<ORIGINAL>

MITSUBISHI ELECTRIC

e-series

Air-cooled Chilling Unit

EAHV-M1500, 1800YCL(-N)(-BS)
EACV-M1500, 1800YCL(-N)(-BS)

For use with R32

Installation/Operation Manual	en
Installations-/Bedienungsanleitung	de
Manuel d'installation et d'utilisation	fr
Installatie-/gebruikshandleiding	nl
Manual de instalación/operación	es
Manuale di installazione e funzionamento	it
Εγχειρίδιο εγκατάστασης/λειτουργίας	el
Manual de Instalação/Funcionamento	pt
Installations- og betjeningsvejledning	da
Installations- och drifthandbok	sv
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Ръководство за монтаж/експлоатация	bg
Instrukcja montażu/obsługi	pl
Installasjons-/driftshåndbok	no
Asennus- ja käyttöopas	fi
Посібник з монтажу/експлуатації	uk
Instalační/provozní příručka	cs
Inštalačná/prevádzková príručka	sk
Beépítési/üzemeltetési kézikönyv	hu
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WT10603X04

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1. Safety Precautions

- **Thoroughly read this manual prior to use.**
- **Save this manual for future reference.**
- **Some of the items in this manual may not apply to made-to-order units.**
- **Make sure that this manual is passed on to the end users.**
- **Thoroughly read the following safety precautions prior to use.**
- **Observe these precautions carefully to ensure safety.**

⚠ WARNING	Indicates a risk of death or serious injury
⚠ CAUTION	Indicates a risk of injury or structural damage
IMPORTANT	Indicates a risk of damage to the unit or other components in the system

All electric work must be performed by personnel certified by Mitsubishi Electric.

1-1. General

⚠ WARNING

Do not use refrigerant other than the type indicated in the manuals provided with the unit and on the nameplate.

- Doing so may cause the unit or pipes to burst, or result in explosion or fire during use, during repair, or at the time of disposal of the unit.
- It may also be in violation of applicable laws.
- MITSUBISHI ELECTRIC CORPORATION cannot be held responsible for malfunctions or accidents resulting from the use of the wrong type of refrigerant.

Do not install the unit in a place where large amounts of oil, steam, organic solvents, or corrosive gases, such as sulfuric gas, ammonia, and sulfide are present or where acidic/alkaline solutions or sprays containing sulfur are used frequently.

- These substances can compromise the performance of the unit or cause certain components of the unit to corrode, which can result in refrigerant leakage, water leakage, injury, electric shock, malfunctions, smoke, or fire.

Do not try to defeat the safety features of the unit or make unauthorized setting changes.

- Forcing the unit to operate the unit by defeating the safety features of the devices such as the pressure switch or the temperature switch, making unauthorized changes to the switch settings, or using accessories other than the ones recommended by Mitsubishi Electric may result in smoke, fire, or explosion.

To reduce the risk of fire or explosion, do not use volatile or flammable substances as a heat carrier.

To reduce the risk of burns or electric shock, do not touch exposed pipes and wires.

To reduce the risk of shorting, current leakage, electric shock, malfunctions, smoke, or fire, do not splash water on electric parts.

To reduce the risk of electric shock, malfunctions, smoke or fire, do not operate the switches/buttons or touch other electrical parts with wet hands.

To reduce the risk of electric shock and injury from the fan or other rotating parts, stop the operation and turn off the main power before cleaning, maintaining, or inspecting the unit.

To reduce the risk of burns or frost bites, do not touch the refrigerant pipes or refrigerant circuit components with bare hands during and immediately after operation.

Before cleaning the unit, switch off the power. (Unplug the unit, if it is plugged in.)

To reduce the risk of injury, keep children away while installing, inspecting, or repairing the unit.

Children should be supervised to ensure that they do not play with the appliance.

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.

Keep the space well ventilated. Refrigerant can displace air and cause oxygen starvation.
- If leaked refrigerant comes in contact with a heat source, toxic gas may be generated.

Always replace a fuse with one with the correct current rating.
- The use of improperly rated fuses or a substitution of fuses with steel or copper wire may result in fire or explosion.

If any abnormality (e.g., burning smell) is noticed, stop the operation, turn off the power switch, and consult your dealer.
- Continuing the operation may result in electric shock, malfunctions, or fire.

Properly install all required covers and panels on the terminal box and control box to keep moisture and dust out.
- Dust accumulation and water may result in electric shock, smoke, or fire.

Consult an authorized agency for the proper disposal of the unit.
- Refrigerant oil and refrigerant that may be left in the unit pose a risk of fire, explosion, or environmental pollution.

The appliance 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.

⚠ CAUTION

To reduce the risk of fire or explosion, do not place flammable materials or use flammable sprays around the unit.

Do not operate the unit without panels and safety guards properly installed.

To reduce the risk of injury, do not sit, stand, or place objects on the unit.

Do not connect the makeup water pipe directly to the potable water pipe. Use a cistern tank between them.
- Connecting these pipes directly may cause the water in the unit to migrate into the potable water and cause health problems.

To reduce the risk of adverse effects on plants and animals, do not place them where they are directly exposed to discharge air from the unit.

Do not install the unit on or over things that are vulnerable to water damage.
- Condensation may drip from the unit.

The model of heat pump unit described in this manual is not intended for use to preserve food, animals, plants, precision instruments, or art work.

To reduce the risk of injury, do not touch the heat exchanger fins or sharp edges of components with bare hands.

Do not place a container filled with water on the unit.
- If water spills on the unit, it may result in shorting, current leakage, electric shock, malfunction, smoke, or fire.

Always wear protective gears when touching electrical components on the unit.
- Several minutes after the power is switched off, residual voltage may still cause electric shock.

To reduce the risk of injury, do not insert fingers or foreign objects into air inlet/outlet grills.

To reduce the risk of injury, wear protective gear when working on the unit.

Do not release refrigerant into the atmosphere. Collect and reuse the refrigerant, or have it properly disposed of by an authorized agency.
- Refrigerant poses environmental hazards if released into the air.

To prevent environmental pollution, dispose of brine in the unit and cleaning solutions according to the local regulations.
- It is punishable by law not to dispose of them according to the applicable laws.

The water heated by the heat pump is not suitable for use as drinking water or for cooking.
- It may cause health problems or degrade food.

In areas where temperature drops to freezing during the periods of non-use, blow the water out of the pipes or fill the pipes with anti-freeze solution.
- Not doing so may cause the water to freeze, resulting in burst pipes and damage to the unit or the furnishings.

In areas where temperature drops to freezing, use an anti-freeze circuit and leave the main power turned on to prevent the water in the water circuit from freezing and damaging the unit or causing water leakage and resultant damage to the furnishings.

Use clean tap water.
- The use of acidic or alkaline water or water high in chlorine may corrode the unit or the pipes, causing water leakage and resultant damage to the furnishings.

In areas where temperature can drop low enough to cause the water in the pipes to freeze, operate the unit often enough to prevent the water from freezing.
- Frozen water in the water circuit may cause the water to freeze, resulting in burst pipes and damage to the unit or the furnishings.

Periodically inspect and clean the water circuit.
- Dirty water circuit may compromise the unit’s performance or corrodes the unit or cause water leakage and resultant damage to the furnishings.

Ensure that the flow rate of the feed-water is within the permitted range.
- If the flow rate exceeds the permitted range, the unit may become damaged due to corrosion. Furniture may become wet due to water leaks.

Do not install the unit in an enclosed space or a semi-underground space.
- If the refrigerant leaks, a fire may result.
- The unit must be stored where leaking refrigerant will not accumulate.
- Store the unit in a room large enough to allow clearance in the event of refrigerant leakage.

To avoid damage to the unit, use appropriate tools to install, inspect, or repair the unit.

To reduce the risk or malfunction, turn on the power at least 12 hours before starting operation, and leave the power turned on throughout the operating season.

Do not unnecessarily change the switch settings or touch other parts in the refrigerant circuit.
- Doing so may change the operation mode or damage the unit.

To reduce the risk of malfunctions, use the unit within its operating range.

Do not switch on or off the main power in a cycle of shorter than 10 minutes.
- Short-cycling the compressor may damage the compressor.

When servicing the refrigerant, open and close the check joint using two spanners, as there is the risk of refrigerant leaking due to damaged piping.

Please build the water circuit so that it is a closed system.
- Do not use water directly for showers or other applications.
- Do not allow other heat source water to mix with the water circuit.

To ensure proper operation of the unit, periodically check for proper concentration of anti-freeze.
- Inadequate concentration of anti-freeze may compromise the performance of the unit or cause the unit to abnormally stop.

Take appropriate measures against electrical noise interference when installing the unit in hospitals or facilities with radio communication capabilities.
- Inverter, high-frequency medical, or wireless communication equipment as well as power generators may cause the unit to malfunction. The unit may also adversely affect the operation of these types of equipment by creating electrical noise.

Check the water system, using a relevant manual as a reference.
- Using the system that does not meet the standards (including water quality and water flow rate) may cause the water pipes to corrode.

Have a backup system, if failure of the unit has a potential for causing significant problems or damages.

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. Transportation

⚠ WARNING

Lift the unit by placing the slings at designated locations. Support the unit securely at four points to keep it from slipping and sliding.
- If the unit is not properly supported, it may fall and cause personal injury.

⚠ CAUTION

To reduce the risk of injury, do not carry the product by the PP bands that are used on some packages.

Observe the restrictions on the maximum weight that a person can lift, which is specified in local regulations.

1-3. Installation

⚠ WARNING

Do not install the unit where there is a risk of leaking flammable gas.
- If flammable gas accumulates around the unit, it may ignite and cause a fire or explosion.

Properly dispose of the packing materials.
- Plastic bags pose suffocation hazard to children.

The unit should be installed only by personnel certified by Mitsubishi Electric according to the instructions detailed in the Installation/Operation Manual.
- Improper installation may result in refrigerant leakage, water leakage, injury, electric shock, or fire.

Periodically check the installation base for damage.
- If the unit is left on a damaged base, it may fall and cause injury.

Remove packing materials from the unit before operating the unit. Note that some accessories may be taped to the unit. Properly install all accessories that are required.
- Failing to remove the packing materials or failing to install required accessories may result in refrigerant leakage, oxygen starvation, smoke, or fire.

Consult your dealer and take appropriate measures to safeguard against refrigerant leakage and resultant oxygen starvation. An installation of a refrigerant gas detector is recommended.

Any additional parts must be installed by qualified personnel. Only use the parts specified by Mitsubishi Electric.

Take appropriate safety measures against wind gusts and earthquakes to prevent the unit from toppling over and causing injury.

Be sure to install the unit horizontally, using a level.
- If the unit is installed at an angle, it may fall and cause injury or cause water leakage.

The unit should be installed on a surface that is strong enough to support its weight.

As an anti-freeze, use ethylene glycol or propylene glycol diluted to the specified concentration.
- The use of other types of anti-freeze solution may cause corrosion and resultant water leakage. The use of flammable anti-freeze may cause fire or explosion.

⚠ CAUTION

Do not install the unit on or over things that are vulnerable to water damage.
- When the humidity exceeds 80% or if the drain water outlet becomes clogged, condensation may drip from the unit.

All drainage work should be performed by the dealer or qualified personnel according to the instructions detailed in the Installation Manual.
- Improper drainage work may cause rain water or drain water to enter the buildings and damage the furnishings.

To maintain optimum performance and reduce the risk of malfunction, keep the air pathway clear.

1-4. Pipe installation

⚠ WARNING

To prevent explosion, do not heat the unit with refrigerant gas in the refrigerant circuit.

Do not pull out the grounding wire coming from the unit during welding work.

Check for refrigerant leakage at the completion of installation.
- If leaked refrigerant comes in contact with a heat source, toxic gas may be generated.

⚠ CAUTION

Check that no substance other than the specified refrigerant is present in the refrigerant circuit.
- Infiltration of other substances may cause the pressure to rise abnormally high and cause the pipes to explode.

To keep the ceiling and floor from getting wet due to condensation, properly insulate the pipes.

Piping work should be performed by the dealer or qualified personnel according to the instructions detailed in the Installation Manual.
- Improper piping work may cause water leakage and damage the furnishings.

To keep the ceiling and floor from getting wet due to condensation, properly insulate the pipes.

Do not open the control box cover while charging refrigerant.
- If the refrigerant leaks, a fire may result.

1-5. Electrical wiring

⚠ WARNING

To reduce the risk of wire breakage, overheating, smoke, and fire, keep undue force from being applied to the wires.

Properly secure the cables in place and provide adequate slack in the cables so as not to stress the terminals.
- Improperly connected cables may break, overheat, and cause smoke or fire.

To reduce the risk of injury or electric shock, switch off the main power before performing electrical work.

All electric work must be performed by a qualified electrician according to the local regulations, standards, and the instructions detailed in the Installation Manual.
- Capacity shortage to the power supply circuit or improper installation may result in malfunction, electric shock, smoke, or fire.

To reduce the risk of electric shock, smoke, or fire, install an earth leakage breaker on the power supply to each unit.

Use properly rated breakers and fuses (an earth leakage breaker, local switch <a switch + fuse that meets local electrical codes>, or overcurrent breaker).
- The use of improperly rated breakers may result in electric shock, malfunction, smoke, or fire.

To reduce the risk of current leakage, overheating, smoke, or fire, use properly rated cables with adequate current carrying capacity.

Keep the unsheathed part of cables inside the terminal block.
- If unsheathed part of the cables come in contact with each other, electric shock, smoke, or fire may result.

