

# Air-Conditioners For Building Application INDOOR UNIT



## **CMB-WM108V-AA, CMB-WM1016V-AA CMB-WM108V-AB, CMB-WM1016V-AB**

### INSTALLATION MANUAL

For safe and correct use, please read this installation manual thoroughly before installing the air-conditioner unit.

### INSTALLATIONSHANDBUCH

Zum sicheren und ordnungsgemäßen Gebrauch der Klimageräte das Installationshandbuch gründlich durchlesen.

### MANUEL D'INSTALLATION

Veuillez lire le manuel d'installation en entier avant d'installer ce climatiseur pour éviter tout accident et vous assurer d'une utilisation correcte.

### INSTALLATIEHANDLEIDING

Voor een veilig en juist gebruik moet u deze installatiehandleiding grondig doorlezen voordat u de airconditioner installeert.

### MANUAL DE INSTALACIÓN

Para un uso seguro y correcto, lea detalladamente este manual de instalación antes de montar la unidad de aire acondicionado.

### MANUALE DI INSTALLAZIONE

Per un uso sicuro e corretto, leggere attentamente questo manuale di installazione prima di installare il condizionatore d'aria.

### ΕΓΧΕΙΡΙΔΙΟ ΟΔΗΓΙΩΝ ΕΓΚΑΤΑΣΤΑΣΗΣ

Για ασφάλεια και σωστή χρήση, παρακαλείστε διαβάσετε προσεκτικά αυτό το εγχειρίδιο εγκατάστασης πριν αρχίσετε την εγκατάσταση της μονάδας κλιματισμού.

### MANUAL DE INSTALAÇÃO

Para segurança e utilização correctas, leia atentamente este manual de instalação antes de instalar a unidade de ar condicionado.

### INSTALLATIONSMANUAL

Læs venligst denne installationsmanual grundigt, før De installerer aircondition anlægget, af hensyn til sikker og korrekt anvendelse.

### INSTALLATIONSHANDBOK

Läs den här installationshandboken noga innan luftkonditioneringsenheten installeras, för säker och korrekt användning.

### MONTAJ ELKİTABI

Emniyetli ve doğru biçimde nasıl kullanılacağını öğrenmek için lütfen klima cihazını monte etmeden önce bu elkitabını dikkatle okuyunuz.

### РЪКОВОДСТВО ЗА МОНТАЖ

За безопасна и правилна употреба, моля, прочетете внимателно това ръководство преди монтажа на климатизатора.

### PODRECZNIK INSTALACJI

W celu bezpiecznego i poprawnego korzystania należy przed zainstalowaniem klimatyzatora dokładnie zapoznać się z niniejszym podręcznikiem instalacji.

### INSTALLASJONSHÅNDBOK

For sikker og riktig bruk, skal du lese denne installasjonshåndboken nøye før du installerer klimaanlegget.

### РУКОВОДСТВО ПО УСТАНОВКЕ

Для осторожного и правильного использования прибора необходимо тщательно ознакомиться с данным руководством по установке до выполнения установки кондиционера.

### PRÍRUČKA K INSTALACI

V zájmu bezpečného a správneho používání si před instalací klimatizační jednotky důkladně pročtěte tuto příručku k instalaci.

### NÁVOD NA INŠTALÁCIU

Pre bezpečné a správne použitie si pred inštalovaním klimatizačnej jednotky, prosím, starostlivo prečítajte tento návod na inštaláciu.

### TELEPÍTÉSI KÉZIKÖNYV

A biztonságos és helyes használatához, kérjük, olvassa el alaposan ezt a telepítési kézikönyvet, mielőtt telepítené a légkondicionáló egységet.

### PRIROČNIK ZA NAMESTITEV

Za varno in pravilno uporabo pred namestitvijo klimatske naprave skrbno preberite priročnik za namestitev.

### MANUAL CU INSTRUCȚIUNI DE INSTALARE

Pentru o utilizare corectă și sigură, vă rugăm să citiți cu atenție acest manual înainte de a instala unitatea de aer condiționat.

### PRIRUČNIK ZA UGRADNJU

Radi sigurne i ispravne uporabe, temeljito pročítajte ovaj priručnik prije ugradnje klimatizacijskog uređaja.

### 安装手册

为了安全和正确地使用本空调器，请在安装前仔细阅读本安装手册。

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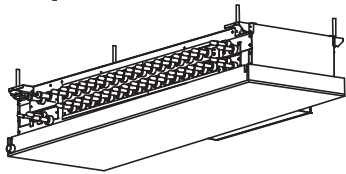
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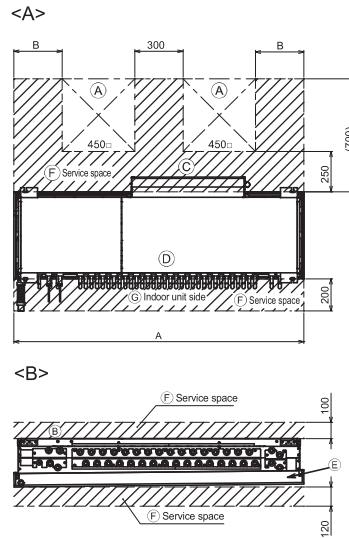
[Fig. 2.2.1]



- (A) Inspection hole
- (B) Side of outdoor unit piping
- (C) Control box
- (D) Side of indoor unit piping
- (E) Water inlet
- (F) Service space
- (G) Indoor unit side

\*1 Dimensions with which pipe connection can be handled at site

[Fig. 2.3.1]



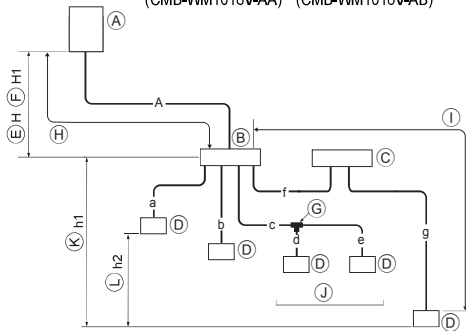
<A> Top view  
<B> Front view  
(Unit: mm)

Model name	A	B
CMB-WM108V-AA	1520	160
CMB-WM1016V-AA	1800	300
CMB-WM108V-AB	1520	160
CMB-WM1016V-AB	1520	160

2.4

[Fig. 2.4.1]

CMB-WM108V-AA + CMB-WM108V-AB  
(CMB-WM1016V-AA) (CMB-WM1016V-AB)



- (A) Outdoor unit
- (B) Main-HBC controller
- (C) Sub-HBC controller
- (D) Indoor unit
- (E) Less than H=50 m (when the outdoor unit is higher than HBC)
- (F) Less than H1=40 m (when the outdoor unit is lower than HBC)
- (G) Twinning pipe (field supply)
- (H) Less than 110 m
- (I) Less than 60 m
- (J) Up to three units for 1 branch port  
Total capacity: less than 80 (but in same mode, cooling/heating)
- (K) Less than 15 m
- (L) Less than 15 m

Notes:

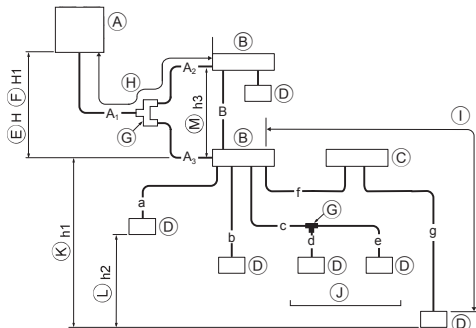
\*1 Indoor units that are connected to the same branch joint cannot be simultaneously operated in different operation modes.

(Unit: m)

Item		Piping portion	Allowable value
Pipe Lengths	Between outdoor unit and HBC controller (refrigerant pipework)	A	110 or less
	Water pipework between indoor units and HBC controller	f + g	60 or less
Difference of elevation	Between indoor and outdoor units	Above outdoor unit	H
		Below outdoor unit	H1
Difference of elevation	Between indoor units and HBC controller	h1	15 or less
	Between indoor units	h2	15 or less

[Fig. 2.4.2]

CMB-WM108V-AA + CMB-WM108V-AB  
(CMB-WM1016V-AA) (CMB-WM1016V-AB)

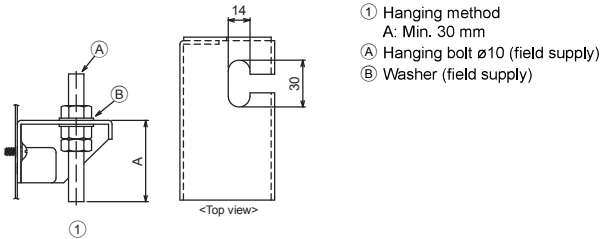


- (A) Outdoor unit
- (B) Main-HBC controller
- (C) Sub-HBC controller
- (D) Indoor unit
- (E) Less than H=50 m (when the outdoor unit is higher than the indoor unit)
- (F) Less than H1=40 m (when the outdoor unit is lower than the indoor unit)
- (G) Twinning pipe (field supply)
- (H) Less than 110 m
- (I) Less than 60 m
- (J) Up to three units for 1 branch port  
Total capacity: less than 80 (but in same mode, cooling/heating)
- (K) Less than 15 m
- (L) Less than 15 m
- (M) Less than 15 m

(Unit: m)

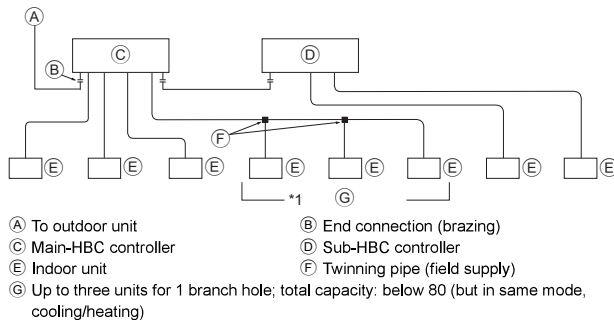
Item		Piping portion	Allowable value
Pipe Lengths	Between outdoor unit and HBC controller (refrigerant pipework)	A <sub>1</sub> + A <sub>2</sub> + A <sub>3</sub>	110 or less
	Water pipework between indoor units and HBC controller	f + g	60 or less
	Between HBC controllers	B	40 or less
Difference of elevation	Between indoor and outdoor units	Above outdoor unit	H
		Below outdoor unit	H1
Difference of elevation	Between indoor units and HBC controller	h1	15 or less
	Between indoor units	h2	15 or less
	Between HBC controllers	h3	15 or less

