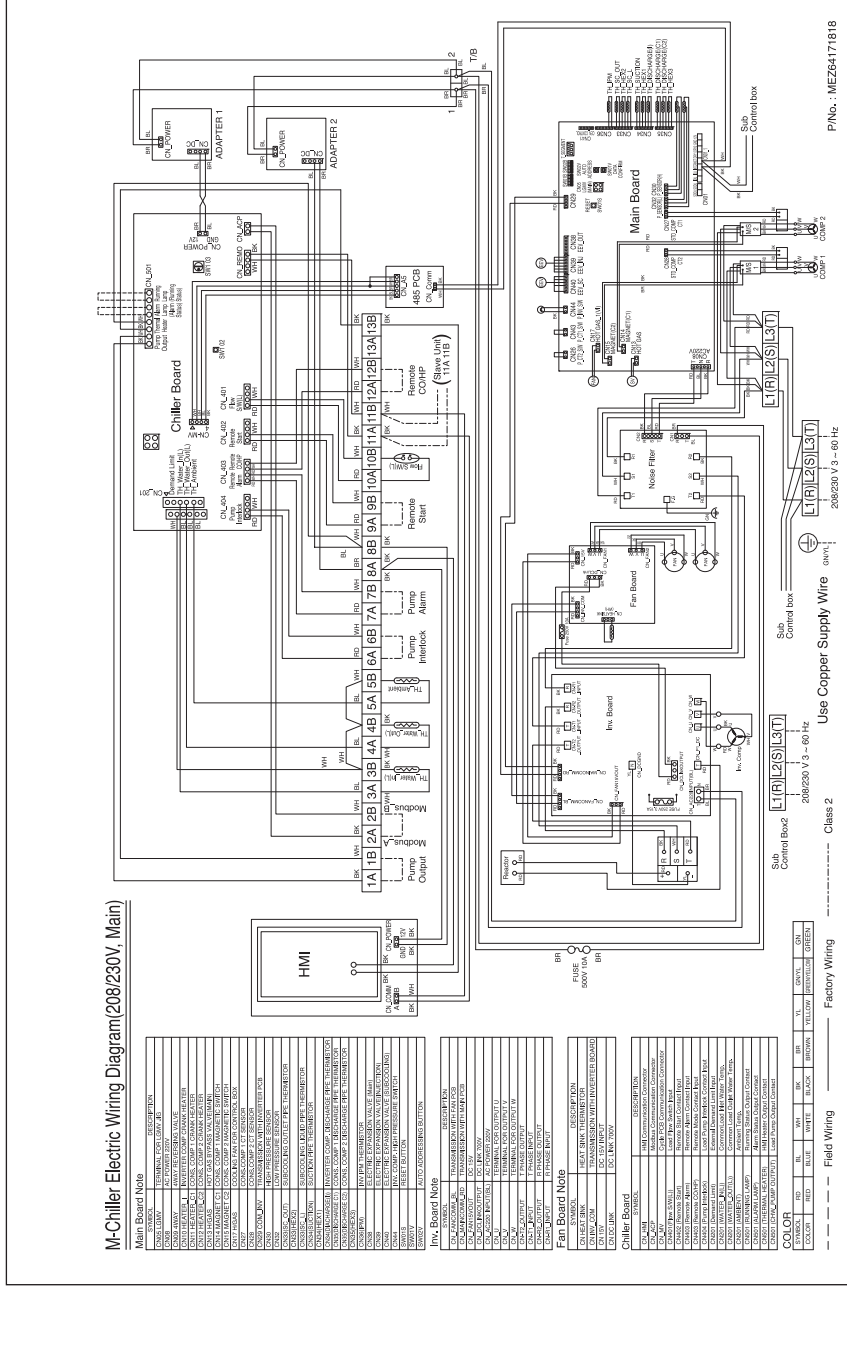
ENGLISH

Electric Wiring Diagram