Proper grounding must be provided by a qualified personnel. Do not connect the grounding wire to a gas pipe, water pipe, lightning rod, or telephone wire.
- Improper grounding may result in electric shock, smoke, fire, or malfunction due to electrical noise interference.

Tighten all terminal screws to the specified torque.
- Loose screws and contact failure may result in smoke or fire.

Only use standard power cables of sufficient capacity.
- Failure to do so may result in current leakage, overheating, smoke, or fire.

⚠ CAUTION

To reduce the risk of current leakage, wire breakage, smoke, or fire, keep the wiring out of contact with the refrigerant pipes and other parts, especially sharp edges.

To reduce the risk of electric shock, shorting, or malfunctions, keep wire pieces and sheath shavings out of the terminal block.

To reduce the risk of both the breaker on the product side and the upstream breaker from tripping and causing problems, split the power supply system or provide protection coordination between the earth leakage breaker and overcurrent breaker.

To reduce the risk of power capacity shortage, always use a dedicated power supply circuit.

1-6. Transportation and repairs

⚠ WARNING

The unit should be moved, disassembled, or repaired only by qualified personnel. Do not alter or modify the unit.
- Improper repair or unauthorized modifications may result in refrigerant leakage, water leakage, injury, electric shock, or fire.

After disassembling the unit or making repairs, replace all components as they were.
- Failing to replace all components may result in injury, electric shock, or fire.

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.

Recover all refrigerant from the unit.
- It is punishable by law to release refrigerant into the atmosphere.

⚠ CAUTION

To reduce the risk of shorting, electric shock, fire, or malfunction, do not touch the circuit board with tools or with your hands, and do not allow dust to accumulate on the circuit board.

Do not open the control box cover while charging refrigerant.
- If the refrigerant leaks, a fire may result.

1-7. IMPORTANT

This appliance is Electromagnetic Compatibility Directive Class A. When it uses at residentialenvironment, it may cause electromagnetic interference.
User may be asked to prepare the properly way.
- Other products installed in the same environment have the risk of malfunction.

Refrigerant R32 is flammable. Do not use a naked-flame type detector.

Store the unit in a space with sufficient area so that the refrigerant concentration in the air will not reach a dangerous level in the event of refrigerant leakage.

Avoid frequent switching between Cooling and Heating modes.

- Too frequent switching of operation modes may cause the unit to make an abnormal stop.
- Before switching the operation mode from Heating to Cooling, make sure the water temperature is 35ºC or below.
- Before switching the operation mode from Cooling to Heating, make sure the water temperature is15ºC or above.
- Before switching the operation mode between Cooling and Heating, leave the unit stopped for approximately 15 minutes.

---

2. Selecting the Installation Site

2-1. Installation Conditions

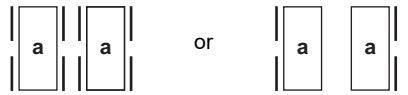
Select the installation site in consultation with the client.

Select a site to install the unit that meets the following conditions:

- The unit will not be subject to heat from other heat sources.
- A site does not cause a trouble by the noise from the unit.
- The unit will not be exposed to strong winds.
- Water from the unit can be drained properly.
- The space requirements are met. Refer to the following page(s) for detail. "Installation Space Requirements" (p. 13)
- There is a possibility of injuring with the fin of the heat exchanger, so abide by following contents.

1) Appliances are not accessible to the general public.
2) Limit the installation to a place where the general public cannot touch the product.
3) When installing in a location where the general public can touch the product, install the optional fin guard.
Option Parts: EC-130FG

When two units are joined



EC-130FG × 2 EC-130FG × 1

a Unit

2-1-1. Protection against winds

- Pay attention to the wind direction and installation location to ensure that the air heat exchanger is not directly exposed to strong winds.
- If unable to avoid strong winds, install wind breaking hoods or walls, etc.

2-1-2. Cold Climate Installation

Observe the following when installing the units in areas where snow or strong winds prevail.

- Avoid direct exposure to rain, winds, and snow.
- If the unit is installed in the direct line of rain, winds, or snow, install snow hoods. Use a snow net or snow fence as necessary to protect the unit.
- Install the unit on a base approximately twice as high as the expected snowfall.
- If the unit of heating mode is continuously operated for a long time with the outdoor temperature below the freezing point, install a heater at the drain pan of the unit to prevent freezing of drain.

2-1-3. Weight

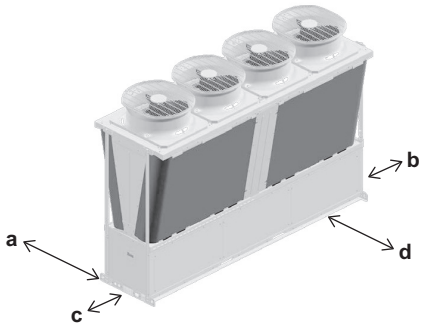
		Net weight <kg>	Operating weight <kg>
EAHV	Standard piping	1280	1315
	Inside header piping	1307	1382
EACV	Standard piping	1039	1074
	Inside header piping	1067	1142

Weight of the optional parts: EC-01HK (30 kg), EC-02HK (44 kg), EC-130FG (20 kg)

2-2. Installation Space Requirements

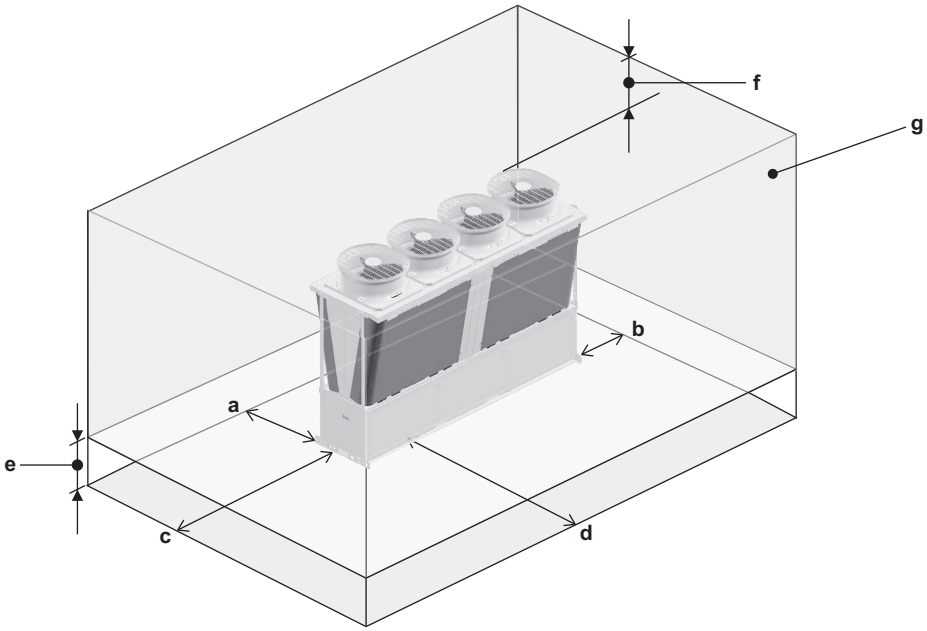
2-2-1. Single unit installation

[1] Required space



a **[Left side]** 0.9 m (Service space)
b **[Opposite service side]** 0.9 m (Service space)
c **[Service side]** 0.9 m (Service space)
d **[Right side]** 0.9 m (Service space)

[2] If entire surrounding area enclosed by walls (but vent holes installed at bottom of wall)

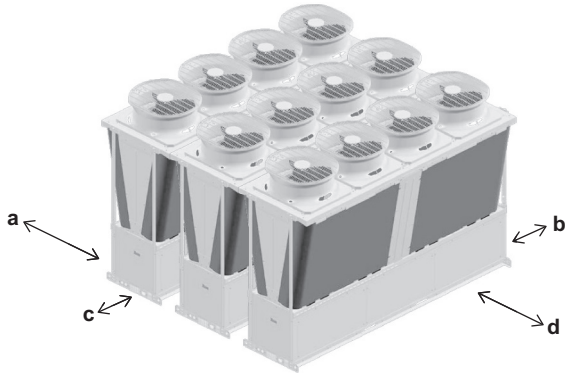


a **[Left side]** 0.9 m or more (Service space)
b **[Opposite service side]** 0.9 m or more (Service space)
c **[Service side]** 0.9 m or more (Service space)
d **[Right side]** 0.9 m or more (Service space)
e Wall opening 0.5 m
f 0.5 m
g Wall

*1:Wall height 2.9 m (unit height (2.4 m + 0.5 m))
*2:Vent holes: 0.5 m from floor
*3:Even if installed as shown in this figure, a short cycle may occur due to the influence of wind.

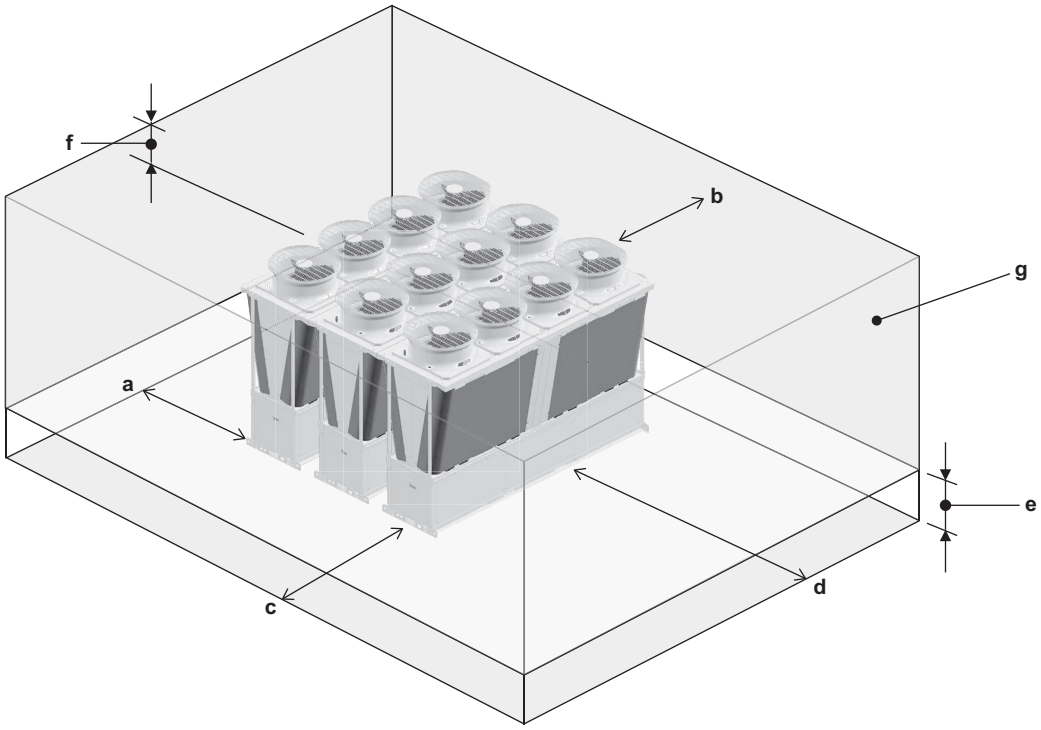
2-2-2. Multiple unit installation

[1] Required space



a **[Left side]** 0.9 m (Service space)
b **[Opposite service side]** 0.9 m (Service space)
c **[Service side]** 0.9 m (Service space)
d **[Right side]** 0.9 m (Service space)

[2] If entire surrounding area enclosed by walls (but vent holes installed at bottom of wall)



a **[Left side]** 1.5 m or more (Service space)
b **[Opposite service side]** 1.5 m or more (Service space)
c **[Service side]** 1.5 m or more (Service space)
d **[Right side]** 1.5 m or more (Service space)
e Wall opening 0.5 m
f 0.5 m
g Wall

*1:Wall height 2.9 m (unit height (2.4 m + 0.5 m))
*2:Vent holes: 0.5 m from floor
*3:Even if installed as shown in this figure, a short cycle may occur due to the influence of wind.

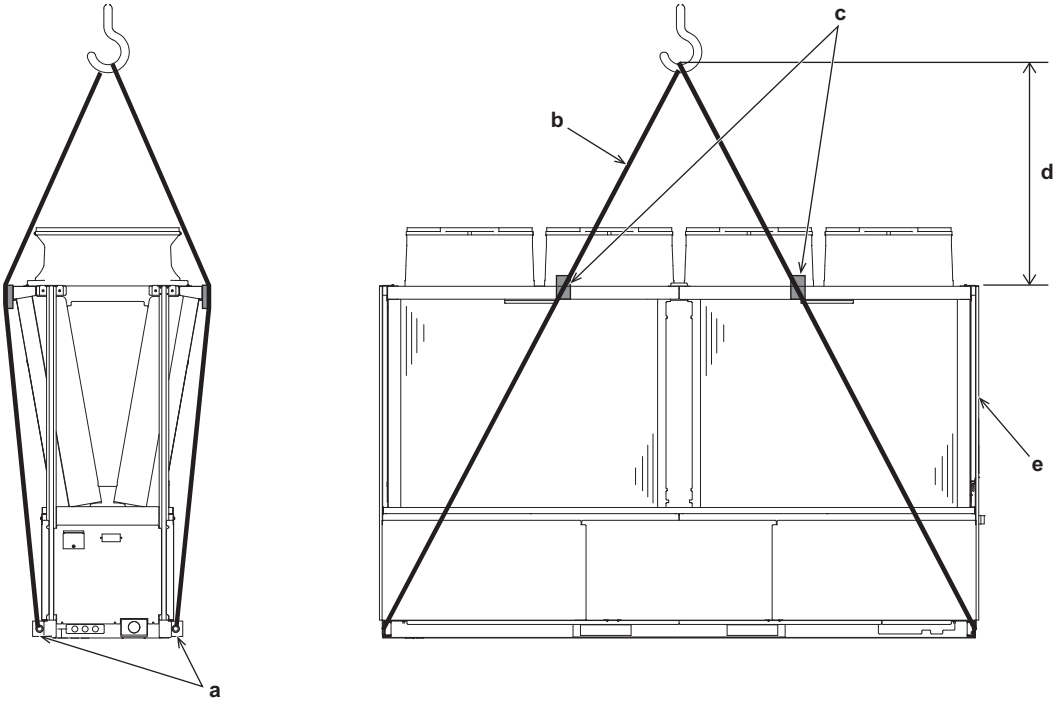
3. Unit Installation

Units should be installed only by personnel certified by Mitsubishi Electric.