[Fig. 3.2.1]



[Fig. 4.1.2]

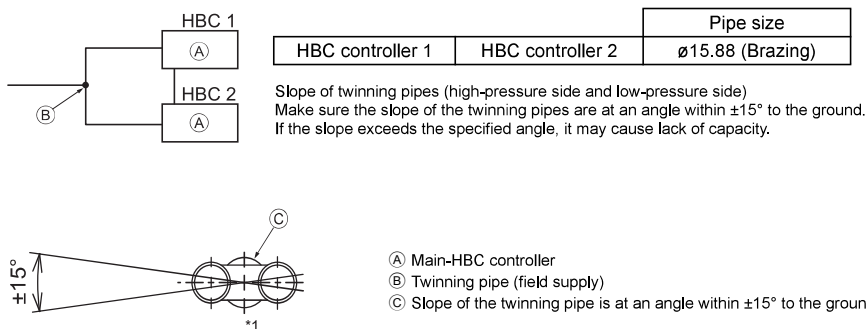
		HBC CONTROLLER		
Unit model	Model name	High pressure side	Low pressure side	
Outdoor unit side	PURY-(E)P200	$\phi 15.88$ (Brazing)	$\phi 19.05$ (Brazing)	
	PURY-(E)P250	$\phi 19.05$ (Brazing)	$\phi 22.2$ (Brazing)	
	PURY-(E)P300	$\phi 19.05$ (Brazing)	$\phi 22.2$ (Brazing)	
	PURY-(E)P350	$\phi 19.05$ (Brazing)	$\phi 28.58$ (Brazing)	
	PURY-(E)P400	$\phi 15.88$ (Brazing) for each HBC	$\phi 19.05$ (Brazing) for each HBC	
	PURY-(E)P450	$\phi 15.88$ (Brazing) for each HBC	$\phi 22.2$ (Brazing) for each HBC	
	PURY-(E)P500	$\phi 19.05$ (Brazing) for each HBC	$\phi 22.2$ (Brazing) for each HBC	
	PURY-(E)M200	CMB-WM108V-AA *2	$\phi 15.88$ (Brazing)	$\phi 19.05$ (Brazing)
	PURY-(E)M250		$\phi 15.88$ (Brazing)	$\phi 22.2$ (Brazing)
	PURY-(E)M300		$\phi 15.88$ (Brazing)	$\phi 22.2$ (Brazing)
	PURY-(E)M350		$\phi 15.88$ (Brazing)	$\phi 28.58$ (Brazing)
	PURY-(E)M400		$\phi 15.88$ (Brazing) for each HBC	$\phi 19.05$ (Brazing) for each HBC
	PURY-(E)M450		$\phi 15.88$ (Brazing) for each HBC	$\phi 22.2$ (Brazing) for each HBC
	PURY-(E)M500		$\phi 15.88$ (Brazing) for each HBC	$\phi 22.2$ (Brazing) for each HBC



**Note:**

- Be sure to use non-oxidative brazing.
- \*1. Connection of multiple indoor units with one connection (or joint pipe)
  - Total capacity of connectable indoor units: Less than 80
  - Number of connectable indoor units: Maximum 3 Sets
  - Twinning pipe is field supplied.
- \*2. PURY-(E)P-400YNW/PURY-(E)M400YNW model or larger requires a connection of two main-HBC controllers in parallel.

[Fig. 4.2.1]



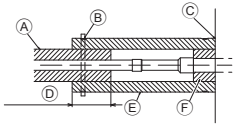
**Note:**

- \*1. Straight run of pipe connecting twinning pipe is 500 mm or more.

[Fig. 4.2.2]



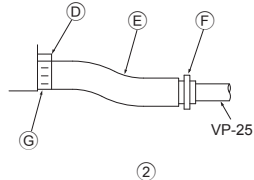
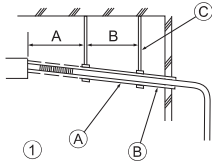
[Fig. 4.3.1]



- (A) Locally procured insulating material for pipes
- (B) Bind here using band or tape.
- (C) Do not leave any opening.
- (D) Lap margin: more than 40 mm
- (E) Insulating material (field supply)
- (F) Unit side insulating material

4.4

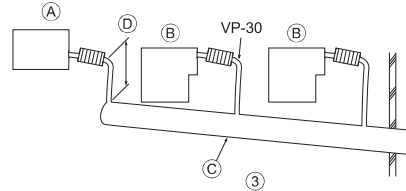
[Fig. 4.4.1]



A: 25 cm      B: 1.5 – 2 m

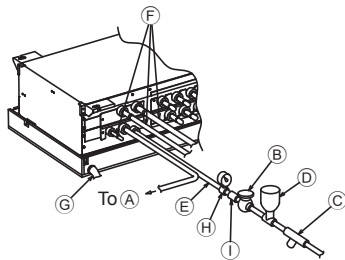
- (A) Downward gradient of more than 1/100
- (B) Insulating material
- (C) Supporting bracket
- (D) Drain discharge port
- (E) Drain hose (200 mm long, accessory)
- (F) Cable tie (accessory)
- (G) Hose band (accessory)

[Fig. 4.4.2]



- (A) Main-HBC controller/Sub-HBC controller
- (B) Indoor unit
- (C) Collecting pipe
- (D) Please ensure this length is at least 100 mm.

[Fig. 5.1.1]



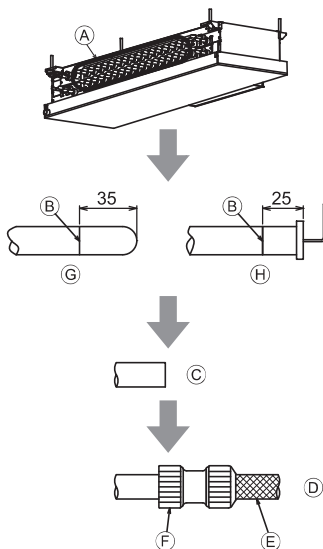
**HBC controller sample installation (\*1)**

- (A) Expansion vessel (field supply)
- (B) Shutoff valve (field supply)
- (C) Strainer (field supply)
- (D) Pressure reducing valve (field supply)
- (E) Water inlet
- (F) Refrigerant pipes
- (G) Drain pipe
- (H) Pressure gauge (field supply)
- (I) Check valve (field supply)

**Note:**

\*1. Connect the pipes to the water pipes according to the local regulations.

[Fig. 5.1.2]



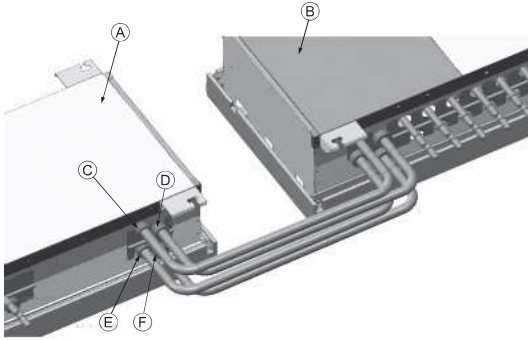
- (A) Indoor unit connection
- (B) Cutting point
- (C) Cut the piping at the cutting point
- (D) Field pipe connection (field supply)
- (E) Field pipe
- (F) Pipe connection (field supply)
- (G) Indoor unit and Sub-HBC connecting port
- (H) Water inlet (EXP. VESSEL)

**Note:**

• Remove burr after cutting the piping to prevent entering the pipe connection.

Check that there is no crack at the edge of the piping.

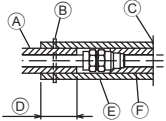
[Fig. 5.1.3]



- Ⓐ HBC controller
- Ⓑ Sub-HBC controller
- Ⓒ To Sub-HBC controller (Hot water)
- Ⓓ From Sub-HBC controller (Hot water)
- Ⓔ To Sub-HBC controller (Cold water)
- Ⓕ From Sub-HBC controller (Cold water)

5.2

[Fig. 5.2.1]

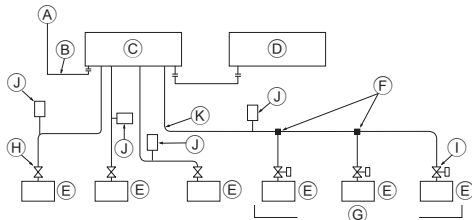


- Ⓐ Locally procured insulating material for pipes
- Ⓑ Bind here using band or tape.
- Ⓒ Do not leave any opening.
- Ⓓ Lap margin: more than 40 mm
- Ⓔ Insulating material (field supply)
- Ⓕ Unit side insulating material

[Fig. 5.2.2]

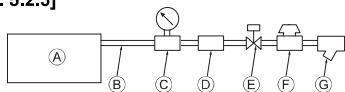
Indoor unit	Connection size		Pipe size	
	Water inlet	Water outlet	Water out	Water return
PEFY-W-VMA	O.D. 22.0 mm	O.D. 22.0 mm	I.D. 20 mm	I.D. 20 mm

\* For other indoor units, refer to the indoor unit installation manual.  
 \* The pipe diameter depends on the capacity of indoor units.  
 Refer to the indoor unit installation manual for details.