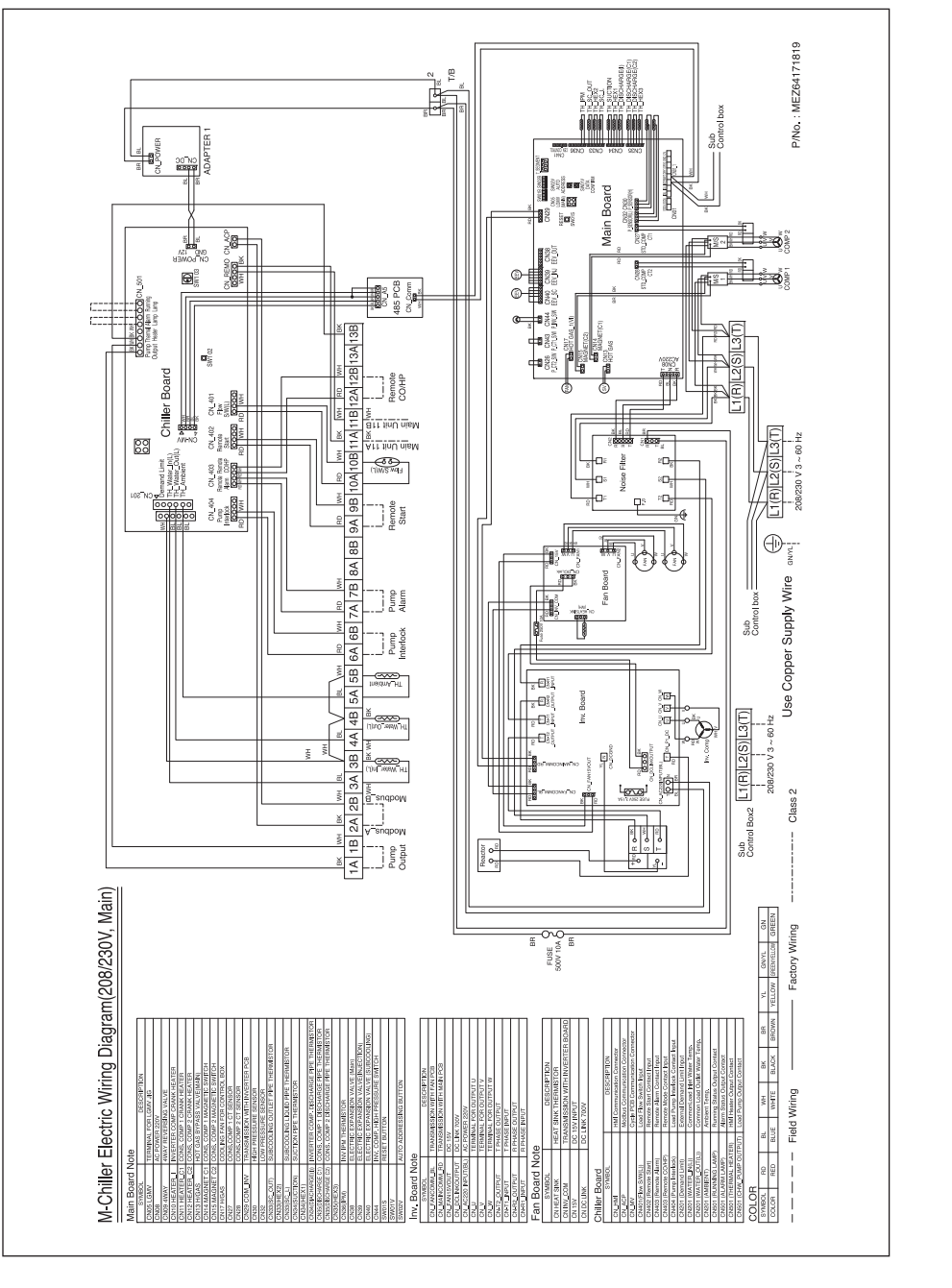
• 20RT



- 40RT(Main unit _ Main cycle)
  60RT(Main unit _ Main cycle)