3-1. Product suspension method

- If transporting the product suspended, use the two suspension sections at the front and rear.
- Always feed rope through the four suspension sections so that the unit is not subjected to shocks.
- Use two ropes that are 10 m or longer. (Use four ropes that are 5 m or longer.)
- Use suspension equipment that is capable of supporting the weight of the product.
- Always suspend the product in four sections. (do not suspend the product two sections as this is dangerous)
- Use the appropriate protective pads to ensure that the rope does not rub against the outer panel.
- Refer to the section "Center of Gravity", and suspend the unit while taking care to prevent a deviated center of gravity.

en



a Plate suspension fittings
b 10 m or longer × 2 ropes (5 m or longer × 4 ropes)
c Protective pads
d 1.6 m or more
e Unit

⚠ WARNING

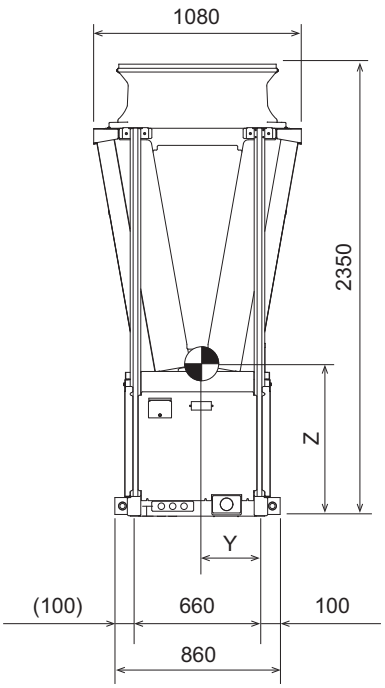
- **Lift the unit by placing the slings at designated locations. Support the unit securely at four points to keep it from slipping and sliding. If the unit is not properly supported, it may fall and cause personal injury.**

3-2. Center of Gravity

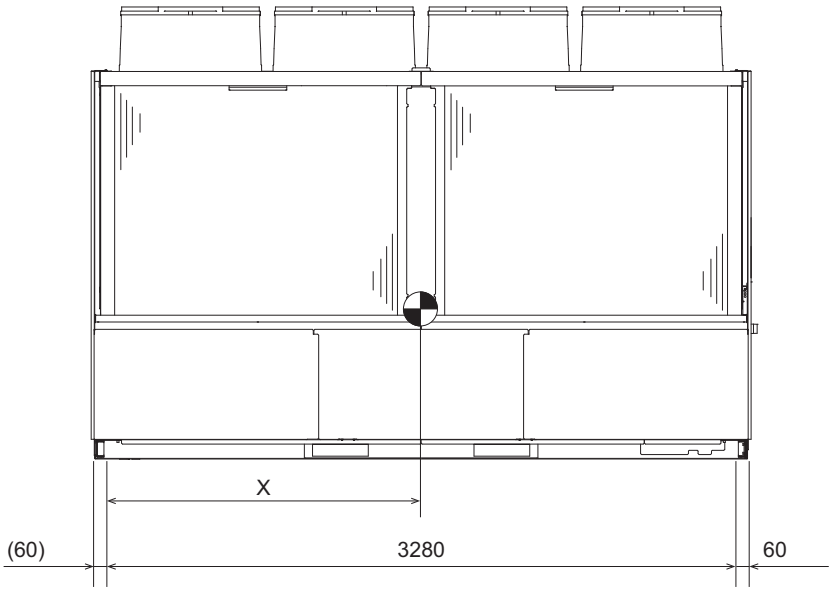
The center of gravity position is shown with the ◓ mark.

Standard piping type

Unit: mm



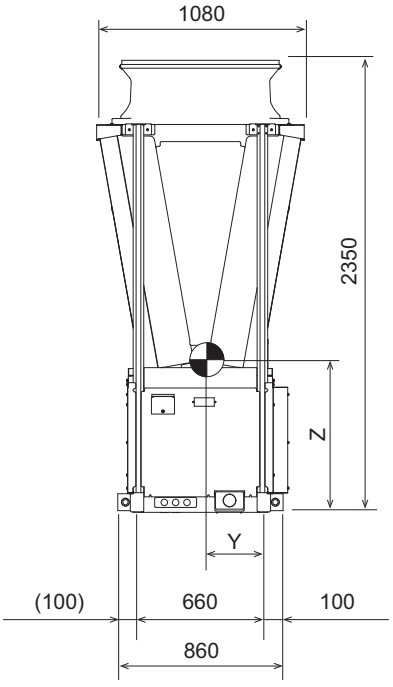
<Service side>



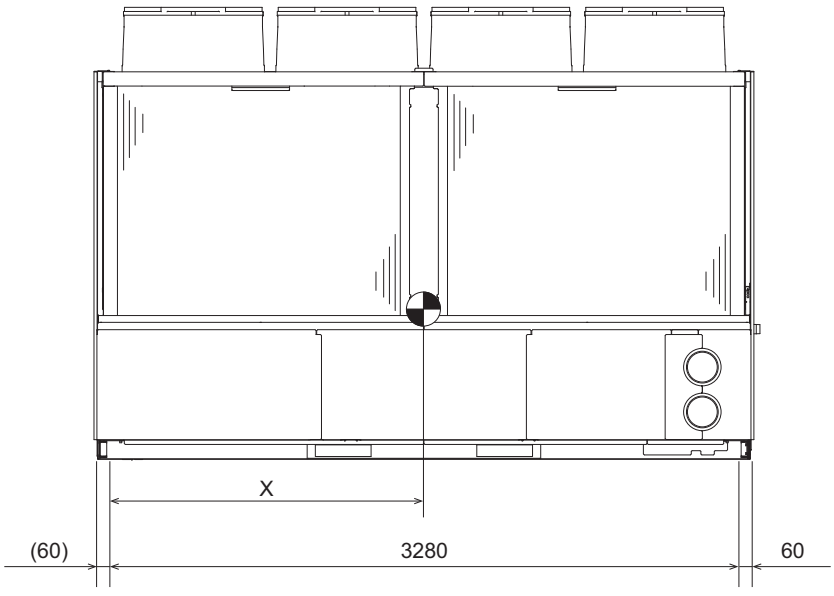
<Right side>

Inside header piping type

Unit: mm



<Service side>



<Right side>

Unit: mm

Model	X	Y	Z
EAHV-M1500, 1800YCL(-BS)	1610	350	790
EACV-M1500, 1800YCL(-BS)	1620	350	730
EAHV-M1500, 1800YCL-N(-BS)	1710	350	760
EACV-M1500, 1800YCL-N(-BS)	1740	350	705

3-3. Installation on foundation

- Securely fix the unit with bolts to keep the unit from falling down during earthquakes.
- Install the unit on a foundation made of concrete or iron.
- Noise and vibrations from the unit may be transmitted through the floor and walls. Provide adequate protection against noise and vibration. (Such as using damper pads)

⚠ WARNING

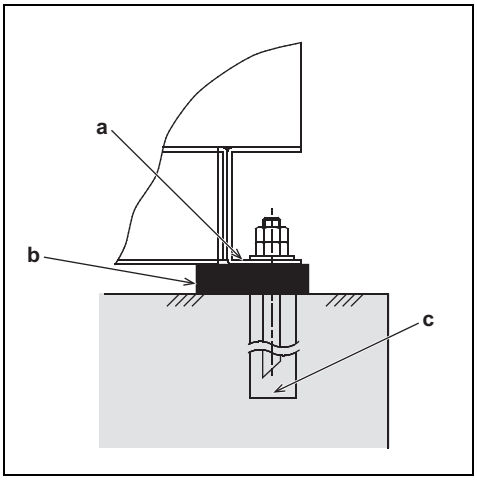
- **Be sure to install the unit on a surface strong enough to withstand its weight to keep the unit from falling down and causing injury.**
- **Provide adequate protection against earthquakes. Improper installation may cause the unit to fall down, resulting in personal injury.**

en

When building the foundation, take the floor strength, and piping and wiring routes into consideration.
When using damper pads, be sure to attach them to all corners of the unit.

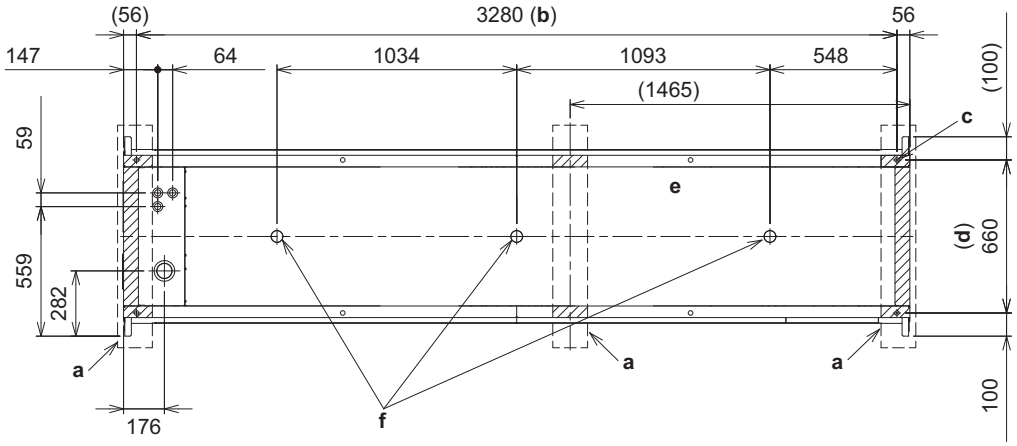
Bolt size	Number
M16	4

Enlarged view



a Base frame
b Damper pad
c Adhesive

Unit: mm



show mounting surface.

a Foundation
b Anchor bolt hole pitch
c 4-ø20 holes
Bolt size: M16
d Anchor bolt hole pitch
e Base surface (unit bottom)
f Drain discharge hole 3-ø50

4. Water Pipe Installation

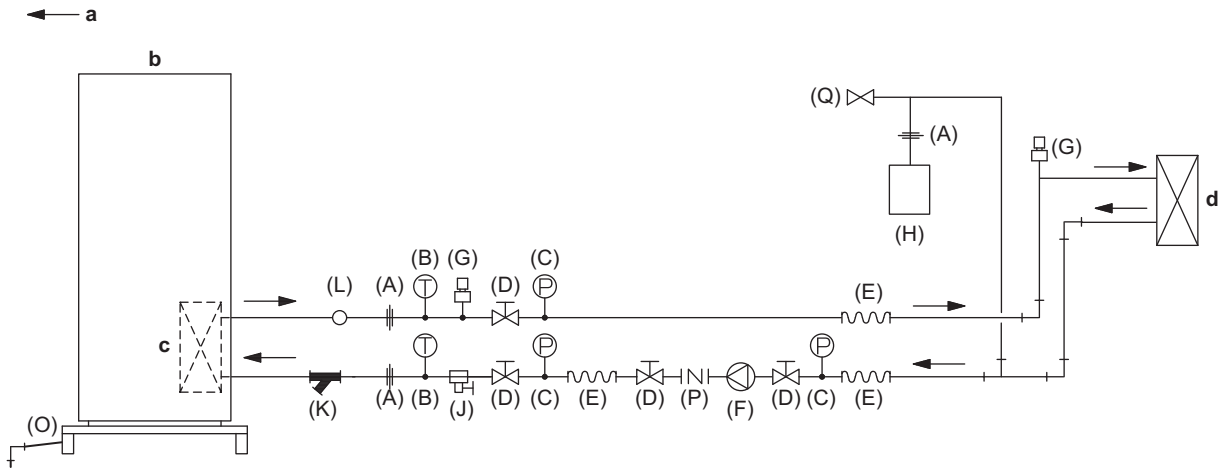
4-1. Schematic Piping Diagram and Piping System Components

[1] Water circuit

WARNING

Please build the water circuit so that it is a closed system.

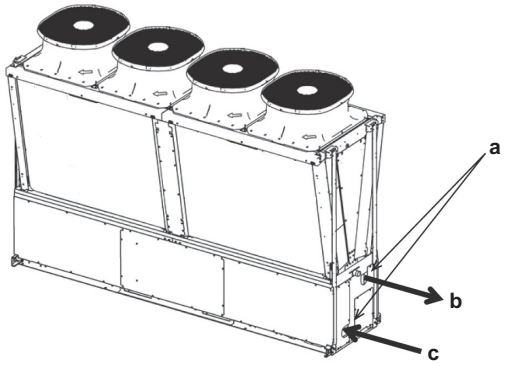
- Do not use water directly for showers or other applications.
- Do not allow other heat source water to mix with the water circuit.
- Build a water circuit as inlet water temperature fluctuation is within 5ºC/10 minutes.