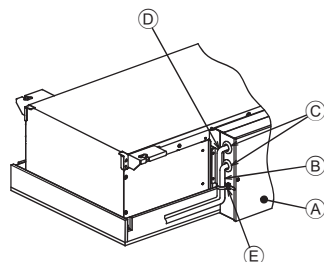
- Ⓐ To outdoor unit
- Ⓑ End connection (brazing)
- Ⓒ Main-HBC controller
- Ⓓ Sub-HBC controller
- Ⓔ Indoor unit
- Ⓕ Twinning pipe (field supply)
- Ⓖ Up to three units for 1 branch hole; total capacity: below 80 (but in same mode, cooling/heating)
- Ⓗ Shutoff valve (field supply)
- Ⓙ Pressure control valve (field supply)
- Ⓚ Auto air vent valve (Highest point on the water pipe for each branch) (field supply)
- Ⓛ Water pipework

[Fig. 5.2.3]



- Ⓐ HBC controller
- Ⓑ Water pipe
- Ⓒ Pressure gauge (field supply)
- Ⓓ Check valve (field supply)
- Ⓔ Shutoff valve (field supply)
- Ⓕ Pressure reducing valve (field supply)
- Ⓖ Strainer (field supply)

[Fig. 6.0.1]



- CMB-WM108V-AA, CMB-WM1016V-AA  
 CMB-WM108V-AB, CMB-WM1016V-AB
- Ⓐ Control box
  - Ⓑ Power source wiring
  - Ⓒ ø21 hole (closed rubber bushing)
  - Ⓓ Transmission wiring
  - Ⓔ Clip cables here

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## 1. Safety precautions

### 1.1. Before installation and electric work

- ▶ Before installing the unit, make sure you read all the “Safety precautions”.
- ▶ The “Safety precautions” provide very important points regarding safety. Make sure you follow them.

#### Symbols used in the text





##### **Warning:**

Describes precautions that should be observed to prevent danger of injury or death to the user.

##### **Caution:**

Describes precautions that should be observed to prevent damage to the unit.

#### Symbols used in the illustrations

-  : Indicates an action that must be avoided.
-  : Indicates that important instructions must be followed.
-  : Indicates a part which must be grounded.
-  : Beware of electric shock. (This symbol is displayed on the main unit label.)  
<Color: Yellow>

##### **Warning:**

**Carefully read the labels affixed to the main unit.**

##### **HIGH VOLTAGE WARNING:**

- Control box houses high-voltage parts.
- When opening or closing the front panel of the control box, do not let it come into contact with any of the internal components.
- Before inspecting the inside of the control box, turn off the power, keep the unit off for at least 10 minutes.

##### **Warning:**

- Ask the dealer or an authorized technician to install the air conditioner.
  - Improper installation by the user may result in water leakage, electric shock, or fire.
- Install the unit at a place that can withstand its weight.
  - Failure to do so may cause the unit to fall down, resulting in injuries and damage to the unit.
- Use the specified cables for wiring. Make the connections securely so that the outside force of the cable is not applied to the terminals.
  - Inadequate connection and fastening may generate heat and cause a fire.
- Prepare for earthquakes and install the unit at the specified place.
  - Improper installation may cause the unit to fall down and result in injury and damage to the unit.
- Always use accessories specified by Mitsubishi Electric.
  - Ask an authorized technician to install the accessories. Improper installation by the user may result in water leakage, electric shock, or fire.
- Never repair the unit. If the air conditioner must be repaired, consult the dealer.
  - If the unit is repaired improperly, water leakage, electric shock, or fire may result.
- If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.
- If refrigerant gas leaks during installation work or service, ventilate the room.
  - If the refrigerant gas comes into contact with a flame, poisonous gases will be released.

- Install the air conditioner according to this Installation Manual.
  - If the unit is installed improperly, water leakage, electric shock, or fire may result.
- Do not modify or adjust safety protection devices.
  - Shorting of pressure or temperature switches to force operation may lead to damage, fire, explosions etc...
  - Do not change the set values as this may lead to damage, fire, explosions etc...
  - Use of any product except that specified by this company may lead to damage, fire, explosions etc...
- Do not spray water on electrical parts.
  - This could lead to shorting, fire, smoke, electrical shock, unit failure etc...
- Do not create a situation where the refrigeration circuit is sealed yet incomplete with oil or refrigerant in the system.
  - This may result in an explosion.
- Do not touch electrical components during or directly after operation.
  - This may lead to burns.
- Put covers on control and terminal boxes.
  - Shock due to ingress of dust, water, smoke, fire etc. may result.
  - During refrigerant recovery or purge, fire may result.
- Do not operate with guards or panels removed.
  - Injury due to rotating parts, electric shock due to high voltage or burns due to high temperatures may result.
- Do not sit, ride or place objects on the unit.
  - Injury due to the unit falling may result.
- Use the appropriate safety gear.
  - High voltages may result in electric shock.
  - Hot parts may result in burns.
- Recover the refrigerant in the unit.
  - Reuse the refrigerant or have it disposed of by a specialist.
  - Release of refrigerant may damage the environment.
- Clear the pipework of remnant gas and oil.
  - Failure to do so could lead to an eruption of flames and burns if the pipework is heated.
- Vacuum dry the refrigerant pipework. Do not replace with a refrigerant that has not been specified.
  - This could lead to explosions, fire.
- Do not touch the onsite pipework ends.
  - This could damage the pipework leading to refrigerant leaks and oxygen deficiency.
- Have all electric work done by a licensed electrician according to “Electric Facility Engineering Standard” and “Interior Wire Regulations” and the instructions given in this manual and always use a dedicated power supply.
  - If the power source capacity is inadequate or electric work is performed improperly, electric shock and fire may result.
- Securely install the cover of control box.
  - If the cover is not installed properly, dust or water may enter the outdoor unit and fire or electric shock may result.
- When installing and moving the air conditioner to another site, do not charge it with a refrigerant different 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.
- If the air conditioner is installed in a small room, measures must be taken to prevent the refrigerant concentration from exceeding the safety limit if the refrigerant should leak.
  - 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.
- When moving and reinstalling the air conditioner, consult the dealer or an authorized technician.
  - If the air conditioner is installed improperly, water leakage, electric shock, or fire may result.



- **After completing installation work, make sure that refrigerant gas is not leaking.**
  - If the refrigerant gas leaks and is exposed to a fan heater, stove, oven, or other heat source, it may generate noxious gases.
- **Do not reconstruct or change the settings of the protection devices.**
  - If the pressure switch, thermal switch, or other protection device is shorted or operated forcibly, or parts other than those specified by Mitsubishi Electric are used, fire or explosion may result.
- **To dispose of this product, consult your dealer.**
- **The installer and system specialist shall secure safety against leakage according to local regulation or standards.**
  - Choose the appropriate wire size and the switch capacities for the main power supply described in this manual if local regulations are not available.
- **Pay special attention to the place of installation, such as basement, etc. where refrigeration gas can accumulate, since refrigerant is heavier than the air.**
- **This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.**
- **Children should be supervised to ensure that they do not play with the appliance.**
- **This appliance is intended to be used by expert or trained users in shops, in light industry and on farms, or for commercial use by lay persons.**

## 1.2. Precautions for devices that use R410A and R32 refrigerants

### ⚠ Caution:

- **Do not use existing refrigerant piping.**
  - The old refrigerant and refrigerant oil in the existing piping contain a large amount of chlorine which may cause the refrigerant oil of the new unit to deteriorate.
  - R410A and R32 are high-pressure refrigerants and can cause the existing piping to burst.
- **Use refrigerant piping made of phosphorus deoxidized copper and copper alloy seamless pipes and tubes. In addition, be sure that the inner and outer surfaces of the pipes are clean and free of hazardous sulphur, oxides, dust/dirt, shaving particles, oils, moisture, or any other contaminant.**
  - Contaminants on the inside of the refrigerant piping may cause the refrigerant residual oil to deteriorate.
- **Store the piping to be used during installation indoors and keep both ends of the piping sealed until just before brazing. (Store elbows and other joints in a plastic bag.)**
  - If dust, dirt, or water enters the refrigerant cycle, deterioration of the oil and compressor failure may result.
- **Apply a small amount of ester oil, ether oil, or alkyl benzene to flares. (for indoor unit)**
  - Infiltration of a large amount of mineral oil may cause the refrigerant oil to deteriorate.
- **Do not use a refrigerant other than R410A or R32.**
  - If another refrigerant (R22, etc.) is mixed with R410A or R32, the chlorine in the refrigerant may cause the refrigerant oil to deteriorate.
- **Use a vacuum pump with a reverse flow check valve.**
  - The vacuum pump oil may flow back into the refrigerant cycle and cause the refrigerant oil to deteriorate.
- **Do not use the following tools that are used with conventional refrigerants. (Gauge manifold, charge hose, gas leak detector, reverse flow check valve, refrigerant charge base, refrigerant recovery equipment)**
  - If the conventional refrigerant and refrigerant oil are mixed in the R410A or R32, the refrigerant may deteriorate.
  - If water is mixed in the R410A or R32, the refrigerant oil may deteriorate.
  - Since R410A or R32 does not contain any chlorine, gas leak detectors for conventional refrigerants will not react to it.
- **Refrigerant R32 is flammable. Do not use a naked-flame type detector.**
- **Do not use a charging cylinder.**
  - Using a charging cylinder may cause the refrigerant to deteriorate.
- **Do not use antioxidant or leak-detection additive.**
- **Be especially careful when managing the tools.**
  - If dust, dirt, or water gets into the refrigerant cycle, the refrigerant may deteriorate.

## 1.3. Before installation

### ⚠ Caution:

- **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 use the air conditioner where food, pets, plants, precision instruments, or artwork are kept.**
  - The quality of the food, etc. may deteriorate.
- **Do not use the air conditioner in special environments.**
  - Oil, steam, sulfuric smoke, etc. can significantly reduce the performance of the air conditioner or damage its parts.

- **When installing the unit in a hospital, communication station, or similar place, provide sufficient protection against noise.**
  - Sound pressure level does not exceed 70 dB(A). However, inverter equipment, private power generator, high-frequency medical equipment, or radio communication equipment may cause the air conditioner to operate erroneously, or fail to operate. On the other hand, the air conditioner may affect such equipment by creating noise that disturbs medical treatment or image broadcasting.
- **Do not install the unit on or over things that are subject to water damage.**
  - When the room humidity exceeds 80 % or when the drain pipe is clogged, condensation may drip from the indoor unit or HBC controller. Perform collective drainage work together with the outdoor unit, as required.
- **Do not install the unit where corrosive gas may be generated.**
  - Doing so can corrode the pipes, resulting in refrigerant leakage and fire.
- **Check that markings of the unit are not illegible.**
  - Illegible warning or caution markings may cause damage to the unit, resulting in injury.