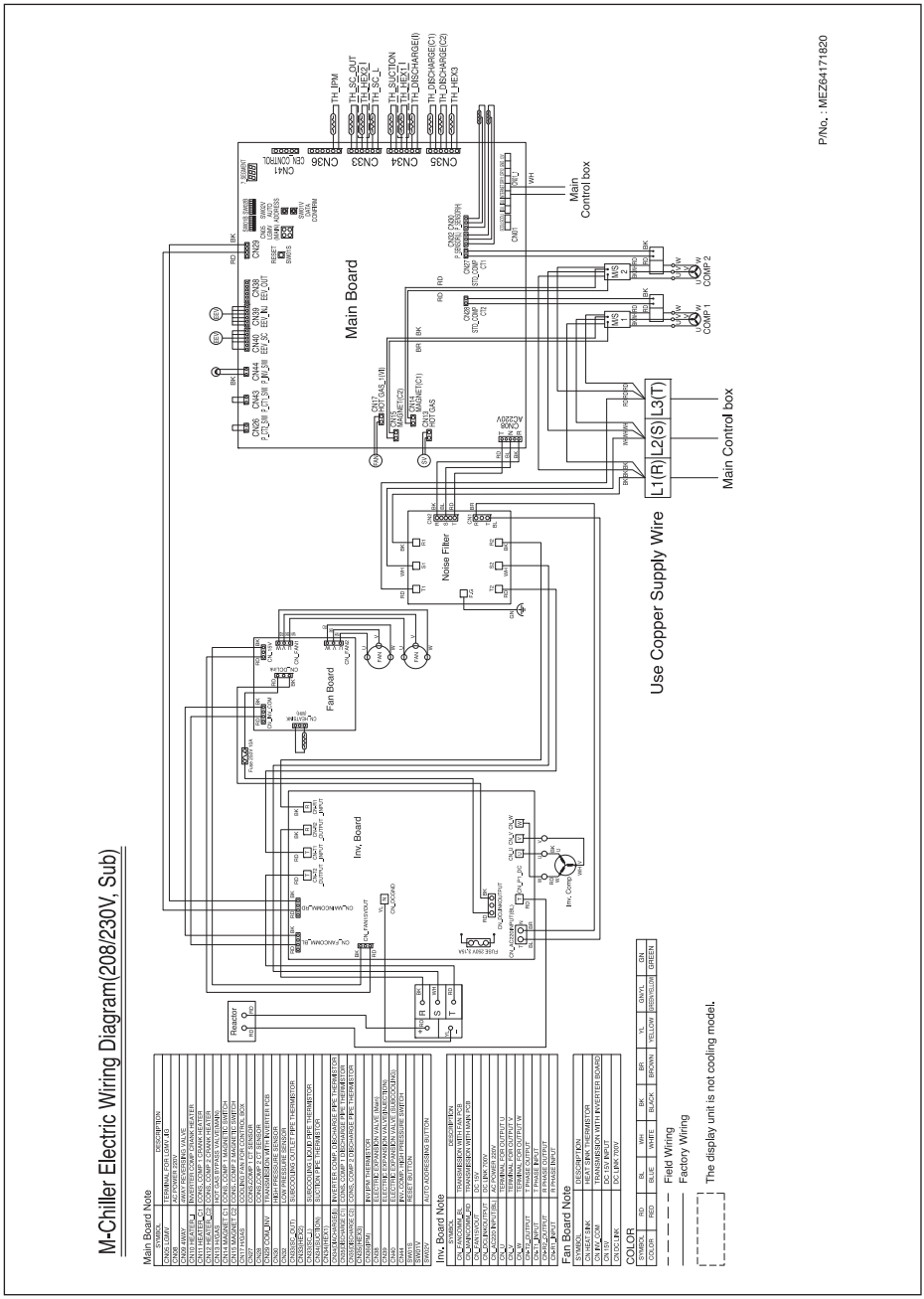


- 40RT(Slave unit _ Main cycle)
  60RT(Slave unit _ Main cycle)



- 40RT(Main/Slave unit _ Sub cycle)
  60RT(Main/Slave unit _ Sub cycle)

M-Chiller Electric Wiring Diagram(208/230V, Sub)



Main Board Note

SYMBOL	DESCRIPTION
CN05, CN06	TERMINAL FOR USER I/F
CN09	485
CN10	485 INV
CN12	4WAY REVERSING VALVE
CN13	CONT, COMP 1 CRANK HEATER
CN14	CONT, COMP 2 CRANK HEATER
CN15	CONT, COMP 3 CRANK HEATER
CN16	CONT, COMP 4 CRANK HEATER
CN17	CONT, COMP 1 MAGNETIC SWITCH
CN18	CONT, COMP 2 MAGNETIC SWITCH
CN19	COOLING FAN CONTROL BOX
CN20	CONT, COMP 1 CT SENSOR
CN21	CONT, COMP 2 CT SENSOR
CN22, CN23, CN24	TRANSMISSION WITH INVERTER PCB
CN25	OUTDOOR AIR THERMISTOR
CN26	LOW PRESSURE SENSOR
CN27, CN28	SUBCOOLING OUT PIPE THERMISTOR
CN29	SUBCOOLING IN PIPE THERMISTOR
CN30, CN31	SUCTION PIPE THERMISTOR
CN32, CN33, CN34	INVERTER COMP. DISCHARGE PIPE THERMISTOR
CN35, CN36, CN41	INVERTER COMP. DISCHARGE PIPE THERMISTOR
CN37, CN38, CN39	CONT, COMP 2 DISCHARGE PIPE THERMISTOR
CN40	CONT, COMP 1 DISCHARGE PIPE THERMISTOR
CN42	EVI PIPE THERMISTOR
CN43	ELECTRIC EXPANSION VALVE (Main)
CN44	ELECTRIC EXPANSION VALVE (SUBCOOLING)
CN45	ELECTRIC EXPANSION VALVE (SUBCOOLING)
CN46	HIGH PRESSURE SWITCH
CN47	RESET BUTTON
CN48	SW/OFF
CN49	AUTO ADDRESSING BUTTON