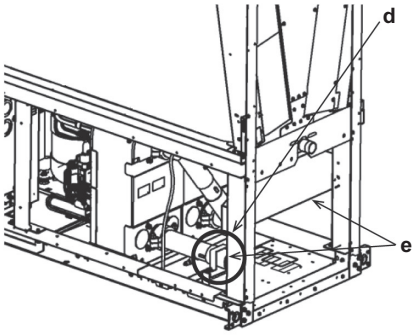


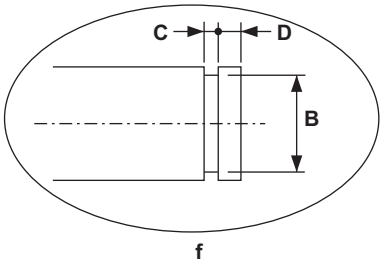
a Indicates the direction of the flow.
b Unit
c Water-side heat exchanger
d Air conditioning, floor heating, etc.

(A)	Union joints/flange joints	Required to allow for a replacement of equipment.
(B)	Thermometer	Required to check the performance and monitor the operation of the units.
(C)	Water pressure gauge	Recommended for checking the operation status.
(D)	Valve	Required to allow for a replacement or cleaning of the flow adjuster.
(E)	Flexible joint	Recommended to prevent the noise and vibration from the pump from being transmitted.
(F)	Pump	Use a pump that is large enough to compensate for the total water pressure loss and supply sufficient water to the unit.
(G)	Automatic air vent valve	Install automatic air vent valves where air accumulates. Even in the case of a failure of the water-side heat exchanger in the unit, the refrigerant may leak from the automatic air vent valve. To prevent accidents resulted from refrigerant leakage, install the unit where leaked refrigerant will not accumulate, such as outdoors.
(H)	Closed expansion tank	Install a closed expansion tank to accommodate expanded water and to supply water.
(I)	Water pipe	Use pipes that allow for easy air purging, and provide adequate insulation.
(J)	Drain valve	Install drain valves so that water can be drained for servicing.
(K)	Strainer	Install a strainer near the unit to keep foreign materials from entering the water-side heat exchanger.
(L)	Flow switch	Required to protect the unit.
(O)	Drain pipe	Install the drain pipe with a downward inclination of between 1/100 and 1/200. To prevent drain water from freezing in winter, install the drain pipe as steep an angle as practically possible and minimize the straight line. For cold climate installation, take an appropriate measure (e.g., drain heater) to prevent the drain water from freezing.
(P)	Check valve	Required to prevent the backward flow.
(Q)	Safety valve	Install a safety valve near the closed expansion tank. Even in the case of a failure of the water-side heat exchanger in the unit, the refrigerant may leak from the safety valve. To prevent accidents resulted from refrigerant leakage, install the unit where leaked refrigerant will not accumulate, such as outdoors.

4-2. Standard piping type

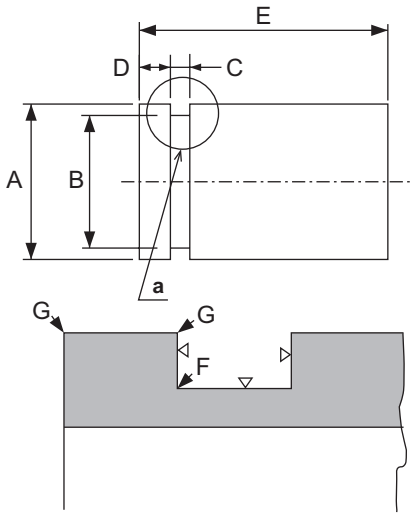






a 65A housing type joint
b Water outlet
c Water inlet
d Connection detail
e Groove pipes at chiller side
f The dimension of the groove pipe at the chiller side

Groove specifications

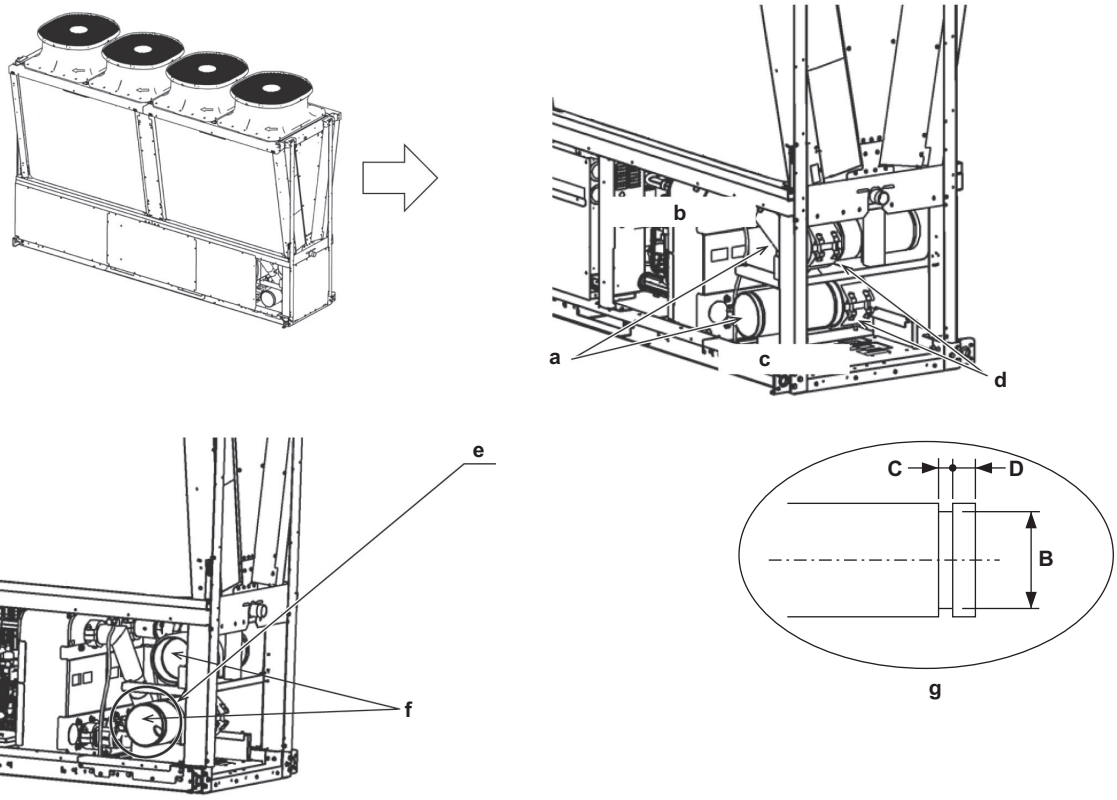


Unit: mm

	Pipe size
	2-1/2B (65A)
A	ø76.1
B	ø72.2 $^{+0}_{-0.4}$
C	8.7 $^{+0}_{-0.7}$
D	15.88 $^{+0}_{-0.7}$
E	50.0
F	R1.0
G	C0.5

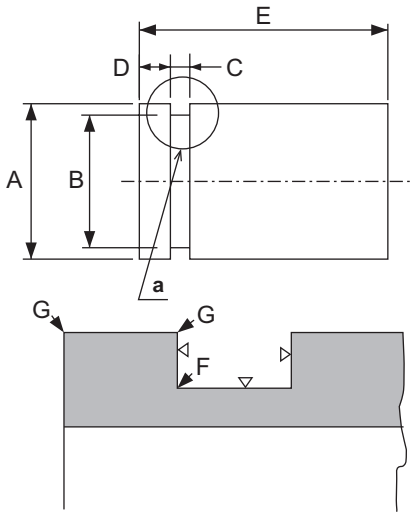
a Groove detail

4-3. Inside header piping type



a 150A housing type joint
b Water outlet
c Water inlet
d Pipe coupling
e Connection detail
f Groove pipes at chiller side
g The dimension of the groove pipe at the chiller side

Groove specifications

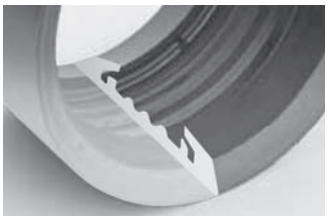


Unit: mm

	Pipe size
	6B (150A)
A	ø165.1
B	ø160.8
C	$8.7\ ^{+0}_{-0.7}$
D	$15.88\ ^{+0}_{-0.7}$
E	50.0
F	R1.0
G	C0.5

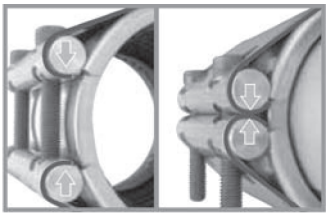
a Groove detail

Installing the pipe coupling

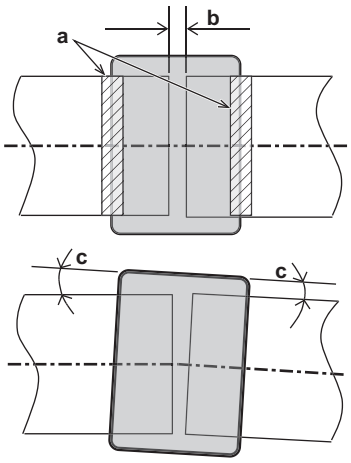


The seal rubber has a lip construction to improve water stopping performance.

Adjust the Pipe coupling position to that the marking on both sides is visible.



The bolts need only be tightened until the casing is sealed (metal touches).
Consequently, the procedure can be carried out accurately by anyone to the same level, regardless of worker proficiency or the type of pipe.



- Allowable tolerance for gaps and tilting

a Marking
b Pipe gap tolerance: 0 to 25 mm
c Allowable pipe tilt angle: ±2°

en

4-4. Notes on Pipe Corrosion

Water treatment and water quality control

Poor-quality circulating water can cause scale build-up and corrosion in the water-side heat exchanger, reducing heat-exchange performance. Properly control the quality of the circulating water.

- Removing foreign objects and impurities in the pipes

  During installation, keep foreign objects, such as welding and sealant fragments and rust, out of the pipes.

- Water Quality Control

(1) Poor-quality water can corrode or scale up the heat exchanger. Regular water treatment is recommended.

Water circulation systems using open heat storage tanks are particularly prone to corrosion.

When using an open heat storage tank, install a water-to-water heat exchanger, and use a closed-loop circuit.

If a water supply tank is installed, keep contact with air to a minimum, and keep the level of dissolved oxygen in the water no higher than 1 mg/ℓ.

(2) Water quality standard

Items			Lower mid-range temperature water system Water Temp. ≤ 60ºC		Higher mid-range temperature water system Water Temp. > 60ºC		Tendency	
			Recirculating water	Make-up water	Recirculating water	Make-up water	Corrosive	Scale-forming
Standard items	pH	(25°C)	7.0 – 8.0	7.0 – 8.0	7.0 – 8.0	7.0 – 8.0	○	○
	Electric conductivity	(mS/m) (25°C)	30 or less	30 or less	30 or less	30 or less	○	○
		(μs/cm) (25°C)	[300 or less]	[300 or less]	[300 or less]	[300 or less]		
	Chloride ion	(mg Cl^-/ℓ)	50 or less	50 or less	30 or less	30 or less	○	
	Sulfate ion	(mg $SO4^{2-}$/ℓ)	50 or less	50 or less	30 or less	30 or less	○	
	Acid consumption	(pH4.8) (mg $CaCO_3$/ℓ)	50 or less	50 or less	50 or less	50 or less		○
	Total hardness	(mg $CaCO_3$/ℓ)	70 or less	70 or less	70 or less	70 or less		○
	Calcium hardness	(mg $CaCO_3$/ℓ)	50 or less	50 or less	50 or less	50 or less		○
	Ionic silica	(mg SiO_2/ℓ)	30 or less	30 or less	30 or less	30 or less		○
Reference items	Iron	(mg Fe/ℓ)	1.0 or less	0.3 or less	1.0 or less	0.3 or less	○	○
	Copper	(mg Cu/ℓ)	1.0 or less	1.0 or less	1.0 or less	0.1 or less	○	
	Sulfide ion	(mg S^{2-}/ℓ)	Not to be detected	Not to be detected	Not to be detected	Not to be detected	○	
	Ammonium ion	(mg NH_4^+/ℓ)	0.3 or less	0.1 or less	0.1 or less	0.1 or less	○	
	Residual chlorine	(mg Cl/ℓ)	0.25 or less	0.3 or less	0.1 or less	0.3 or less	○	
	Free carbon dioxide	(mg CO_2/ℓ)	0.4 or less	4.0 or less	0.4 or less	4.0 or less	○	
	Ryznar stability index		–	–	–	–	○	○

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

(3) Please consult with a water quality control specialist about water quality control methods and water quality calculations before using anti-corrosive solutions for water quality management.

(4) When replacing a chilling unit (including when only the heat exchanger is replaced), first analyze the water quality and check for possible corrosion.