## 1.4. Before installation (relocation) - electrical work

### ⚠ Caution:

- **Ground the unit.**
  - Do not connect the ground wire to gas or water pipes, lightning rods, or telephone ground lines. Improper grounding may result in electric shock.
- **Install the power cable so that tension is not applied to the cable.**
  - Tension may cause the cable to break and generate heat and cause a fire.
- **Install a leak circuit breaker, as required.**
  - If a leak circuit breaker is not installed, electric shock may result.
- **Use power line cables of sufficient current carrying capacity and rating.**
  - Cables that are too small may leak, generate heat, and cause a fire.
- **Use only a circuit breaker and fuse of the specified capacity.**
  - A fuse or circuit breaker of a larger capacity, or the use of substitute simple steel or copper wire may result in a general unit failure or fire.
- **Do not wash the air conditioner units.**
  - Washing them may cause an electric shock.
- **Be careful that the installation base is not damaged by long use.**
  - If the damage is left uncorrected, the unit may fall and cause personal injury or property damage.
- **Install the drain piping according to this Installation Manual to ensure proper drainage. Wrap thermal insulation around the pipes to prevent condensation.**
  - Improper drain piping may cause water leakage causing damage to furniture and other possessions.
- **Be very careful about transporting the product.**
  - One person should not carry the product. Its weight is in excess of 20 kg.
  - Some products use PP bands for packaging. Do not use any PP bands as a means of transportation. It is dangerous.
- **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 will not play with them. If children play with a plastic bag which has not been torn apart, they face the risk of suffocation.

## 1.5. Before starting the test run

### ⚠ Caution:

- **Turn on the power at least 12 hours before starting operation.**
  - Starting operation immediately after turning on the main power switch can result in irreversible damage to internal parts. Keep the power switch turned on during the operational season.
- **Do not touch the switches with wet fingers.**
  - Touching a switch with wet fingers can result in an electric shock.
- **Do not touch the refrigerant pipes during and immediately after operation.**
  - During and immediately after operation, the refrigerant pipes may be hot or cold, depending on the condition of the refrigerant flowing through the refrigerant piping, compressor, and other refrigerant cycle parts. Your hands may suffer burns or frostbite if you touch the refrigerant pipes.
- **Do not operate the air conditioner with the panels and guards removed.**
  - Rotating, hot, or high-voltage parts can cause injuries.
- **Do not turn off the power immediately after stopping operation.**
  - Always wait at least 5 minutes before turning off the power. Otherwise, drainage water leakage or mechanical failure of sensitive parts may occur.
- **Check for refrigerant leaks before service.**
  - If the refrigerant leaks, fire may result.

## 2. Selecting an installation site

### 2.1. About the product

- This unit uses R410A-type or R32-type refrigerant.
- Indoor units that are all WP or all W models are connectable to the HBC controller.
- Piping for systems using R410A or R32 may be different from that for systems using conventional refrigerant because the design pressure in systems using R410A or R32 is higher. Refer to the Data Book for more information.
- Some of the tools and equipment used for installation with systems that use other types of refrigerant cannot be used with the systems using R410A or R32. Refer to the Data Book for more information.
- Do not use the existing piping, as it contains chlorine, which is found in conventional refrigerating machine oil and refrigerant. This chlorine will deteriorate the refrigerant machine oil in the new equipment. The existing piping must not be used as the design pressure in systems using R410A or R32 is higher than that in the systems using other types of refrigerant and the existing pipes may burst.

### 2.2. Installation site

- Install the unit in a place not exposed to rain. The HBC controller is designed to be installed indoors.
  - Install the unit with adequate space around it for servicing.
  - Do not install the unit in a place that would result in the piping length restrictions being exceeded.
  - Check for refrigerant leaks before service.
    - If the refrigerant leaks, fire may result.
  - Install or store the unit in a place not exposed to direct radiant heat from other heat sources or naked flame or other ignition sources.
  - Do not install the unit in any oily steamy place or near any machine that generates high frequencies. Doing so may cause a risk of fire, erroneous operation or condensation.
  - Depending on the operation conditions, HBC unit generates noise caused by valve actuation, refrigerant flow, and pressure changes even when operating normally. Therefore install the unit in places such as ceilings of corridor, restrooms and plant rooms.
  - Install indoor unit and HBC controller at least 5 m away from each other when installed in a space with low background noise, e.g., hotel rooms.
  - Allow enough space and access to ensure water piping, refrigerant piping and electrical wiring can be easily connected.
  - Avoid places exposed to the generation, inflow, accumulation or leakage of flammable and sulfuric gases.
  - Ensure a downward gradient of at least 1/100 for drain piping.
  - Properly install the unit on a stable, load-bearing surface.
- 1. For hanging from the ceiling [Fig. 2.2.1] (P.2)**
- Provide 2 inspection holes 450 mm square in the ceiling surface as shown in [Fig. 2.3.1] (P.2).
  - Install the unit in a suitable location (such as in the ceiling of a corridor or in the bathroom etc) away from places regularly occupied. Avoid installing in the center of a room.
  - Ensure hanging bolts are of sufficient pull out strength.

#### ⚠ Warning:

Be sure to install the unit in a place that can sustain the entire weight. If there is a lack of strength, it may cause the unit to fall down, resulting in an injury.

#### ⚠ Caution:

- Be sure to install the unit horizontally.
  - Install the HBC level (less than 1° tilt), so that the drain pan can function correctly.
- Install the HBC in an environment where the temperature is always above 0°C.

### 2.3. Securing installation and service space

#### 1. For hanging from the ceiling

(This is a reference view showing the least installation space.)

[Fig. 2.3.1] (P.2)

- <A> Top view  
 (A) Inspection hole  
 (C) Control box  
 (E) Water inlet  
 (G) Indoor unit side
- <B> Front view  
 (B) Side of outdoor unit piping  
 (D) Side of indoor unit piping  
 (F) Service space

\*1 Dimensions with which pipe connection can be handled at site

Model name	A	B
CMB-WM108V-AA	1520	160
CMB-WM1016V-AA	1800	300
CMB-WM108V-AB	1520	160
CMB-WM1016V-AB	1520	160

### 2.4. Checking the installation site

Check that the difference of elevation between indoor and outdoor units and the length of refrigerant piping are within the following limitations.

#### 1. CMB-WM108V-AA + CMB-WM108V-AB (CMB-WM1016V-AA) (CMB-WM1016V-AB)

[Fig. 2.4.1] (P.2)

- (A) Outdoor unit  
 (C) Sub-HBC controller  
 (E) Less than H=50 m (when the outdoor unit is higher than HBC)  
 (F) Less than H1=40 m (when the outdoor unit is lower than HBC)  
 (G) Twinning pipe (field supply)  
 (H) Less than 110 m  
 (J) Up to three units for 1 branch port  
 Total capacity: less than 80 (but in same mode, cooling/heating)  
 (K) Less than 15 m
- (B) Main-HBC controller  
 (D) Indoor unit  
 (I) Less than 60 m  
 (L) Less than 15 m

(Unit: m)

	Item	Piping portion	Allowable value	
Pipe Lengths	Between outdoor unit and HBC controller (refrigerant pipework)	A	110 or less	
	Water pipework between indoor units and HBC controller	f + g	60 or less	
Difference of elevation	Between indoor and outdoor units	Above outdoor unit	H	50 or less
		Below outdoor unit	H1	40 or less
	Between indoor units and HBC controller	h1	15 or less	
	Between indoor units	h2	15 or less	

#### Notes:

\*1 Indoor units that are connected to the same branch joint cannot be simultaneously operated in different operation modes.

#### 2. CMB-WM108V-AA + CMB-WM108V-AB (CMB-WM1016V-AA) (CMB-WM1016V-AB)

[Fig. 2.4.2] (P.2)

- (A) Outdoor unit  
 (C) Sub-HBC controller  
 (E) Less than H=50 m (when the outdoor unit is higher than the indoor unit)  
 (F) Less than H1=40 m (when the outdoor unit is lower than the indoor unit)  
 (G) Twinning pipe (field supply)  
 (H) Less than 110 m  
 (J) Up to three units for 1 branch port  
 Total capacity: less than 80 (but in same mode, cooling/heating)  
 (K) Less than 15 m  
 (M) Less than 15 m
- (B) Main-HBC controller  
 (D) Indoor unit  
 (I) Less than 60 m  
 (L) Less than 15 m

(Unit: m)

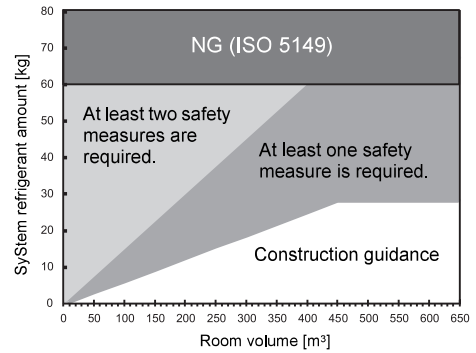
	Item	Piping portion	Allowable value	
Pipe Lengths	Between outdoor unit and HBC controller (refrigerant pipework)	A <sub>1</sub> + A <sub>2</sub> + A <sub>3</sub>	110 or less	
	Water pipework between indoor units and HBC controller	f + g	60 or less	
Difference of elevation	Between HBC controllers	B	40 or less	
	Between indoor and outdoor units	Above outdoor unit	H	50 or less
		Below outdoor unit	H1	40 or less
	Between indoor units and HBC controller	h1	15 or less	
	Between indoor units	h2	15 or less	
	Between HBC controllers	h3	15 or less	



**⚠ Warning:**

(When R32 refrigerant is used)

- Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
- The unit shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater.)
- Do not pierce or burn.
- Be aware that refrigerants may not contain an odour.
- The unit shall be installed, operated and stored in a room with a floor area according to the following figure.
- When installing an HBC controller, take safety measures in accordance with the European Standard, based on the system refrigerant amount and the room volume as shown in the figure below. (The installation restrictions can be simply found by using the flowchart provided on a separate sheet.)



**Notes:**

- Refer to the outdoor unit manual about additional refrigerant amount of HBC and maximum amount of system refrigerant.
- Be sure to protect pipings from physical damage.