Inv. Board Note

SYMBOL	DESCRIPTION
CN_A/CONDM1	TRANSMISSION WITH CNA PCB
CN_A/CONDM2	TRANSMISSION WITH CNA PCB
CN_A/SWOUT	DC 12V
CN_COMP/OUT	DC 15V
CN_COMP/FEL	AC 14V/0.25V
CN_U	TERMINAL FOR OUTPUT U
CN_V	TERMINAL FOR OUTPUT V
CN_W	TERMINAL FOR OUTPUT W
CN_T_EXPIN1	T PHASE EXPIN1
CN_T_EXPIN2	T PHASE EXPIN2
CN_R_OUT	R PHASE OUTPUT
CN_S_OUT	S PHASE OUTPUT
CN_FAN/OUT	FAN PHASE INPUT

Fan Board Note

SYMBOL	DESCRIPTION
CN_HEAT SINK	HEAT SINK THERMISTOR
CN_INV_COM	TRANSMISSION WITH INVERTER BOARD
CN_FAN	DC FAN MOTOR
CN_DC LINK	DC LINK 700V

COLOR

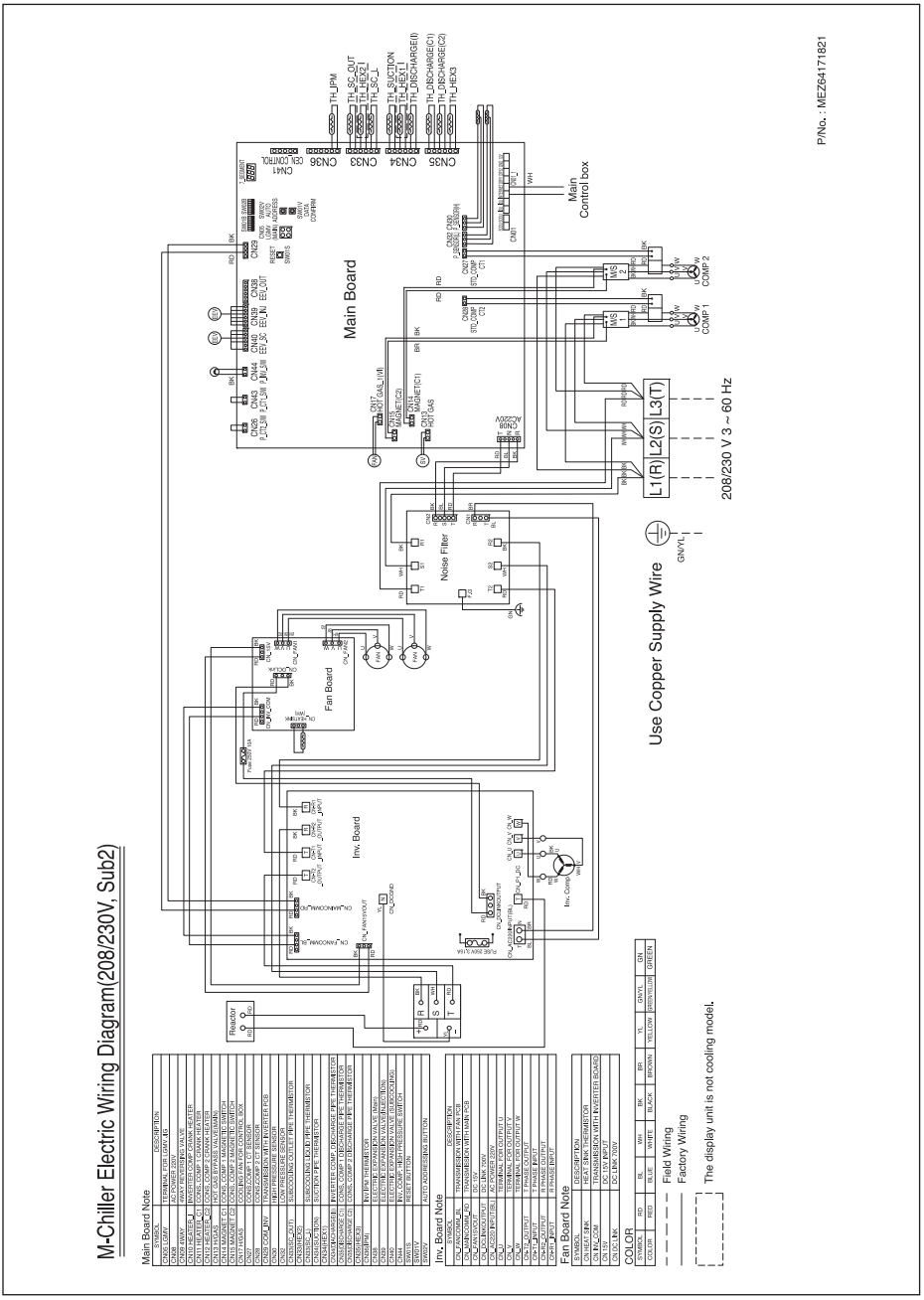
SYMBOL	RD	BL	WH	BK	BR	YL	GN/YL	GN
COLOR	RED	BLUE	WHITE	BLACK	BROWN	YELLOW	GREEN/YELLOW	GREEN