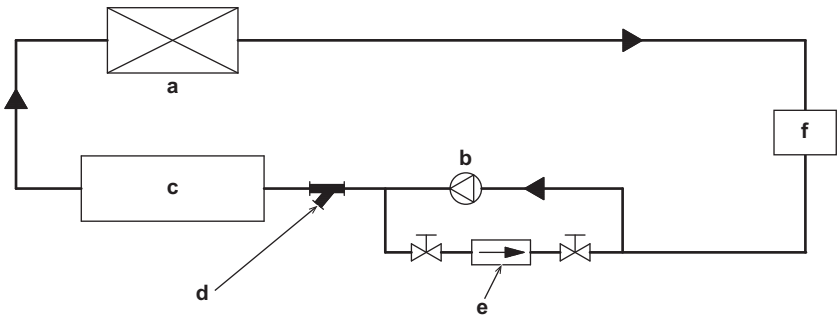
Corrosion can occur in water systems in which there has been no signs of corrosion. If the water quality level has dropped, adjust the water quality before replacing the unit.

(5) Suspended solids in the water

Sand, pebbles, suspended solids, and corrosion products in water can damage the heating surface of the heat exchanger and cause corrosion. Install a good quality strainer (20 mesh or more) at the inlet of the unit to filter out suspended solids.

Removing foreign substances from the water system

Consider installing a settlement tank or a bypass strainer to remove foreign substances from the water system. Select a strainer capable of handling two to three percent of the circulating water. The figure below shows a sample system with a bypass strainer.



a Load system unit
b Pump
c Heat pump unit
d Strainer (20 mesh or more)
e Bypass strainer (100 mesh or more)
f Tank

(6) Connecting pipes made from different materials

If different types of metals are placed in direct contact with each other, the contact surface will corrode. Install an insulating material between pipes that are made of different materials to keep them out of direct contact with each other.

(7) Piping material

Use hot water output piping material that can withstand heat of 60°C or more. Use hot water input piping material that can withstand the maximum input water temperature. All piping must be made of SUS or similar material to withstand corrosion.

4-5. Installing the Strainer and Flow Switch

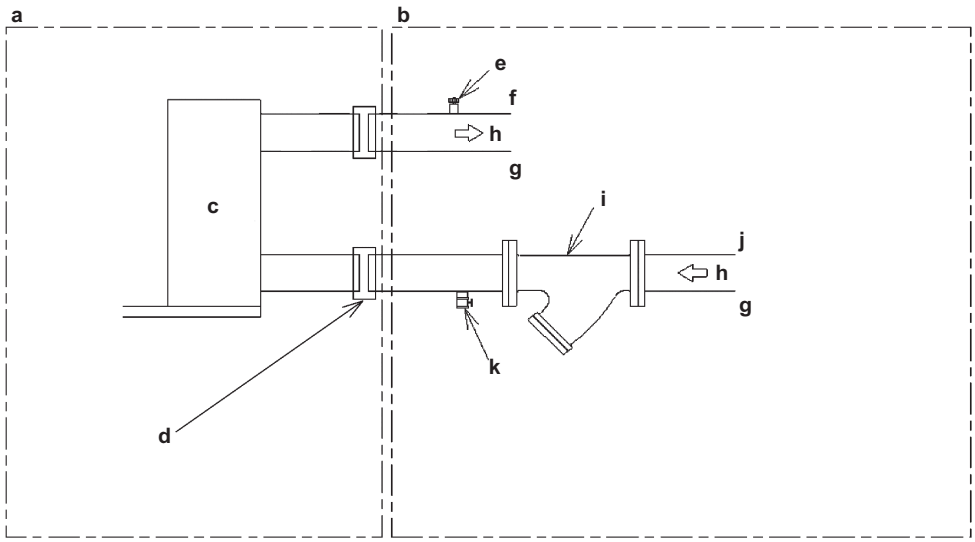
4-5-1. Installing the strainer

Install a strainer on the inlet pipe near the unit to filter out suspended solids and prevent clogging or corrosion of the heat exchanger.

Install a strainer in a way that allows for easy access for cleaning, and instruct the user to clean it regularly.

Operating the units with a clogged strainer may cause the units to make an abnormal stop.

Select a location to install a strainer, taking into consideration the installation angle, insulation thickness, and maintenance space.



a Unit
b Construction site
c Water side heat exchanger
d Housing joint
e Air vent valve
f Outlet
g On-site piping
h Water
i Strainer (20 mesh or more) (Not supplied)
j Inlet
k Drain valve

4-5-2. Installing a flow switch

Install a flow switch that meets the following specifications on the water pipe.

Connect the flow switch to the flow switch contact on the unit.

Minimum flow rate= 12.9 m^3/h (215 L/min)

Unit usage range (water flow rate): 12.9 - 45.0 m^3/h

4-6. Installing the external water temperature sensor

[1] Parts that are required to install an external water temperature sensor TW-TH16

1) External water temperature sensor
2) Wiring to connect the sensor and the unit *1
3) Wiring terminals to connect the wiring to the sensor and the terminal block on the unit
(Four for M4 screws) *1

*1: Items 2) and 3) are field supplied.

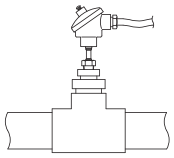
Wire specifications

Wire size	2-core cable Min. 1.25 mm^2
Type	CVVS or CPEVS
Maximum length	20 m

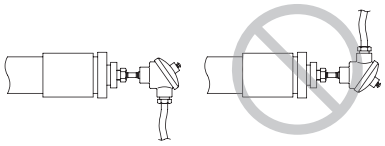
en

[2] Installing the external water temperature sensor

- Install the external water temperature sensor where the water pipes merge or on the load-side tank as shown in the figure below.
- Install horizontally or vertically on top of the pipe.
- When installing horizontally, make sure the wire faces down.



Vertical installation

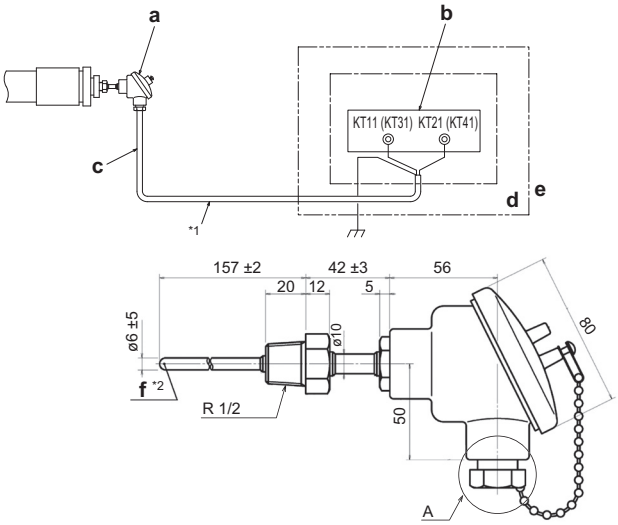


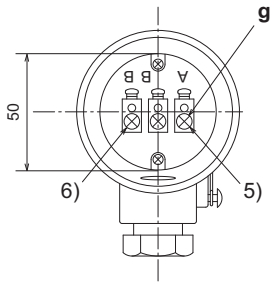
Horizontal installation

[3] Wiring the external water temperature sensor

Connect the external temperature sensor wiring to the terminal block in the control box on the unit as shown in the figure below.

Unit: mm





Terminal block for connection to the sensor

a External water temperature sensor
b Terminal block in the control box on the unit
c Sensor wire
d Control box
e Unit
f Sensor
g M4 screws × 3 (Terminal screws)

*1: Run the sensor wiring at least 5 cm away from any wire that carries a voltage of 100 V or more, and do not put the sensor wiring in the same conduit tube with it.

*2: Sensor properties
Resistance: R = 15 KΩ ± 3% (0 °C)
B-constant: 3460 K

Connect the sensor wiring to terminals KT11 and KT21 (or KT31 and KT41) of the terminal block in the control box on the unit.

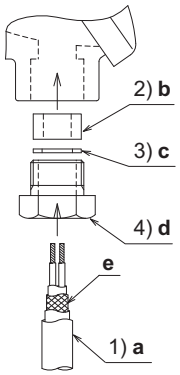
Connect the shield to the earth terminal.

Thread the wire to the external water temperature sensor through parts 2) through 4) as shown in the figure below. Attach M4 terminals (field-supplied) to the wires, and connect them to 5) and 6) (terminals A and B).

Cut the shield wire. Do not connect it to the terminal. (Connect the shield on the unit side to the ground terminal.)

After the wire is connected, securely tighten the tightening screw 4), and then caulk the gap between the wire 1) and the tightening screw to keep water from entering.

*1: In a multiple module connection system, install the temperature sensor where the cold/hot water from each module is sufficiently mixed to provide a representative temperature.
*2: The temperature sensor must be installed on a pipe between the outlet of the unit and the entrance to the load-side system.
*3: Install the sensor at least 5D (D: pipe diameter) away from pipe bends and other areas that can obstruct the normal water flow and so that the sensing probe (protective tube) will not vibrate from the whirl or shock flow.
*4: The sensor is for use at a flow rate of 3 m/sec or below.



a Field-supplied wire
b Water-sealing rubber (Internal diameter ø11)
c Washer (Internal diameter ø12)
d Tightening screw (Internal diameter ø15)
e Shield (to be cut)

Detailed view of the area labeled "A" in the figure above

4-7. Ensuring enough water in the water circuit

4-7-1. Required amount of water (for single unit)

If the amount of water in the water circuit (circulating water circuit) is insufficient, the unit operation hours may become shorter or the amount of water temperature change to be controlled may become extremely large. Also, the defrost operation during the heating mode may not function properly. Refer to the table below for the minimum amount of water required in the circuit. If the water pipe is too short to keep enough amount of water, install a cushion tank in the water pipe to ensure enough amount of water.

Model	Minimum amount of water <ℓ>
EAHV-M1500/1800YCL	1650
EACV-M1500/1800YCL	850

en

[1] Calculating the required amount of water in the water circuit

The required amount of water in the water circuit can be obtained from the following formula.

(Required amount of water in the water circuit) = (Amount of water that can be held in the water pipe) + (Amount of water that can be held in the heat source unit) + (Amount of water that can be held in the load-side unit)

The amount of water that can be held per meter of the water pipe <ℓ/m>

Pipe size					
2 1/2B (65A)	3B (80A)	4B (100A)	5B (125A)	6B (150A)	8B (200A)
3.77	5.16	8.87	13.23	18.91	32.44

The amount of water that can be held in the heat source unit <ℓ>

Standard	Inside header piping type
35	75

[2] Inlet/Outlet pipe connection size and material

The table below shows the inlet/outlet pipe connection size.

Inlet/Outlet pipe connection size

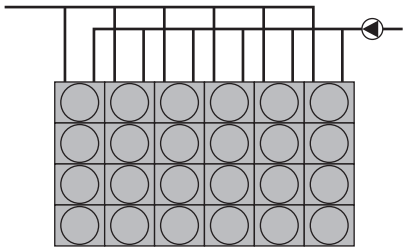
Piping type	Inlet pipe connection	Outlet pipe connection
Standard	65A housing type joint (Field-supplied housing joint)	65A housing type joint (Field-supplied housing joint)
Inside header piping type	150A housing type joint (Field-supplied housing joint)	150A housing type joint (Field-supplied housing joint)

4-7-2. Required amount of water (for multiple units)

The total water volume required for an air conditioning system is determined by whichever operation (cooling or heating) requires more water.

Cooling operation: 850 L per unit

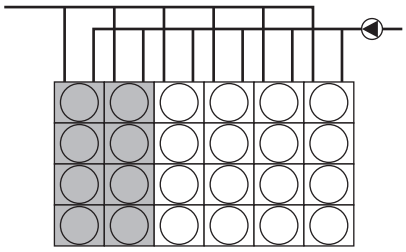
The total water volume required for a system is the sum of the water required for each unit in the system.



The system shown above requires six times the volume of water required for a single unit.

Heating operation: 1650 L per unit

The total water volume required for a system is the sum of the water required for all units that simultaneously go into the defrost mode in the same water system.



Two units operate in the defrost mode while the function to suppress the simultaneous operation of multiple units in the defrost mode is enabled.

Requires twice as much water as a system with a single unit

[1] Simultaneous operation of multiple units in the defrost mode

This operation is performed to keep multiple units from simultaneously operating in the defrost mode which leads to a sudden decrease in supply temperature.

This function sets the ratio of units that can simultaneously be operated in the defrost mode in the same water system and the ratio of units that can simultaneously be operated in the groups that are concurrently operated, and suppresses the number of units that operate in the defrost mode at the same time.

Ratio of units that are operable in the defrost mode in the same system	40% (Enabled)
Ratio of units that are operable in the defrost mode in the groups that are concurrently operated	35% (Enabled)

Calculation results less than 1 unit will be rounded up to 1 unit.