### 3. Installing the HBC controller

#### 3.1. Checking the accessories with the HBC controller

The following items are supplied with each HBC controller.

		Model name
		CMB-WM108V-AA CMB-WM1016V-AA
	Item	Qty
①	Drain hose	1
②	Cable tie	1
③	Hose band	1
④	Installation manual	1
⑤	Air vent manual	1
⑥	Wrench	1

		Model name
		CMB-WM108V-AB CMB-WM1016V-AB
	Item	Qty
①	Drain hose	1
②	Cable tie	1
③	Hose band	1
④	Installation manual	1
⑤	Air vent manual	1

#### 3.2. Installing HBC controllers

##### Installing hanging bolts

Install locally procured hanging bolts (threaded rod) following the procedure given in the figure. The hanging bolt size is  $\phi 10$  (M10 screw).

To hang the unit, use a lifting machine to lift and pass it through the hanging bolts. The suspension bracket has an oval hole. Use a large diameter washer.

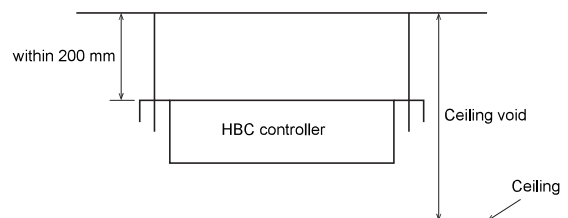
[Fig. 3.2.1] (P.3)

- ① Hanging method  
A: Min, 30 mm
- Ⓐ Hanging bolt  $\phi 10$  (field supply)      Ⓑ Washer (field supply)

- ▶ Be sure to install the HBC controller horizontally. Check using a level. If the controller is installed at an angle, drain water may leak out. If the unit is slanted, loosen the fixing nuts on the hanging brackets to adjust its position. Install the HBC level (less than  $1^\circ$  tilt), so that the drain pan can function correctly.

**⚠ Caution:**

- Be sure to install the unit horizontally. Install the HBC level (less than  $1^\circ$  tilt), so that the drain pan can function correctly.
- ▶ Install the HBC controllers with the hanging length within 200 mm [7-7/8 in] or shorter.



## 4. Connecting refrigerant pipes and drain pipes

### 4.1. Connecting refrigerant pipes

- Be sure to use non-oxidative brazing where necessary. If you do not use non-oxidative brazing, it may clog the pipes.  
When brazing the outdoor unit connecting port of HBC controller, supply nitrogen gas into the pipe between the outdoor unit and HBC controller.
- After completing pipe connection, support the pipes to ensure that load is not imparted to the HBC controller's end connections.
- When using mechanical couplings, use the ones that meet ISO14903.
- Support the on-site pipes near the HBC controller at 0.5-meter intervals or less, and at 2-meter intervals or less in other areas.

#### ⚠ Warning:

When installing and moving the unit, do not charge it with refrigerant other than the refrigerant (R410A or R32) specified on the unit.

- Mixing of a different refrigerant, air, etc. may cause the refrigerant cycle to malfunction and result in severe damage.

#### ⚠ Caution:

- Use refrigerant piping made of phosphorus deoxidized copper and copper alloy seamless pipes and tubes. In addition, be sure that the inner and outer surfaces of the pipes are clean and free of hazardous sulphur, oxides, dust/dirt, swarf, oils, moisture, or any other contaminants.

- R410A and R32 are high-pressure refrigerants and can cause the existing piping to burst.

- Store the piping to be used during installation indoors and keep both ends of the piping sealed until just before brazing. (Store elbows and other joints in a plastic bag.)

- If dust, dirt, or water enters the refrigerant cycle, deterioration of the oil and compressor failure may result.

- Infiltration of a large amount of mineral oil may cause the refrigerant oil to deteriorate.

- Do not vent R410A and R32 into the atmosphere.

#### 1. Size of HBC controller's end connection piping

[Fig. 4.1.2] (P.3)

Unit model		HBC CONTROLLER		
		Model name	High pressure side	Low pressure side
Outdoor unit side	PURY-(E)P200	(HBC CONTROLLER) CMB-WM108V-AA CMB-WM1016V-AA *2	ø15.88 (Brazing)	ø19.05 (Brazing)
	PURY-(E)P250		ø19.05 (Brazing)	ø22.2 (Brazing)
	PURY-(E)P300		ø19.05 (Brazing)	ø22.2 (Brazing)
	PURY-(E)P350		ø19.05 (Brazing)	ø28.58 (Brazing)
	PURY-(E)P400		ø15.88 (Brazing) for each HBC	ø19.05 (Brazing) for each HBC
	PURY-(E)P450		ø15.88 (Brazing) for each HBC	ø22.2 (Brazing) for each HBC
	PURY-(E)P500		ø19.05 (Brazing) for each HBC	ø22.2 (Brazing) for each HBC
	PURY-(E)M200		ø15.88 (Brazing)	ø19.05 (Brazing)
	PURY-(E)M250		ø15.88 (Brazing)	ø22.2 (Brazing)
	PURY-(E)M300		ø15.88 (Brazing)	ø22.2 (Brazing)
	PURY-(E)M350		ø15.88 (Brazing)	ø28.58 (Brazing)
	PURY-(E)M400		ø15.88 (Brazing) for each HBC	ø19.05 (Brazing) for each HBC
	PURY-(E)M450		ø15.88 (Brazing) for each HBC	ø22.2 (Brazing) for each HBC
PURY-(E)M500	ø15.88 (Brazing) for each HBC	ø22.2 (Brazing) for each HBC		

- Ⓐ To outdoor unit
- Ⓒ Main-HBC controller
- Ⓓ Indoor unit
- Ⓔ Up to three units for 1 branch hole; total capacity: below 80 (but in same mode, cooling/heating)
- Ⓑ End connection (brazing)
- Ⓔ Sub-HBC controller
- Ⓕ Twinning pipe (field supply)

#### Note:

- Be sure to use non-oxidative brazing.
- \*1. Connection of multiple indoor units with one connection (or joint pipe)**
  - Total capacity of connectable indoor units: Less than 80
  - Number of connectable indoor units: Maximum 3 Sets
  - Twinning pipe is field supplied.
- \*2. PURY-(E)P-400YNW/PURY-(E)M400YNW model or larger requires a connection of two main-HBC controllers in parallel.**

### 4.2. Refrigerant piping work

After connecting the refrigerant pipes of the outdoor units with the outdoor units' stop valves remained fully closed, evacuate vacuum from the outdoor units' stop valve service ports.

After completing the above, open the outdoor units' stop valves. This connects the refrigerant circuit (between outdoor and HBC controller) completely. How to handle stop valves is described on each outdoor unit.

#### Precautions for HBC controller combinations

Refer to [Fig. 4.2.1] for the positioning of twinning pipes.

[Fig. 4.2.1] (P.3)

		Pipe size
HBC controller 1	HBC controller 2	ø15.88 (Brazing)

Slope of twinning pipes (high-pressure side and low-pressure side)  
Make sure the slope of the twinning pipes are at an angle within ±15° to the ground. If the slope exceeds the specified angle, it may cause lack of capacity.

- Ⓐ Main-HBC controller
- Ⓑ Twinning pipe (field supply)
- Ⓒ Slope of the twinning pipe is at an angle within ±15° to the ground

#### Notes:

- Have a fire extinguisher nearby before brazing work.
- Provide no-smoking signs at the brazing workplace.
- After pipe connection, be sure to check that there is no gas leakage, using a leak detector or soap-and-water solution.
- Before brazing the refrigerant piping, always wrap the piping on the main body, and the thermal insulation piping, with damp cloths to prevent heat shrinkage and burning the thermal insulation tubing. Take care to ensure that the flame does not come into contact with the main body itself.
- Do not use leak-detection additives.
- Straight run of pipe connecting twinning pipe is 500 mm or more.
- Piping work shall be kept to a minimum.
- The pipes shall be protected from physical damage.

#### ⚠ Warning:

Do not mix anything other than the specified refrigerant (R410A or R32) into the refrigerating cycle when installing or moving. Mixing air may cause the refrigerating cycle to reach abnormally high temperature, resulting in burst pipes.

#### ⚠ Caution:

Cut the tip of the outdoor unit piping, remove the gas, and then remove the brazed cap.

[Fig. 4.2.2] (P.3)

- Ⓐ Cut here
- Ⓑ Remove brazed cap

### 4.3. Insulating pipes

Be sure to add insulation work to piping by covering high-temperature pipe and low-temperature pipe separately with enough thickness heat-resistant polyethylene foam, so that no gap is observed in the joint between the HBC controller and insulating material, and insulating materials themselves. When insulation work is insufficient, there is a possibility of condensation. Pay special attention to insulation work in the ceiling plenum.

[Fig. 4.3.1] (P.4)

- Ⓐ Locally procured insulating material for pipes
- Ⓑ Bind here using band or tape.
- Ⓒ Do not leave any opening.
- Ⓓ Lap margin: more than 40 mm
- Ⓔ Insulating material (field supply)
- Ⓕ Unit side insulating material

- Insulation materials for the pipes to be added on site must meet the following specifications:

Outdoor unit	High-pressure pipe	10 mm or more
-HBC controller	Low-pressure pipe	20 mm or more
Temperature Resistance	100°C min.	

- Installation of pipes in a high-temperature high-humidity environment, such as the top floor of a building, may require the use of insulation materials thicker than the ones specified in the chart above.
- When certain specifications presented by the client must be met, ensure that they also meet the specifications on the chart above.
- The brazed connections must be covered with insulation, with its seam facing upward and fastened with the bands.

## 4.4. Additional refrigerant charge

### Notes:

- **Charge refrigerant in a liquid state.**
  - Charging refrigerant in the gaseous state will change the composition of the refrigerant and lead to a performance drop.
- **Do not use a charging cylinder when charging refrigerant.**
  - The use of a charging cylinder may change the composition of the refrigerant and lead to a performance drop.

The table below summarizes the factory-charged amount of refrigerant, the maximum amount of refrigerant to be added on site, and the maximum total amount of refrigerant in the system.