Field Wiring

Factory Wiring

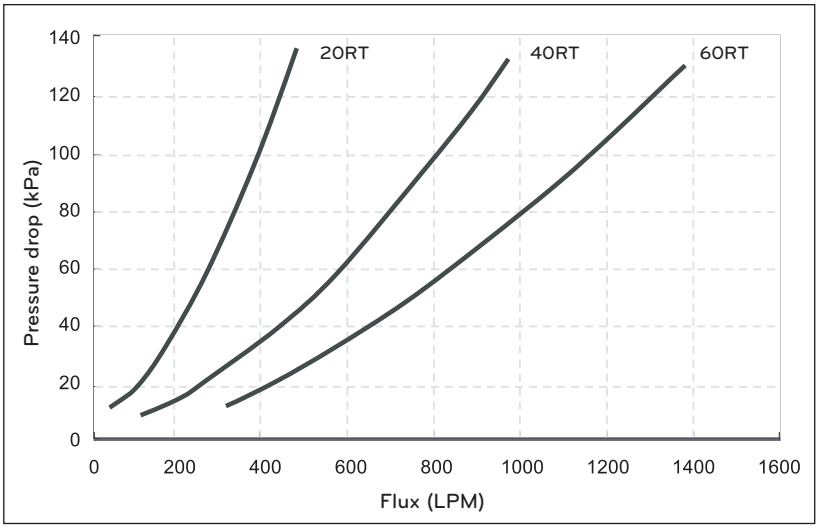
The display unit is not cooling model.

• 60RT(Main/Slave unit_Sub2 cycle)



Cold water head loss curve

ACAH Heat Exchanger Pressure Drop Graph



* LPM : Liter Per Minute

Modebus protocol

Coil Register

Register Address	Length	Meaning	
1-8	1 Octet	1-RA1	0: Stop 1: Start
		2-RA2	0: Maintain 1: Reset alarm
		3-RA3	0 : Maintain 1 : Accumulated Time delete
		Other	Reserved

Discrete Register

Register Address	Length	Meaning	
1-8	1 Octet	Other	Reserved
9-16	1 Octet	Other	Reserved
17-24	1 Octet	Other	Reserved
25-32	1 Octet	10025	0: Load water flow switch off 1: Load water flow switch on
		10026 (Reserved)	Reserved
		Other	Reserved
33-40	1 Octet	Other	Reserved
41-48	1 Octet	Other	Reserved
		10044	0: Load water pump output off 1: Load water pump output on
		10045 (Reserved)	Reserved
		Other	Reserved
49~56	1 Octet	Other	Reserved
		10054	0: Load water pump output off 1: Load water pump output on
		10055 (Reserved)	Reserved
		Other	Reserved
57-64	1 Octet	Other	Reserved
65-72	1 Octet	Other	Reserved
73-80	1 Octet	Other	Reserved
81-88	1 Octet	Other	Reserved
89-96	1 Octet	Other	Reserved