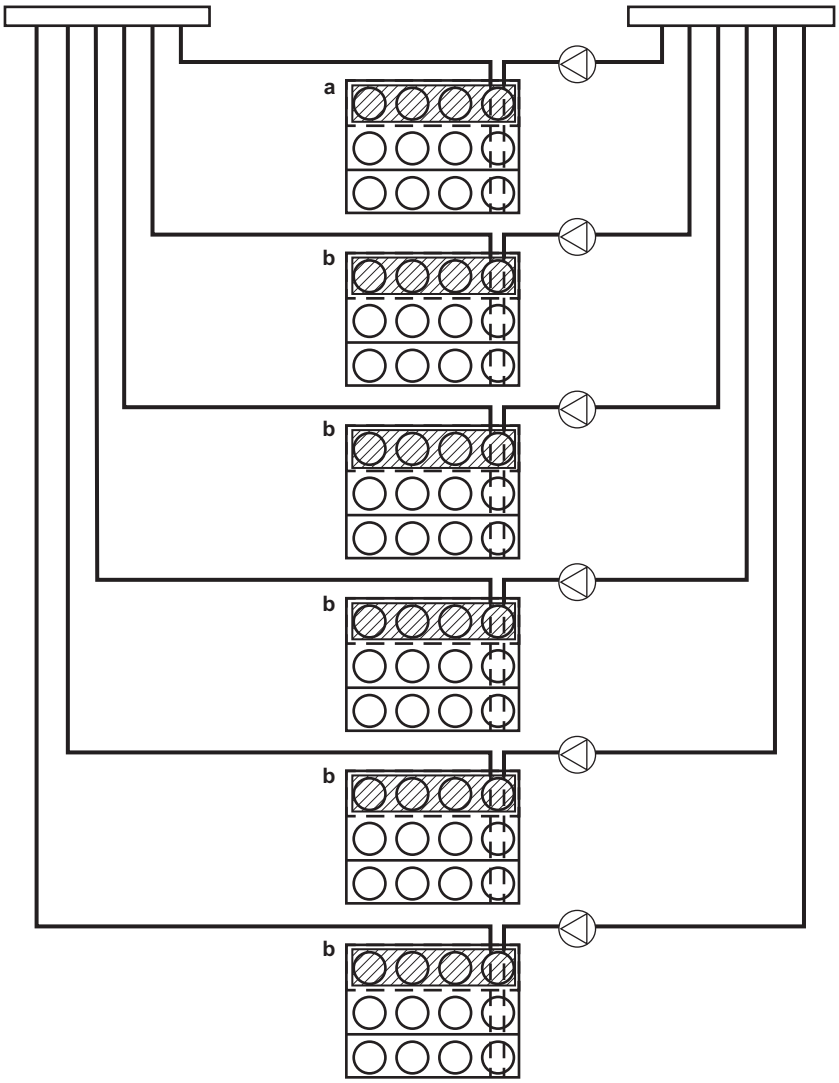
Calculation results more than 1 unit will be rounded down to the nearest integer.

The representative unit of the system and the representative unit of the simultaneously operated groups send a command to allow defrost operation to the unit that meets the defrost conditions, ensuring that the total number of units operating in the defrost mode will not exceed the set value.

* Each unit will not go into the defrost mode until it receives a command to allow defrost operation. However, if a command to allow defrost operation is not sent within 60 minutes after the defrost conditions are met, defrost operation will start regardless of the above settings.
* If set to a value lower than the default value, defrost operation may not be performed properly. Additionally, this may cause multiple units to go into the defrost mode simultaneously. Do not set this value below the default value.

Example system with 18 EAHV-M1500YCL units (with 6 simultaneously operated groups)

There are 7 units (18 units × 40% = 7.2 units → 7 units) that are simultaneously operable in the defrost mode within the system. Among the simultaneously operated groups, a total of 6 units in 6 groups (3 units × 35% = 1.05 unit→ 1 unit, 1 unit × 6 groups = 6 units) can simultaneously perform defrost operation. The maximum number of units that can simultaneously perform defrost operation in this system is 6.



Defrost operation

a Representative unit in the system

b Representative unit in each of the simultaneously operated groups

1) Unit that are operated from the local remote controller are operable in the defrost mode, regardless of the status of the function to suppress simultaneous defrost operation.
However, during defrosting, this unit is counted as a unit in the defrost mode toward simultaneous defrost prevention control among other units that are operated remotely.

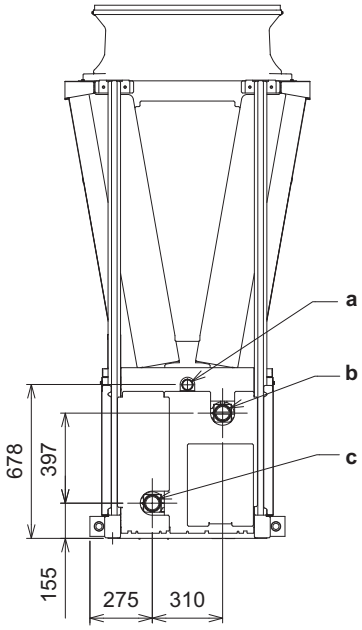
2) The input signal to force the unit to operate in the defrost mode is effective regardless of the setting of simultaneous defrost prevention control for units that are operated both remotely and locally.

3) The unit that is triggered into the defrost mode by this input signal is also counted as a unit in the defrost mode toward simultaneous defrost prevention control among other units that are operated remotely.

4-8. Water Piping Size and Location

[1] Standard piping type

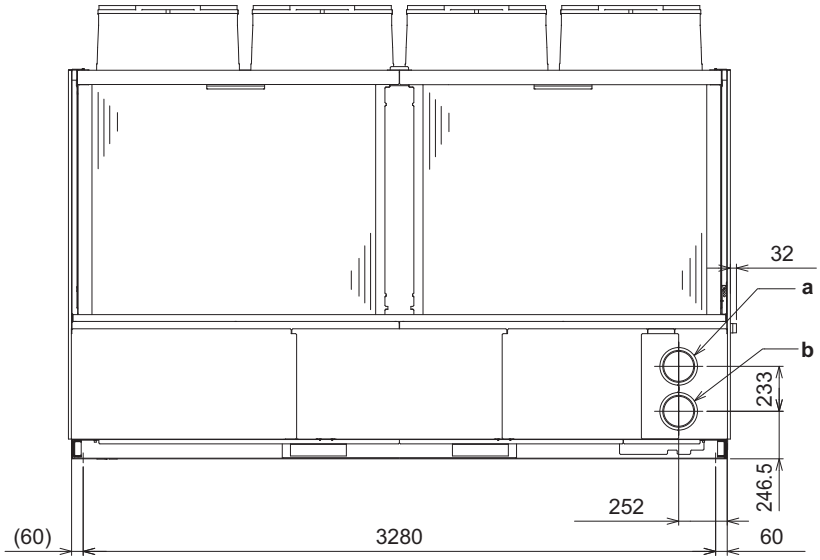
Unit: mm

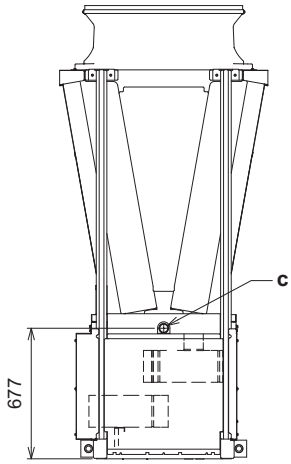


a Drain R1 1/2
b Water outlet 65A housing type joint
c Water inlet 65A housing type joint

[2] Inside header piping type

Unit: mm





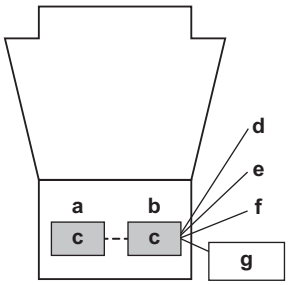
a Water outlet 150A housing type joint
b Water inlet 150A housing type joint
c Drain R1 1/2

5. System Configurations

The system must be configured only by personnel certified by Mitsubishi Electric.

5-1. Schematic Diagrams of Individual and Multiple Units Connection Systems

5-1-1. Individual system



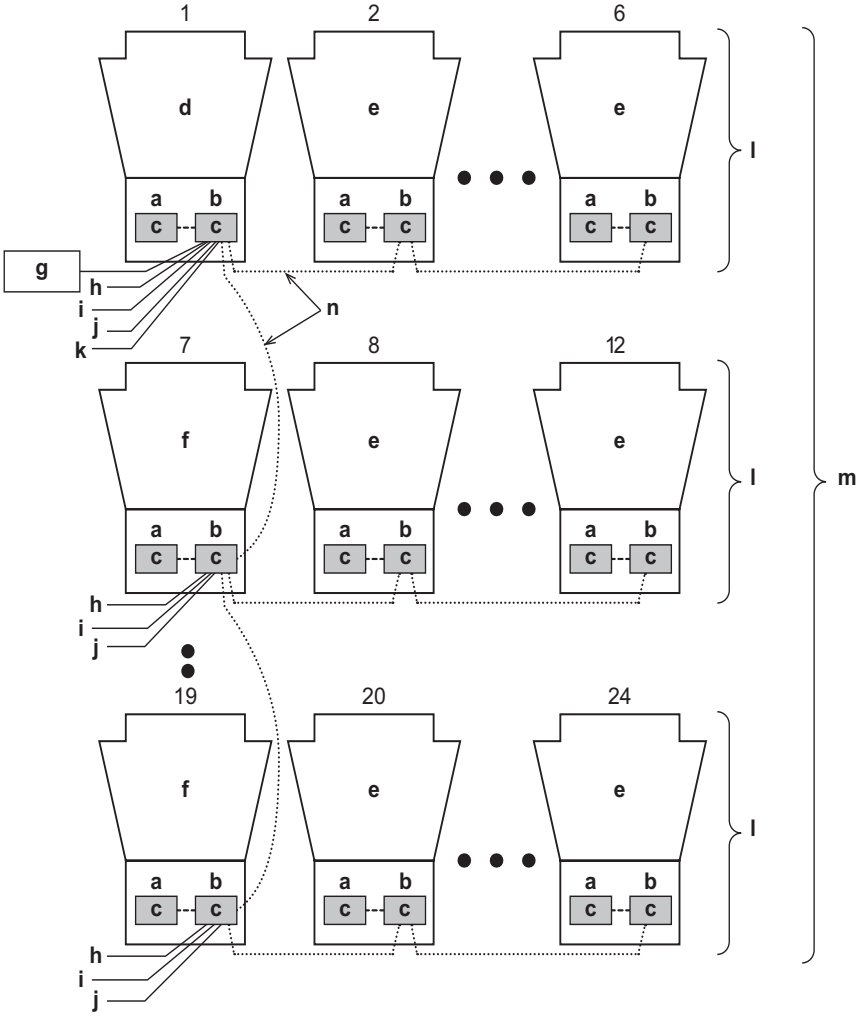
a SUB
b MAIN
c PCB
d External temperature sensor 2 (option)
e Flow switch
f Pump interlock
g Field-supplied dry contact switch/relay, remote controller or centralized controller

Refer to the following page(s) for detail. "Switch Types and the Factory Settings" (p. 33), "Configuring the Settings" (p. 36)

5-1-2. Multiple units connection system (Max 24 units)

System leader unit	The unit controls the identical water system group.
Group leader unit	The unit transmits the command from the system leader unit to the sub unit.
Sub unit	The unit is other than leader unit.

Example system



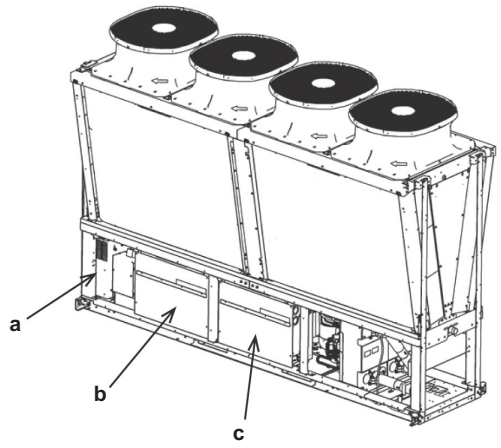
a SUB
b MAIN
c PCB
d System leader unit
e Sub unit
f Group leader unit
g Field-supplied dry contact switch/relay, remote controller or centralized controller
h External temperature sensor 1 (option)
i Flow switch
j Pump interlock
k External temperature sensor 2 (option)
l Simultaneous operating group (Max 6 units)
m Identical water system group (Max 24 units)
n M-NET line

Refer to the following page(s) for detail. "Switch Types and the Factory Settings" (p. 33), "Configuring the Settings" (p. 36)

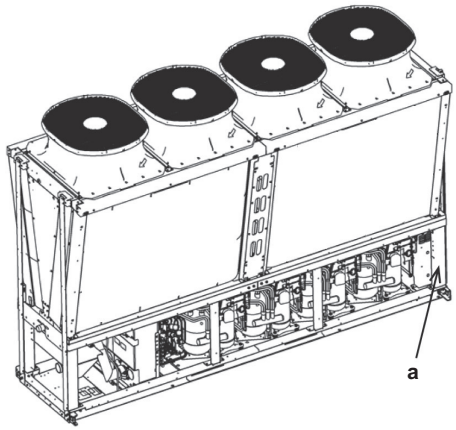
Refer to the following page(s) for details about connecting the flow switch and the pump."Setting the pump system" (p. 47) The example system shows Pattern 1.