\* R32 refrigerant is charged in the (E)M200–500YNW model of units, and R410A refrigerant is charged in the (E)P200–500YNW model of units.

[kg (oz)]

Unit model	Factory-charged amount	Maximum amount to be added on site	Maximum total amount in the system
M200YNW	5.2 (184)	13.5 (477)	18.7 (660)
M250YNW	5.2 (184)	13.5 (477)	18.7 (660)
M300YNW	5.2 (184)	15.5 (547)	20.7 (731)
M350YNW	8.0 (283)	15.5 (547)	23.5 (829)
M400YNW	8.0 (283)	19.5 (688)	27.5 (971)
M450YNW	10.8 (381)	19.5 (688)	30.3 (1069)
M500YNW	10.8 (381)	19.5 (688)	30.3 (1069)

Unit model	Factory-charged amount	Maximum amount to be added on site	Maximum total amount in the system
EM200YNW	5.2 (184)	13.5 (477)	18.7 (660)
EM250YNW	5.2 (184)	13.5 (477)	18.7 (660)
EM300YNW	5.2 (184)	15.5 (547)	20.7 (731)
EM350YNW	8.0 (283)	15.5 (547)	23.5 (829)
EM400YNW	8.0 (283)	19.5 (688)	27.5 (971)
EM450YNW	10.8 (381)	19.5 (688)	30.3 (1069)
EM500YNW	10.8 (381)	19.5 (688)	30.3 (1069)

Unit model	Factory-charged amount	Maximum amount to be added on site	Maximum total amount in the system
P200YNW	5.2 (184)	31.8 (1122)	37.0 (1306)
P250YNW	5.2 (184)	37.8 (1333)	43.0 (1517)
P300YNW	5.2 (184)	37.8 (1333)	43.0 (1517)
P350YNW	8.0 (283)	41.3 (1457)	49.3 (1740)
P400YNW	8.0 (283)	47.3 (1668)	55.3 (1951)
P450YNW	10.8 (381)	44.5 (1570)	55.3 (1951)
P500YNW	10.8 (381)	45.2 (1595)	56.0 (1976)

Unit model	Factory-charged amount	Maximum amount to be added on site	Maximum total amount in the system
EP200YNW	5.2 (184)	28.3 (998)	33.5 (1182)
EP250YNW	5.2 (184)	34.3 (1210)	39.5 (1394)
EP300YNW	5.2 (184)	34.3 (1210)	39.5 (1394)
EP350YNW	8.0 (283)	39.0 (1375)	47.0 (1658)
EP400YNW	8.0 (283)	39.0 (1375)	47.0 (1658)
EP450YNW	10.8 (381)	44.7 (1577)	55.5 (1958)
EP500YNW	10.8 (381)	45.2 (1595)	56.0 (1976)

Both refrigerant overcharge and undercharge will cause problems. Charge the system with the proper amount of refrigerant.

Record the added refrigerant amount on the label attached to the control box panel for future servicing.

### Calculation of the amount of additional refrigerant

- The amount of refrigerant to be added depends on the size and the total length of the high-pressure piping and liquid piping.
- Calculate the amount of refrigerant to be charged according to the formula below.
- Round up the calculation result to the nearest 0.1 kg (0.1 oz).
- The refrigerant does not need to be added for the indoor units in a Hybrid City Multi system.

### ■ (E)M200 to 500YNW (R32 refrigerant)

(1) Units "m" and "kg"

<Formula>

- When the piping length from the outdoor unit to the farthest HBC controller is 10 m (32 ft) or shorter

Amount of additional charge (kg)	=	High-pressure pipe ø22.2 total length × 0.23 (kg/m)	+	High-pressure pipe ø19.05 total length × 0.16 (kg/m)	+	High-pressure pipe ø15.88 total length × 0.11 (kg/m)	+	Amount (kg/HBC controller) 2.8
----------------------------------	---	---	---	--	---	--	---	--------------------------------------

Outdoor unit model	Amount (kg)
(E)M200	1.0
(E)M250	1.0
(E)M300	0
(E)M350	0
(E)M400	0
(E)M450	0
(E)M500	0

\* Amount of refrigerant to be charged for single-module units

- When the piping length from the outdoor unit to the farthest HBC controller is longer than 10 m (32 ft)

Amount of additional charge (kg)	=	High-pressure pipe ø22.2 total length × 0.19 (kg/m)	+	High-pressure pipe ø19.05 total length × 0.13 (kg/m)	+	High-pressure pipe ø15.88 total length × 0.09 (kg/m)	+	Amount (kg/HBC controller) 2.8
----------------------------------	---	---	---	--	---	--	---	--------------------------------------

Outdoor unit model	Amount (kg)
(E)M200	1.0
(E)M250	1.0
(E)M300	0
(E)M350	0
(E)M400	0
(E)M450	0
(E)M500	0

\* Amount of refrigerant to be charged for single-module units

<Example>

Outdoor unit model: PURY-EM300YNW-A1  
Main HBC controller 1 model: CMB-WM108V-AA  
Main HBC controller 2 model: CMB-WM108V-AA  
Sub HBC controller model: CMB-WM108V-AB

\* Refer to the pipe connection examples in Fig.2.4.2 (P.2).

A<sub>1</sub>: ø15.88; 18 m

A<sub>2</sub>: ø15.88; 5 m

A<sub>3</sub>: ø15.88; 10 m

B: ø15.88; 8 m

The total length of the high-pressure piping and liquid piping in each case is as follows:

ø15.88 total length: 18 (A<sub>1</sub>)

ø15.88 total length: 5 (A<sub>2</sub>) + 10 (A<sub>3</sub>) + 8 (B) = 23

Therefore, when the piping length from the outdoor unit to the farthest HBC controller is longer than 10 m (32 ft),

Amount of additional charge = (41 × 0.09) + 2.8 × 2

= 9.3 kg (Fractions are rounded up.)

(2) Units "ft" and "oz"

<Formula>

- When the piping length from the outdoor unit to the farthest HBC controller is 10 m (32 ft) or shorter

Amount of additional charge (oz)	=	High-pressure pipe ø7/8 total length × 2.48 (oz/ft)	+	High-pressure pipe ø3/4 total length × 1.73 (oz/ft)	+	High-pressure pipe ø5/8 total length × 1.19 (oz/ft)	Amount (oz/HBC controller)
		Outdoor unit model		Amount (oz)			
		(E)M200		36			
		(E)M250		36			
	+	(E)M300		0			
		(E)M350		0			
		(E)M400		0			
		(E)M450		0			
		(E)M500		0			

\* Amount of refrigerant to be charged for single-module units

- When the piping length from the outdoor unit to the farthest HBC controller is longer than 10 m (32 ft)

Amount of additional charge (oz)	=	High-pressure pipe ø7/8 total length × 2.05 (oz/ft)	+	High-pressure pipe ø3/4 total length × 1.36 (oz/ft)	+	High-pressure pipe ø5/8 total length × 0.97 (oz/ft)	Amount (oz/HBC controller)
		Outdoor unit model		Amount (oz)			
		(E)M200		36			
		(E)M250		36			
	+	(E)M300		0			
		(E)M350		0			
		(E)M400		0			
		(E)M450		0			
		(E)M500		0			

\* Amount of refrigerant to be charged for single-module units

<Example>

Outdoor unit model: PURY-EM300YNW-A1  
Main HBC controller 1 model: CMB-WM108V-AA  
Main HBC controller 2 model: CMB-WM108V-AA  
Sub HBC controller model: CMB-WM108V-AB

\* Refer to the pipe connection examples in Fig.2.4.2 (P.2).

A<sub>1</sub>: ø5/8; 59 ft  
A<sub>2</sub>: ø5/8; 16 ft  
A<sub>3</sub>: ø5/8; 32 ft  
B: ø5/8; 26 ft

The total length of the high-pressure piping and liquid piping in each case is as follows:

ø5/8 total length: 59 (A<sub>1</sub>)  
ø5/8 total length: 16 (A<sub>2</sub>) + 32 (A<sub>3</sub>) + 26 (B) = 74

Therefore, when the piping length from the outdoor unit to the farthest HBC controller is longer than 10 m (32 ft),

Amount of additional charge = (133 × 0.57) + 99 × 2  
= 327.1 oz (Fractions are rounded up.)

■ (E)P200 to 500YNW (R410A refrigerant)

(1) Units "m" and "kg"

<Formula>

- When the piping length from the outdoor unit to the farthest HBC controller is 30.5 m (100 ft) or shorter

Amount of additional charge (kg)	=	High-pressure pipe ø22.2 total length × 0.23 (kg/m)	+	High-pressure pipe ø19.05 total length × 0.16 (kg/m)	+	High-pressure pipe ø15.88 total length × 0.11 (kg/m)	Amount (kg/HBC controller)
		Outdoor unit model		Amount (kg)			
		(E)P200		0			
		(E)P250		0			
	+	(E)P300		0			
		(E)P350		0			
		(E)P400		0			
		(E)P450		0			
		(E)P500		0			

\* Amount of refrigerant to be charged for single-module units

- When the piping length from the outdoor unit to the farthest HBC controller is longer than 30.5 m (100 ft)

Amount of additional charge (kg)	=	High-pressure pipe ø22.2 total length × 0.21 (kg/m)	+	High-pressure pipe ø19.05 total length × 0.14 (kg/m)	+	High-pressure pipe ø15.88 total length × 0.10 (kg/m)	Amount (kg/HBC controller)
		Outdoor unit model		Amount (kg)			
		(E)P200		0			
		(E)P250		0			
	+	(E)P300		0			
		(E)P350		0			
		(E)P400		0			
		(E)P450		0			
		(E)P500		0			

\* Amount of refrigerant to be charged for single-module units

(2) Units "ft" and "oz"

<Formula>

- When the piping length from the outdoor unit to the farthest HBC controller is 30.5 m (100 ft) or shorter

Amount of additional charge (oz)	=	High-pressure pipe ø7/8 total length × 2.48 (oz/ft)	+	High-pressure pipe ø3/4 total length × 1.73 (oz/ft)	+	High-pressure pipe ø5/8 total length × 1.19 (oz/ft)	Amount (oz/HBC controller)
		Outdoor unit model		Amount (oz)			
		(E)P200		0			
		(E)P250		0			
	+	(E)P300		0			
		(E)P350		0			
		(E)P400		0			
		(E)P450		0			
		(E)P500		0			