Register Address	Length	Meaning	
97-104	1 Octet	Other	Reserved
		10100	0 : Cycle#1 static speed compressor1 condition off 1 : Cycle#1 static speed compressor1 condition on
		10101	0 : Cycle#2 static speed compressor1 condition off 1 : Cycle#2 static speed compressor1 condition on
		10102	0 : Cycle#3 static speed compressor1 condition off 1 : Cycle#3 static speed compressor1 condition on
		10103 (Reserved)	Reserved
		10104	0 : Cycle#1 static speed compressor2 condition off 1 : Cycle#1 static speed compressor2 condition on
105-112	1 Octet	10105	0 : Cycle#2 static speed compressor2 condition off 1 : Cycle#2 static speed compressor2 condition on
		10106	0 : Cycle#3 static speed compressor2 condition off 1 : Cycle#3 static speed compressor2 condition on
		10107 (Reserved)	Reserved
		10108	0 : Cycle#1 4way valve condition off 1 : Cycle#1 4way valve condition on
		10109	0 : Cycle#2 4way valve condition off 1 : Cycle#2 4way valve condition on
		10110	0 : Cycle#3 4way valve condition off 1 : Cycle#3 4way valve condition on
		10111	Reserved
		Other	Reserved
		10112	0: Cycle #1 hot gas valve off 1: Cycle #1 hot gas valve on

Register Address	Length	Meaning	
113-120	1 Octet	10113	0: Cycle #2 hot gas valve off 1: Cycle #2 hot gas valve on
		10114	0: Cycle #3 hot gas valve off 1: Cycle #3 hot gas valve on
		10115 (Reserved)	Reserved
		10116	0 : Cycle#1 Oil return valve condition off 1 : Cycle#1 Oil return valve condition on
		10117	0 : Cycle#2 Oil return valve condition off 1 : Cycle#2 Oil return valve condition on
		10118	0 : Cycle#3 Oil return valve condition off 1 : Cycle#3 Oil return valve condition on
		10119	Reserved
		Other	Reserved

Input Register

Register Address	Length	Meaning
30001	2 Octet	Reserved
30002	2 Octet	Load water common pipe inlet water temperature
30003	2 Octet	Load water common pipe outlet water temperature
30004	2 Octet	Reserved
30005	2 Octet	Reserved
30006~30017	24 Octet	Reserved
30018	2 Octet	Outdoor temperature
30019	2 Octet	Reserved
30020	2 Octet	Cycle #1 load water outlet temperature
30021	2 Octet	Cycle #2 load water outlet temperature
30022	2 Octet	Cycle #3 load water outlet temperature
30023	2 Octet	Reserved
30024	2 Octet	Reserved
30025	2 Octet	Reserved
30026	2 Octet	Reserved
30027	2 Octet	Reserved
30028~30034	14 Octet	Reserved
30035	2 Octet	Cycle #1 high pressure
30036	2 Octet	Cycle #2 low pressure
30036~30093	114 Octet	Reserved
30094	2 Octet	Start delay time
30095	2 Octet	Reserved
30100	2 Octet	Error code
30101	2 Octet	Error product
30102	2 Octet	Error cycle
30103~30107	10 Octet	Reserved
30108	2 Octet	Product accumulated operation time top
30109	2 Octet	Product accumulated operation time bottom
30110~30199	178 Octet	Reserved