5-2. Switch Types and the Factory Settings

5-2-1. Switch names and functions



Right side



Left side

a Terminal box
b Control box for MAIN circuit
c Control box for SUB circuit

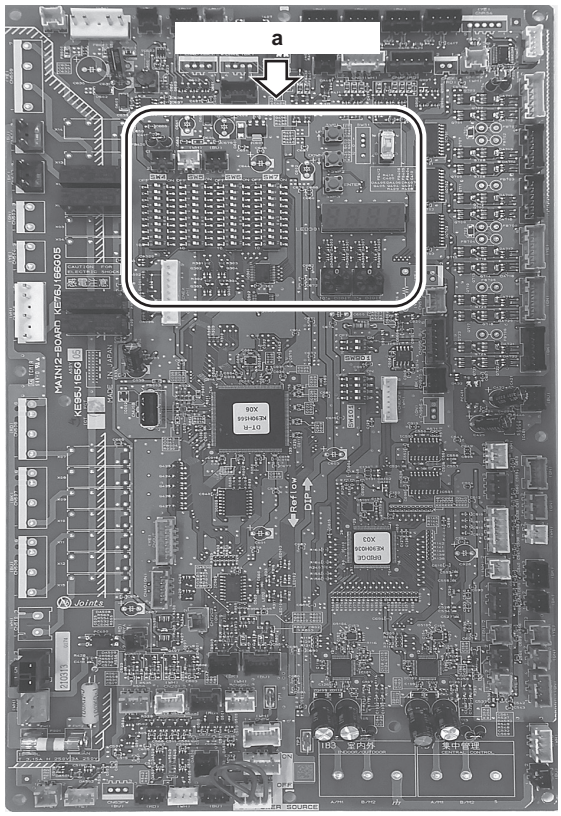
There are three main ways to set the settings as follows:

1) Dip switches (SW4 - SW7)
2) Dip switches used in combination with the push switches
3) Rotary switches

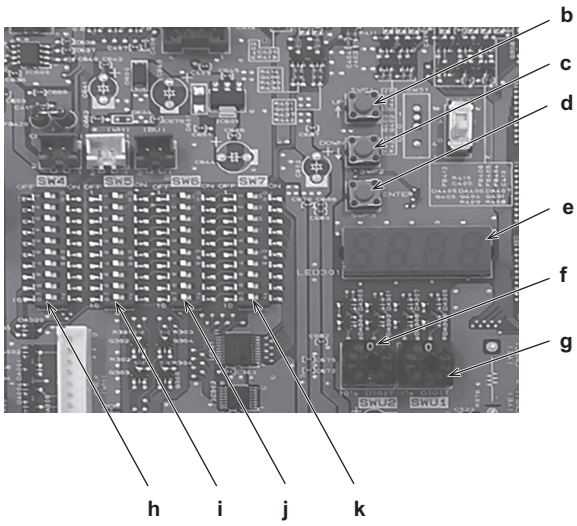
For how these switches are used to set certain items, refer to the following section."Different types of switches on the PCB" (p. 34)

5-2-2. Different types of switches on the PCB

Control board

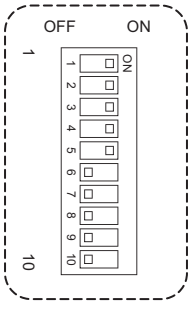


Enlarged view of operation area

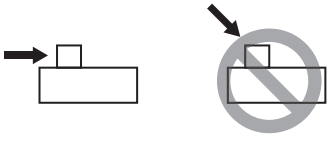


a Operation area
b Push switch (SWP1)
c Push switch (SWP2)
d Push switch (SWP3)
e LED display
f Rotary switch (SWU2) (0-9)
g Rotary switch (SWU1) (0-9)
h Dip switch (SW4)
i Dip switch (SW5)
j Dip switch (SW6)
k Dip switch (SW7)

			Initial Setting	
			MAIN circuit	SUB circuit
Rotary switch	SWU1	Sets the 1's digit of the unit address.	"1"	"1"
	SWU2	Sets the 10's digit of the unit address.	"0"	"5"
Push switch	SWP1	Use for increasing the setting value.	–	–
	SWP2	Use for decreasing the setting value.	–	–
	SWP3	Use for changing and deciding the setting value.	–	–
Dip switch	SW4-7	Select a setting which is decided with a combination of switch numbers.	–	–



a



b

a Example: on the upper figure. 1 to 5 are “ON” and 6 to10 are“OFF”.
b Slide the dip switches: do not push down the switches.

5-2-3. Factory Switch Settings (Dip switch settings table)

SW		Function	Usage	Factory setting: MAIN circuit	Factory setting: SUB circuit	OFF setting	ON setting	System leader unit	Group leader unit	SUB unit	Setting timing
SW4	1	Settings change or view the settings	These switches are used for setting change with push switch SWP 1, 2 and 3.	OFF	OFF	The 7-segment LED display is changed.		Depends on the setting	Depends on the setting	Depends on the setting	Depends on the setting
	2										
	3										
	4										
	5										
	6										
	7										
	8										
	9										
	10										
SW5	1	Model setting		–	–	Leave the setting as it is.		–	–	–	At a reset
	2	System setting	Set the duties to each unit.	OFF	–	System leader unit 2: ON, 3: ON Group leader unit 2: ON, 3: OFF Sub unit 2: OFF, 3: OFF		Required	Required	Required	At a reset
	3										
	4	Water-temperature control 1 (option)	Selects either the external water temperature sensor or the built-in sensor to be used to control water temperature. (Simultaneous operating group)	OFF	–	Built-in sensor on the unit	External water temperature sensor 1	Required	Required	Required	At a reset
	5	Water-temperature control 2 (option)	Selects target temperature correction control. (Identical water system group)	OFF	–	OFF	ON (External water sensor 2 is required.)	Required	Fixed OFF	Fixed OFF	At a reset
	6	Multiple unit control	Selects optimum control of number of operating units.	OFF	–	Ineffective	Effective	Required	Fixed OFF	Fixed OFF	At a reset
	7	Analog input setting	Allows or disallows the analog signals from a remote location.	OFF	–	Disallows the external analog signals.	Allows the external analog signals.	Required	Fixed OFF	Fixed OFF	At a reset
	8	Analog input signal switching	Selects either the water temperature or the capacity control ratio. (Effective only when SW5-7 is set to ON.)	OFF	–	Water temperature	Capacity control ratio	Required	Fixed OFF	Fixed OFF	At a reset
	9	BMS setting *1		OFF	–	No input from BMS	Input from BMS	Required	Fixed OFF	Fixed OFF	At a reset
	10	BMS group setting		OFF	OFF	Leader units	Simultaneous operating group units	Fixed OFF	Fixed OFF	Fixed OFF	Any time
SW6	1	Analog input type setting	Selects analog input 4-20mA/ 0-10V/1-5V/2-10V. (Effective only when SW5-7 is set to ON and SW5-9 is set to OFF.)	OFF	–	4-20mA 1: OFF, 2: OFF 1-5V 1: ON, 2: OFF 0-10V 1: OFF, 2: ON 2-10V 1: ON, 2: ON		Required	Fixed OFF	Fixed OFF	Any time
	2										
	3	Model setting		OFF	OFF	Leave the setting as it is.		Fixed OFF	Fixed OFF	Fixed OFF	Any time
	4										
	5										
	6										
	7										
	8										
	9	Auto restart after power failure	Enables or disables the automatic restoration of operation after power failure (in the same mode as the unit was in before a power failure).	ON	ON	An alarm will be issued when power is restored after a power outage. The alarm will be reset when the power is turned off and then turned back on.	Automatically restores operation after power failure.	Required	Required	Required	Any time
	10	Model setting		OFF	OFF	Leave the setting as it is.		Fixed OFF	Fixed OFF	Fixed OFF	Any time

"-" in the table indicates that the function in the corresponding row will be disabled regardless of the actual switch setting.
The factory setting for these items is OFF.

*1:Connection to a BMS requires an installation of Procon A1M (Modbus interface), which is available from MITSUBISHI ELECTRIC UK.
Use a BMS with insulation.

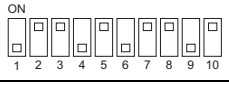
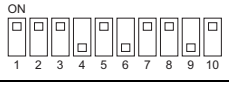
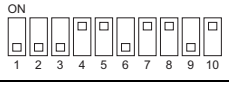
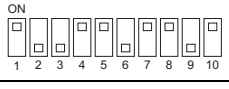
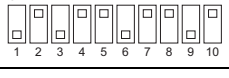
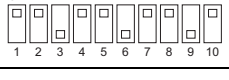
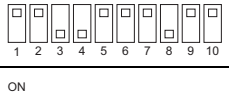
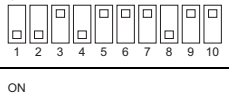
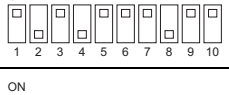
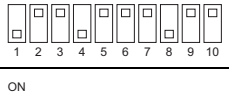
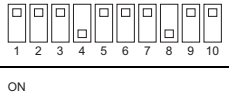
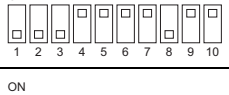
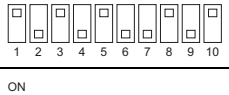
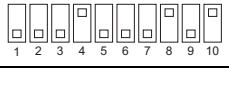
SW5-7	SW5-8	SW5-9	Input from BMS
ON	OFF	ON	Target temperature
ON	ON	ON	Capacity
OFF	OFF	ON	Outdoor temperature

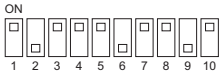
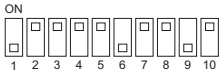
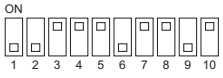
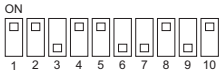
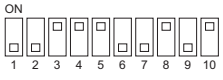
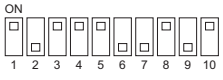
5-3. Configuring the Settings

The settings must be set only by a qualified personnel.

5-3-1. Table of settings items

Set dip switches SW7-1, SW7-2, and SW4 as shown in the table below to set the value for the items in the "Setting item" column.

No.	Dip switch setting *1	Dip switch setting (SW4) *2	Setting Item	Default	Need or non-need to set the setting *5						Notes
					System		Group		Sub		
					M	S	M	S	M	S	
1	SW7-1 ON		Setting temp. 1 (Cooling mode) *3	7ºC	○	–	–	–	–	–	Range 4–30ºC
2	SW7-1 ON		Setting temp. 2 (Cooling mode) *3	7ºC	○	–	–	–	–	–	Range 4–30ºC
3	SW7-1 ON		Setting temp. 1 (Heating mode) *4	45ºC	○	–	–	–	–	–	Range 25–55ºC
4	SW7-1 ON		Setting temp. 2 (Heating mode) *4	45ºC	○	–	–	–	–	–	Range 25–55ºC
5	SW7-1 ON		Setting water temp. A at Heating ECO mode *4	52ºC	○	–	–	–	–	–	Range 25–55ºC
6	SW7-1 ON		Setting outdoor temp. A at Heating ECO mode *4	-7ºC	○	–	–	–	–	–	Range -30–50ºC
7	SW7-1 ON		Setting water temp. B at Heating ECO mode *4	30ºC	○	–	–	–	–	–	Range 25–55ºC
8	SW7-1 ON		Setting outdoor temp. B at Heating ECO mode *4	12ºC	○	–	–	–	–	–	Range -30–50ºC
9	SW7-1 ON		Setting water temp. C at Heating ECO mode *4	42ºC	○	–	–	–	–	–	Range 25–55ºC
10	SW7-1 ON		Setting outdoor temp. C at Heating ECO mode *4	2ºC	○	–	–	–	–	–	Range -30–50ºC
11	SW7-2 ON		Setting water temp. D at Cooling ECO mode *3	11.5ºC	○	–	–	–	–	–	Range 4–30ºC
12	SW7-2 ON		Setting outdoor temp. D at Cooling ECO mode *3	20ºC	○	–	–	–	–	–	Range -20–55ºC
13	SW7-2 ON		Setting water temp. E at Cooling ECO mode *3	7ºC	○	–	–	–	–	–	Range 4–30ºC
14	SW7-2 ON		Setting outdoor temp. E at Cooling ECO mode *3	35ºC	○	–	–	–	–	–	Range -20–55ºC
15	SW7-2 ON		Setting water temp. F at Cooling ECO mode *3	10ºC	○	–	–	–	–	–	Range 4–30ºC
16	SW7-2 ON		Setting outdoor temp. F at Cooling ECO mode *3	25ºC	○	–	–	–	–	–	Range -20–55ºC
17	SW7-1 ON		Peak-demand control signal input source	0	○	–	–	–	–	–	0: Dry contact 1: PAR-W31MAA
18	SW7-1 ON		Maximum peak-demand capacity	100%	○	–	–	–	–	–	Range 60-100%

No.	Dip switch setting *1	Dip switch setting (SW4) *2	Setting Item	Default	Need or non-need to set the setting *5						Notes
					System		Group		Sub		
					M	S	M	S	M	S	
19	SW7-1 ON		Preset temp. A (Cooling)	4ºC	○	–	–	–	–	–	Range 4–30ºC
20	SW7-1 ON		Preset temp. B (Cooling)	30ºC	○	–	–	–	–	–	Range 4–30ºC
21	SW7-1 ON		Preset temp. A (Heating)	25ºC	○	–	–	–	–	–	Range 25–55ºC
22	SW7-1 ON		Preset temp. B (Heating)	55ºC	○	–	–	–	–	–	Range 25–55ºC
23	SW7-1 ON		Supplementary heater operation water temp. *4	40ºC	○	–	○	–	○	–	Range 0–55ºC
24	SW7-1 ON		Supplementary heater operation outdoor temp. *4	-10ºC	○	–	○	–	○	–	Range -30–50ºC
25	SW7-1 ON		Drain pan heater operation outdoor temp.	0ºC	○	–	○	–	○	–	Range -40–20ºC
26	SW7-1 ON		Thermo differential 1 (Cooling mode) *3, *6	3ºC	○	–	○	–	○	–	Range 0.2–5ºC
27	SW7-1 ON		Thermo differential 2 (Cooling mode) *3, *6	2ºC	○	–	○	–	○	–	Range 0.2–5ºC
28	SW7-1 ON		Thermo differential 1 (Heating mode) *4, *6	3ºC	○	–	○	–	○	–	Range 0.2–5ºC
29	SW7-1 ON		Thermo differential 2 (Heating mode) *4, *6	2ºC	○	–	○	–	○	–	Range 0.2–5ºC
30	SW7-1 ON		Year setting	–	○	–	–	–	–	–	–
31	SW7-1 ON		Month/Date setting	–	○	–	–	–	–	–	–
32	SW7-1 ON		Current time	–	○	–	–	–	–	–	–

*1: Only the switches designated in the table must be set to ON. (The other switches must be OFF.)