\* Amount of refrigerant to be charged for single-module units

- When the piping length from the outdoor unit to the farthest HBC controller is longer than 30.5 m (100 ft)

Amount of additional charge (oz)	=	High-pressure pipe ø7/8 total length × 2.27 (oz/ft)	+	High-pressure pipe ø3/4 total length × 1.52 (oz/ft)	+	High-pressure pipe ø5/8 total length × 1.09 (oz/ft)	Amount (oz/HBC controller)
		Outdoor unit model		Amount (oz)			
		(E)P200		0			
		(E)P250		0			
	+	(E)P300		0			
		(E)P350		0			
		(E)P400		0			
		(E)P450		0			
		(E)P500		0			

\* Amount of refrigerant to be charged for single-module units

## 4.5. Drain piping work

### 1. Drain piping work

- Ensure that the drain piping is downward (sloped gradient of more than 1/100) to the outdoor (discharge) side. If it is impossible to take any downward pitch, use an optionally available drain-up mechanism to obtain a downward pitch of more than 1/100.
- Ensure that any cross-wise drain piping is less than 20 m. If the drain piping is long, support it with metal brackets to prevent it from bending, warping, or vibrating.
- Connect the supplied drain hose to the discharge port on the unit body. Use hard vinyl chloride pipes VP-25 (ø32) for drain piping (②). Tighten the supplied drain hose onto the discharge port using the supplied hose band. (For this, do not use any adhesive because the drain hose will need to be removed for servicing at a later date.)
- Do not use any odor trap around the discharge port.

[Fig. 4.4.1] (P.4)

- |  |                                       |
|--|---------------------------------------|
| A: 25 cm                               | B: 1.5–2 m                            |
| Ⓐ Downward gradient of more than 1/100 | Ⓒ Supporting bracket                  |
| Ⓑ Insulating material                  | Ⓓ Drain hose (200 mm long, accessory) |
| Ⓔ Drain discharge port                 | Ⓔ Hose band (accessory)               |
| Ⓕ Cable tie (accessory)                |                                       |

- As shown in ③, install a collecting pipe about 10 cm below the drain ports and give it a downward pitch of more than 1/100. This collecting pipe should be of VP-30.
- Set the end of drain piping in a place without any risk of odor generation.
- Do not put the end of drain piping into any drain where ionic gases are generated.
- Drain piping may be installed in any direction. However, please be sure to observe the above instructions.

[Fig. 4.4.2] (P.4)

- |   |                   |
|---|-------------------|
| Ⓐ Main-HBC controller/Sub-HBC controller        | Ⓒ Collecting pipe |
| Ⓑ Indoor unit                                   |                   |
| Ⓓ Please ensure this length is at least 100 mm. |                   |

### 2. Discharge test

After completing drain piping work, open the HBC controller panel, and test drain discharge using a small amount of water. Also, check to see that there is no water leakage from the connections.

### 3. Insulating drain pipes

Provide sufficient insulation to the drain pipes just as for refrigerant pipes.

#### ⚠ Caution:

**Be sure to provide drain piping with heat insulation in order to prevent excess condensation. Without drain piping, water may leak from the unit causing damage to your property.**

## 5. Connecting water pipework

Please observe the following precautions during installation.

### 5.1. Important notes on water pipework installation

- The design pressure of the HBC water system is 0.6MPa.
- Use water pipe-work with a design pressure of at least 1.0MPa.
- When performing a water leak check, please do not allow the water pressure to go above 0.3MPa.
- Perform a pressure test on the field-installed water pipes at a pressure equal to 1.5 times the design pressure. Before performing a pressure test, isolate the pipes from HBC and indoor units.
- Please connect the water pipework of each indoor unit to the connect port on the HBC. Failure to do so will result in incorrect running.
- Please list the indoor units on the naming plate in the HBC unit with addresses and end connection numbers.
- Use the reverse-return method to insure proper pipe resistance to each unit.
- Provide some joints and valves around inlet/outlet of each unit for easy maintenance, checkup, and replacement.
- Install a suitable air vent on the water pipe. After flowing water through the pipe, vent any excess air.
- Secure the pipes with metal fitting, positioning them in locations to protect pipes against breakage and bending.
- Do not confuse the water intake and outlet piping especially when connecting the HBC controller and the Sub-HBC controller.  
(Error code 5102 will appear on the remote controller if a test run is performed with the pipe-work installed incorrectly (inlet connected to outlet and vice versa).)
- This unit doesn't include a heater to prevent freezing within tubes. If the water flow is stopped on low ambient, drain the water out.
- The unused knockout holes should be closed and the refrigerant pipes, water pipes, power source and transmission wires access holes should be filled with putty.
- Install water pipe so that the water flow rate will be maintained.
- Wrap sealing tape as follows.
  - ① Wrap the joint with sealing tape following the direction of the threads (clockwise), do not wrap the tape over the edge.
  - ② Overlap the sealing tape by two-thirds to three-fourths of its width on each turn. Press the tape with your fingers so that it is tight against each thread.
  - ③ Do not wrap the 1.5th through 2nd farthest threads away from the pipe end.
- Hold the pipe on the unit side in place with a spanner when installing the pipes or strainer. Tighten screws to a torque of 40 N·m.
- If there is a risk of freezing, carry out a procedure to prevent it.
- When connecting heat source unit water piping and on site water piping, apply liquid sealing material for water piping over the sealing tape before connection.
- Please use copper or plastic pipes for the water circuit. Do not use steel or stainless steel pipework. Furthermore, when using copper pipe-work, use a non-oxidative brazing method. Oxidation of the pipe-work will reduce the pump life.
- Add water pressure gauge to see if the water pressure in HBC is correct or not.
- **Be sure to braze the water pipes after covering a wet cloth to the insulation pipes of the units in order to prevent them from burning and shrinking by heat.** (There are some plastic parts in HBC.)
- **Install the unit so that external force is not applied to the water pipes.**
- **After filling the pipes with water, immediately perform debris removal operation and air vent operation.**

### Example of HBC controller installation

[Fig. 5.1.1] (P.4)

- |                                   |  |
|-----------------------------------|--|
| Ⓐ Expansion vessel (field supply) | Ⓑ Shutoff valve (field supply)           |
| Ⓒ Strainer (field supply)         | Ⓓ Pressure reducing valve (field supply) |
| Ⓔ Water inlet                     | Ⓔ Refrigerant pipes                      |
| Ⓕ Drain pipe                      | Ⓕ Pressure gauge (field supply)          |
| Ⓖ Check valve (field supply)      |  |

#### Note:

- \*1. Connect the pipes to the water pipes according to the local regulations.

[Fig. 5.1.2] (P.4)

- |   |  |
|---|--|
| Ⓐ Indoor unit connection                  | Ⓑ Cutting point                        |
| Ⓒ Cut the piping at the cutting point     | Ⓓ Field pipe connection (field supply) |
| Ⓔ Field pipe                              | Ⓔ Pipe connection (field supply)       |
| Ⓖ Indoor unit and Sub-HBC connecting port |  |
| Ⓕ Water inlet (EXP. VESSEL)               |  |

#### Note:

- **Remove burr after cutting the piping to prevent entering the pipe connection.**  
**Check that there is no crack at the edge of the piping.**

[Fig. 5.1.3] (P.5)

- |                                      |  |
|--------------------------------------|--|
| Ⓐ HBC controller                     | Ⓑ Sub-HBC controller                   |
| Ⓒ To Sub-HBC controller (Hot water)  | Ⓓ From Sub-HBC controller (Hot water)  |
| Ⓔ To Sub-HBC controller (Cold water) | Ⓔ From Sub-HBC controller (Cold water) |

## 5.2. Water pipe insulation

1. Connect the water pipes of each indoor unit to the same (correct) end connection numbers as indicated on the indoor unit connection section of each HBC controller. If connected to wrong end connection numbers, there will be no normal operation.
2. List indoor unit model names in the name plate on the HBC controller control box (for identification purposes), and HBC controller end connection numbers and address numbers in the name plate on the indoor unit side.  
  
In case of using cover caps for unused end connections, please use dezincification resistant brass (DZR) (field supply). Not using the rubber end caps will lead to water leakage.
3. Be sure to add insulation work to water piping by covering water pipework separately with enough thickness heat-resistant polyethylene, so that no gap is observed in the joint between indoor unit and insulating material, and insulating materials themselves. When insulation work is insufficient, there is a possibility of condensation, etc. Pay special attention to insulation work in the ceiling plenum.

[Fig. 5.2.1] (P.5)

- |  |                                      |
|--|--------------------------------------|
| Ⓐ Locally procured insulating material for pipes | Ⓒ Do not leave any opening.          |
| Ⓑ Bind here using band or tape.                  | Ⓓ Insulating material (field supply) |
| Ⓔ Lap margin: more than 40 mm                    |                                      |
| Ⓕ Unit side insulating material                  |                                      |

- Insulation materials for the pipes to be added on site must meet the following specifications:

HBC controller -indoor unit	20 mm or more
HBC controller -Sub-HBC controller	20 mm or more

- This specification is based on copper for water piping. When using plastic pipework, choose a thickness based on the plastic pipe performance.



- Installation of pipes in a high-temperature high-humidity environment, such as the top floor of a building, may require the use of insulation materials thicker than the ones specified in the chart above.
  - When certain specifications presented by the client must be met, ensure that they also meet the specifications on the chart above.
4. Expansion vessel
- Install an expansion vessel to accommodate expanded water.
  - Please install expansion vessel at same height level of HBC.
- Expansion vessel selection criteria:
- The water containment volume of the HBC and the indoor unit.

(Unit: L)

Unit model	Water volume
HBC Controller	10
PEFY-WP20VMA	0.7
PEFY-WP25VMA	1
PEFY-WP32VMA	
PEFY-WP40VMA	
PEFY-WP50VMA	1.8

\* For other indoor units, refer to the installation manual for each.