Register Address	Length	Meaning
30200	2 Octet	Cycle #1 inverter compressor operating condition
30201	2 Octet	Cycle #2 inverter compressor operating condition
30202	2 Octet	Cycle #3 inverter compressor operating condition
30203	2 Octet	Reserved
30204	2 Octet	Cycle #1 condenser temperature
30205	2 Octet	Cycle #2 condenser temperature
30206	2 Octet	Cycle #3 condenser temperature
30207	2 Octet	Reserved
30208	2 Octet	Cycle #1 evaporator temperature
30209	2 Octet	Cycle #2 evaporator temperature
30210	2 Octet	Cycle #3 evaporator temperature
30211	2 Octet	Reserved
30212	2 Octet	Cycle #1 inverter compressor discharge temperature
30213	2 Octet	Cycle #2 inverter compressor discharge temperature
30214	2 Octet	Cycle #3 inverter compressor discharge temperature
30215	2 Octet	Reserved
30216	2 Octet	Cycle #1 suction temperature
30217	2 Octet	Cycle #2 suction temperature
30218	2 Octet	Cycle #3 suction temperature
30219	2 Octet	Reserved
30220	2 Octet	Cycle #1 EEV
30221	2 Octet	Cycle #2 EEV
30222	2 Octet	Cycle #3 EEV
30223	2 Octet	Reserved
30224	2 Octet	Cycle #1 Cooling standard condenser pip temperature (Left side)
30225	2 Octet	Cycle #2 Cooling standard condenser pip temperature (Left side)
30226	2 Octet	Cycle #3 Cooling standard condenser pip temperature (Left side)
30227	2 Octet	Reserved
30228	2 Octet	Cycle #1 liquid pipe temperature
30229	2 Octet	Cycle #2 liquid pipe temperature
30230	2 Octet	Cycle #3 liquid pipe temperature

Register Address	Length	Meaning
30231	2 Octet	Reserved
30232	2 Octet	Cycle#1 CT current
30233	2 Octet	Cycle#2 CT current
30234	2 Octet	Cycle#3 CT current
30235	2 Octet	Reserved
30236	2 Octet	Cycle #1 static speed compressor 1 discharge temperature
30237	2 Octet	Cycle #2 static speed compressor 1 discharge temperature
30238	2 Octet	Cycle #3 static speed compressor 1 discharge temperature
30239	2 Octet	Reserved
30240	2 Octet	Cycle #1 static speed compressor 2 discharge temperature
30241	2 Octet	Cycle #2 static speed compressor 2 discharge temperature
30242	2 Octet	Cycle #3 static speed compressor 2 discharge temperature
30243	2 Octet	Reserved
30244	2 Octet	Cycle #2 high pressure
30245	2 Octet	Cycle #2 low pressure
30246	2 Octet	Cycle #3 high pressure
30247	2 Octet	Cycle #3 low pressure
30248	2 Octet	Reserved
30249	2 Octet	Reserved
30250	2 Octet	Cycle#1 Cooling standard condenser pip temperature (Right side)
30251	2 Octet	Cycle#2 Cooling standard condenser pip temperature (Right side)
30252	2 Octet	Cycle#3Cooling standard condenser pip temperature (Right side)
30253	2 Octet	Reserved

Holding Register

Register Address	Length	Meaning
40001	2 Octet	Demand Limit (0:Not Used ,10%~140%)
40008	2 Octet	Control Mode (Remote/Local)
40011	2 Octet	Cooling Target Temperature
40100	2 Octet	Remote Mode (Contact/Modbus)
40101	2 Octet	Mode (Cooling/Heating)
40104	2 Octet	Heating Target Temperature

Check List

1 Project information

Content	Information
Project name	
Address	
Installed by	
Sold by	
Test run by	

2 Model information

Content	Information		
Product	Model name: Serial:	Model name: Serial:	Model name: Serial:
Compressor A	Model name: Serial:	Model name: Serial:	Model name: Serial:
Compressor B	Model name: Serial:	Model name: Serial:	Model name: Serial:
Compressor C	Model name: Serial:	Model name: Serial:	Model name: Serial:

3 Preparation checklist

Content	Check	
Is there any damage?	Yes	No
Is the bolt/nut assembled properly?	Yes	No
Does the power specification match the product specification?	Yes	No
Is the wiring done accurately?	Yes	No
Is the product installed correctly?	Yes	No
Are the protective devices of the electric circuit installed correctly in accordance with the specification?	Yes	No
Are all the terminal blocks connected properly?	Yes	No
Are all plugs connected properly?	Yes	No

4 Check cold water system

Content	Check	
Are all valves connected to the chiller open?	Yes	No
Are all pipes connected accurately?	Yes	No
Is there any clog for drain pipe?	Yes	No
Is there any leakage?	Yes	No
Is the air within the system well discharged?	Yes	No
Is the cold water pump operating properly?	Yes	No
Is the cold water pump starter connected to the chiller properly?	Yes	No
Is the cold water flux switch operating?	Yes	No
Is the strainer installed on the pipe to the evaporator?	Yes	No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