- The maximum water temperature is 60°C.
  - The minimum water temperature is 5°C.
  - The circuit protection valve set pressure is 370-490kPa.
  - The circulation pump head pressure is 0.24MPa.
  - The design pressure of the expansion vessel is the charged water pressure (the reading of the pressure gauge).
  - Tank volume of expansion vessel is as follows:  
 $Tank\ volume = \epsilon \times G / (1 - (P_{supply} + 0.1) / 0.29) \times 1.2$   
 $\epsilon =$  The expansion coefficient of water  
 (= 0.0171)
- \* Please choose  $\epsilon$  for using antifreeze solution on the type and temperature range used.
- $\epsilon =$  Max density/Min density - 1  
 $G [L] = (HBC [L] + Indoor\ unit [L] + Pipe [L]) \times 1.1$   
 $P_{supply}$ : Water supply pressure [MPa]
5. Leakproof the water pipework, valves and drain pipework. Leakproof all the way to, and include pipe ends so that condensation cannot enter the insulated pipework.
6. Apply caulking around the ends of the insulation to prevent condensation getting between the pipework and insulation.
7. Add a drain valve so that the unit and pipework can be drained.
8. Ensure there are no gaps in the pipework insulation. Insulate the pipework right up to the unit.
9. Ensure that the gradient of the drain pan pipework is such that discharge can only blow out.
10. HBC water pipe connection sizes and pipe sizes.

[Fig. 5.2.2] (P.5)

Indoor unit	Connection size		Pipe size	
	Water inlet	Water outlet	Water out	Water return
PEFY-W-VMA	O.D. 22.0 mm	O.D. 22.0 mm	I.D. 20 mm	I.D. 20 mm

\* For other indoor units, refer to the indoor unit installation manual.  
 \* The pipe diameter depends on the capacity of indoor units.  
 Refer to the indoor unit installation manual for details.

- (A) To outdoor unit
- (B) End connection (brazing)
- (C) Main-HBC controller
- (D) Sub-HBC controller
- (E) Indoor unit
- (F) Twinning pipe (field supply)
- (G) Up to three units for 1 branch hole; total capacity: below 80 (but in same mode, cooling/heating)
- (H) Shutoff valve (field supply)
- (I) Pressure control valve (field supply)
- (J) Auto air vent valve (Highest point on the water pipe for each branch) (field supply)
- (K) Water pipework

**Note:**

- \*1. Connection of multiple indoor units with one connection (or joint pipe)
- Total capacity of connectable indoor units: Less than 80
  - Number of connectable indoor units: Maximum 3 Sets
  - Selection of water piping  
 Select the size according to the total capacity of indoor units to be installed downstream.
  - Please group units that operate on 1 branch.
  - When multiple indoor units are connected to a single port, install a pressure control valve in the pipe to equalize the pressure of all indoor units.

11. Please refer to the [Fig. 5.2.3] when connecting the water supply.

[Fig. 5.2.3] (P.5)

- (A) HBC controller
- (B) Water pipe
- (C) Pressure gauge (field supply)
- (D) Check valve (field supply)
- (E) Shutoff valve (field supply)
- (F) Pressure reducing valve (field supply)
- (G) Strainer (field supply)

12. Use formula  $0.1 [MPa] < 0.01 + 0.01 \times A < 0.16 [MPa]$  for the supply pressure range to be used.  
 (A: Head pressure (m) between the HBC and the highest indoor unit)  
 If the supply pressure is greater than 0.16 MPa, use a pressure reducing valve to keep the pressure within the range.  
 If the head pressure is unknown, set it to 0.16 MPa.
13. Before performing a pressure test on the pipes in the water circuit, be sure to install a shutoff valve on the inlet/outlet water pipes of the indoor units. Also, install a strainer on the field-installed water pipes for easy operation and maintenance.
14. Apply insulation to the indoor unit pipework, strainer, shutoff valve, and pressure reducing valve.
15. Please do not use a corrosion inhibitor in the water system.
16. **When installing the HBC unit in an environment which may drop below 0°C, please add antifreeze solution (Propylene Glycol only) to the circulating water according to the local regulations.**

### 5.3. Water treatment and quality control

To preserve water quality, use the closed type of water circuit. When the circulating water quality is poor, the water heat exchanger can develop scale, leading to a reduction in heat-exchange power and possible corrosion. Pay careful attention to water processing and water quality control when installing the water circulation system.

- Removing of foreign objects or impurities within the pipes.  
 During installation, make sure that foreign objects, such as welding fragments, sealant particles, or rust, do not enter the pipes.
- Water Quality Processing
  - ① Depending on the quality of the cold-temperature water used in the air conditioner, the copper piping of the heat exchanger may corrode. Regular water quality processing is recommended.  
 If a water supply tank is installed, keep air contact to a minimum, and keep the level of dissolved oxygen in the water no higher than 1mg/l.

② Water quality standard

Items		Low to mid-range temperature water system		Tendency	
		Recirculating water [20<T<60°C] [68<T<140°F]	Make-up water	Corrosive	Scale-forming
Standard items	pH (25°C) [77°F]	7.0 ~ 8.0	7.0 ~ 8.0	○	○
	Electric conductivity (mS/m) (25°C) [77°F]	30 or less [300 or less]	30 or less [300 or less]	○	○
	Chloride ion (mg Cl-/l)	50 or less	50 or less	○	
	Sulfate ion (mg SO4 <sup>2-</sup> /l)	50 or less	50 or less	○	
	Acid consumption (pH4.8) (mg CaCO <sub>3</sub> /l)	50 or less	50 or less		○
	Total hardness (mg CaCO <sub>3</sub> /l)	70 or less	70 or less		○
	Calcium hardness (mg CaCO <sub>3</sub> /l)	50 or less	50 or less		○
Reference items	Ionic silica (mg SiO <sub>2</sub> /l)	30 or less	30 or less		○
	Iron (mg Fe/l)	1.0 or less	0.3 or less	○	○
	Copper (mg Cu/l)	1.0 or less	0.1 or less	○	
	Sulfide ion (mg S <sup>2-</sup> /l)	not to be detected	not to be detected	○	
	Ammonium ion (mg NH <sub>4</sub> <sup>+</sup> /l)	0.3 or less	0.1 or less	○	
	Residual chlorine (mg Cl/l)	0.25 or less	0.3 or less	○	
	Free carbon dioxide (mg CO <sub>2</sub> /l)	0.4 or less	4.0 or less	○	
Ryzner stability index	6.0 ~ 7.0	-	○	○	

Reference : Guideline of Water Quality for Refrigeration and Air Conditioning Equipment. (JRA GL02E-1994)

- ③ Consult with a specialist about water quality control methods and calculations before using anti-corrosive solutions.

## 6. Electrical work

- ▶ Consult all related regulations and power companies beforehand.

### Warning:

Electrical work should be handled by qualified electrical engineers in accordance with all related regulations and attached instruction manuals. Special circuits should also be used. If there is a lack of power capacity or a deficiency in electrical work, it may cause a risk of electric shock or fire.

- ▶ Connect all wires securely.
- Fix power source wiring to control box by using buffer bushing for tensile force (PG connection or the like).

#### [Fig. 6.0.1] (P.5)

- |                                      |                         |
|--------------------------------------|-------------------------|
| (A) Control box                      | (B) Power source wiring |
| (C) ø21 hole (closed rubber bushing) | (D) Transmission wiring |
| (E) Clip cables here                 |                         |

- ▶ Never connect the power cable to the terminal board for control cables. (Otherwise it may be broken.)
- ▶ Be sure to wire between the control wire terminal boards for indoor unit, outdoor unit and HBC/Sub-HBC controller.

Use non-polarized 2-wire as transmission cables.

Use 2-core shielding cables (CVVS, CPEVS) of more than 1.25 mm<sup>2</sup> in diameter as transmission cables.

The switch capacity of the main power to HBC/Sub-HBC controllers and the wire size are as follows:

Switch (A)		Molded case circuit breaker	Earth leakage breaker	Wire size
Capacity	Fuse			
16	16	20 A	20 A 30 mA 0.1 s or less	1.5 mm <sup>2</sup>

- For other detailed information, refer to the outdoor unit installation manual.
- Power supply cords of appliances shall not be lighter than design 245 IEC 53 or 227 IEC 53.
- A switch with at least 3 mm contact separation in each pole shall be provided by the Air conditioner installation.

### Caution:

Do not use anything other than the correct capacity fuse and breaker. Using fuse, conductor or copper wire with too large capacity may cause a risk of malfunction or fire.

Ensure that the outdoor units are put to the ground. Do not connect the earth cable to any gas pipe, water pipe, lightning rod or telephone earth cable. Incomplete grounding may cause a risk of electric shock.

## 7. Setting addresses and operating units

The address switch of each HBC/Sub-HBC controller is set to "000" when shipped from the factory.

- Set the address switch to an address that equals the lowest address of the indoor units that are connected to the HBC/Sub-HBC controller plus 50.

- ▶ Assign the HBC controller address that equals the lowest address of the indoor units that are connected to the HBC/Sub-HBC controller plus 50. However, if the address overlaps any other units' addresses, assign the address that equals the next lowest address plus 50.
- Please refer to the outdoor unit installation manual.

## 8. Test run

Before commencing a test run please check the following:

- ▶ After installing, piping and wiring the indoor units and HBC controllers, check to see again that there is no refrigerant leakage, water leakage, the indoor unit inlet and outlet piped backwards, and no slack on power and control cables.
- ▶ Use a 500 V tester to check that there is an insulation resistance of more than 1.0 MΩ between the power terminal block and the ground. If it is less than 1.0 MΩ, do not operate the unit.
- When water has been supplied to the water pipework, purge the system of air. The details of air purging can be found separately in the water circuit maintenance manual.

### Caution:

- Never measure the insulation resistance of the terminal block for any control cables.
- Incomplete purging of the air in the system, closing of the valves upstream or down stream of the pump etc. may cause the pump to operate with no water flow and thus lead to pump failure.
- Ensure that the power is off when replacing a pump. Do not remove or attach the pump connector with the power on. Otherwise pump will break. After turning off the power, wait 10 minutes before commencing work.