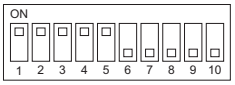
*2: Do not apply undue force when changing the Dip switch settings as this may cause malfunctions.

*3: They are enabled during the cooling. (EAHV, EACV)

*4: They are enabled during the heating. (EAHV)

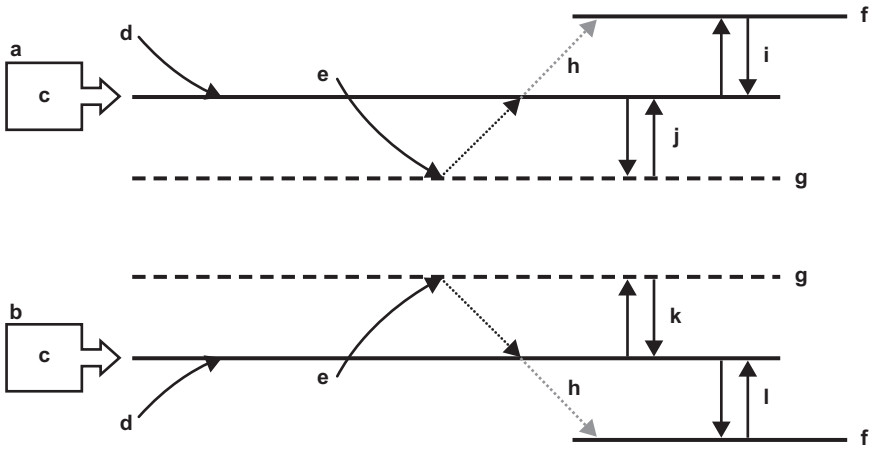
*5: System: System leader unit
Group: Group leader unit
Sub: Sub unit
M: MAIN circuit
S: SUB circuit

*6: Thermo - ON/OFF temperature conditions (water temperature control)



The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

en



a Cooling
b Heating
c Target temp.
d Outlet water temperature changes 1
e Outlet water temperature changes 2
f Thermo-ON temperature
g Thermo-OFF temperature
h Preset water temperature
i Thermo-differential 1 (Cooling mode): 3°C (Default)
j Thermo-differential 2 (Cooling mode): 2°C (Default)
k Thermo-differential 2 (Heating mode): 2°C (Default)
l Thermo-differential 1 (Heating mode): 3°C (Default)

When the water temperature is controlled based on the outlet water temperature, compressor frequency will be controlled in the way that the target water temperature will be maintained.

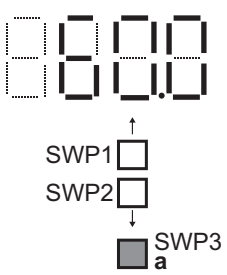
5-3-2. Making the setting value

Use the LED display and the three push switches (SWP1 (↑), SWP2 (↓), and SWP3 (Enter)) to change the current settings on the circuit board and to monitor various monitored values.

[1] Setting procedures

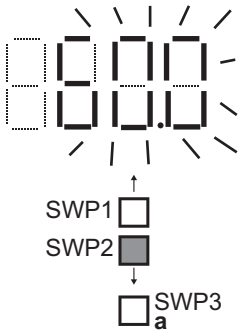
Take the following steps to set the push switches SWP1 through SWP3. These switches must be set after the dip switch SW4 has been set.

1.



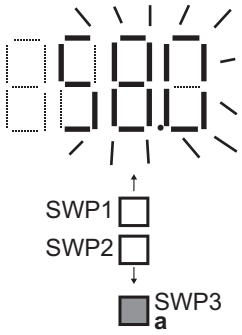
Normally a value of setting item appears on the display.
↓
Press SWP3 (Enter) to enable the configuration changes.

2.



The current setting value will blink.
↓
The left figure shows that the current setting value is "60.0."
To decrease this value to 58.0, for example, press SWP2 (↓).
Press SWP1 (↑) to increase the value.

3.



When the desired value is displayed (58.0 in the example at left), press SWP3 (Enter).
↓
The displayed value will stop blinking and stay lit.
A lit LED indicates that the new setting has been saved.
* Pressing SWP1 (↑) or SWP2 (↓) will change the blinking setting value, but the change will not be saved until SWP3 (Enter) is pressed.
Press and hold SWP1 (↑) or SWP2 (↓) for one second or longer to fast forward through the numbers.

a Enter

5-3-3. System configuration

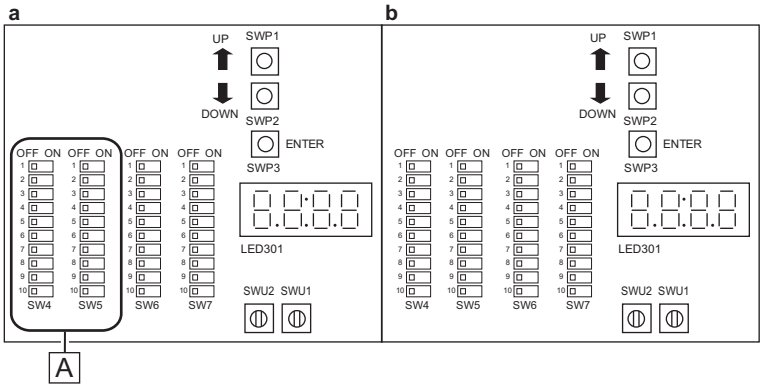
[1] Set the dip switches.

Switch settings on the MAIN circuit

Set the dip switches (labeled A in the figure at right) that correspond to the items below, according to the local system.

- Water temperature control based on the external water temperature reading
- Analog signals from a remote location

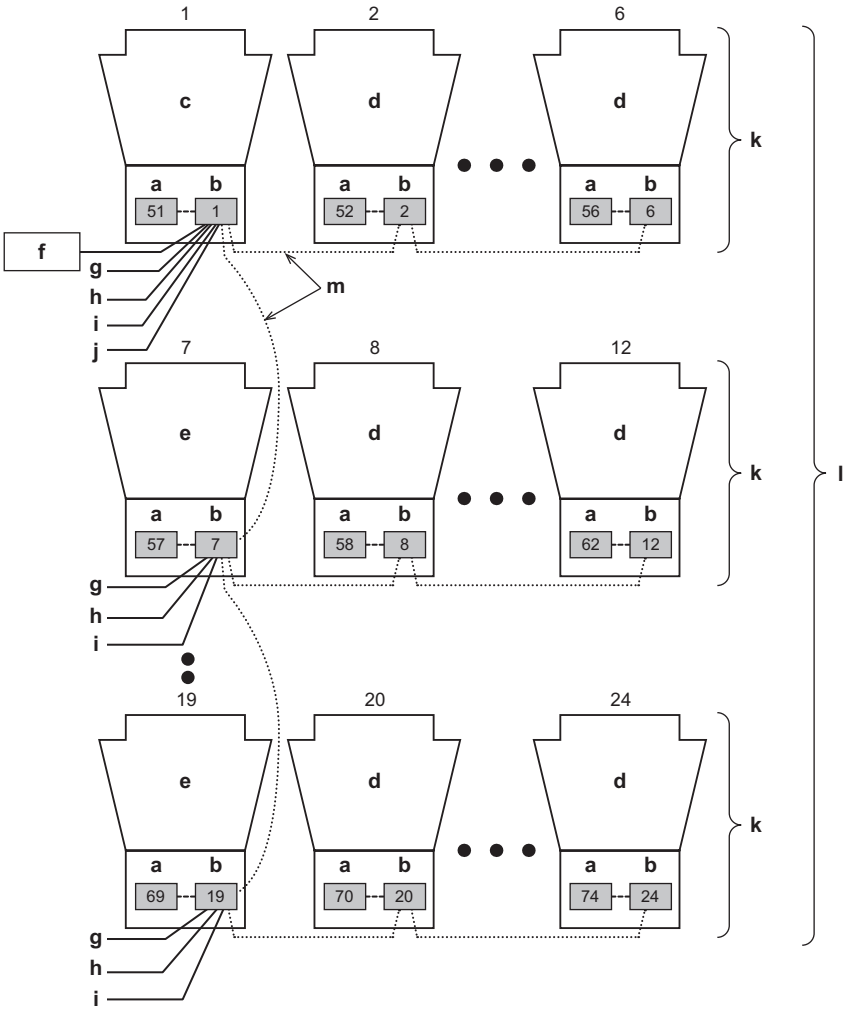
Refer to the following page(s) for detail. "Factory Switch Settings (Dip switch settings table)" (p. 35)



a MAIN circuit board
b SUB circuit board

[2] Set the rotary switches. (Address setting)

(1) Example of address setting



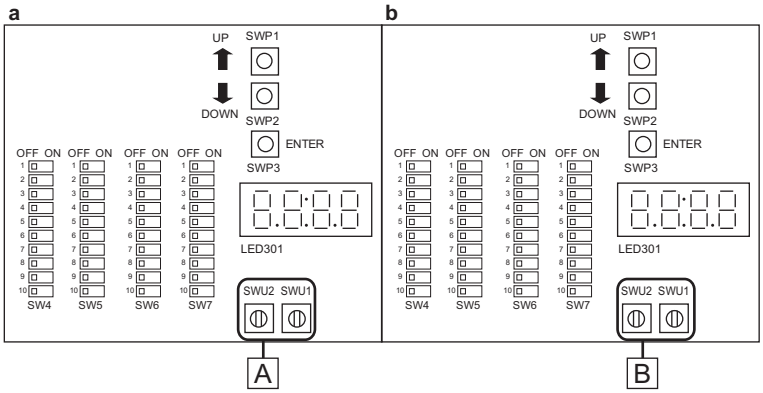
a SUB
b MAIN
c System leader unit
d Sub unit
e Group leader unit
f Field-supplied dry contact switch/ relay, remote controller or centralized controller
g External temperature sensor 1 (option)
h Flow switch
i Pump interlock
j External temperature sensor 2 (option)
k Simultaneous operating group (Max 6 units)
l Identical water system group (Max 24 units)
m M-NET line

Refer to the following page(s) for details about connecting the flow switch and the pump."Setting the pump system" (p. 47) The example system shows Pattern 1.

(2) Setting the switches on the system leader unit

Make sure the address of the MAIN circuit on the main unit is set to "1" (labeled A in the figure at right) and that the address of the SUB circuit on the main unit is set to "51" (labeled B in the figure at right).

The address of each SUB circuit should equal the sum of the MAIN circuit address on the same unit and 50.



a MAIN circuit board
b SUB circuit board

(3) Setting the switches on the group leader unit and the sub unit

MAIN circuit

Set the MAIN circuit addresses with the rotary switches (labeled A in the figure). Set the 10's digit with SWU2, and set the 1's digit with SWU1. Assign sequential addresses to the MAIN circuit on all sub units starting with 2.

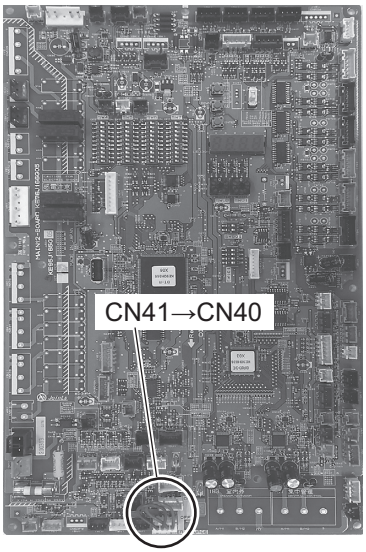
SUB circuit

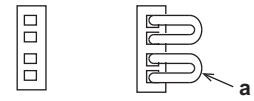
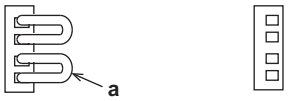
Set the SUB circuit addresses with the rotary switches (labeled B in the figure). Set the 10's digit with SWU2, and set the 1's digit with SWU1. Assign sequential addresses to the SUB circuit on all sub units starting with 52.

[3] Set the M-NET power supply.

When connecting a system leader unit and a group leader unit to a multiple units connection system, the connector connected to CN41 on the MAIN circuit board (Address 1) must be disconnected and then connected to CN40.

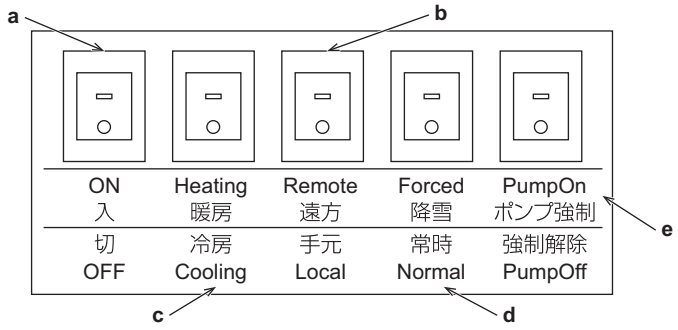
* Leave the connector connected to CN41 when using an AE-200, AE-C400, EW-C50 as the centralized controller.



Address 1	All addresses other than Address 1
Move the connector from CN41 to CN40.	Leave the connector connected to CN41.
	

a Connector

(1) Selector switch settings

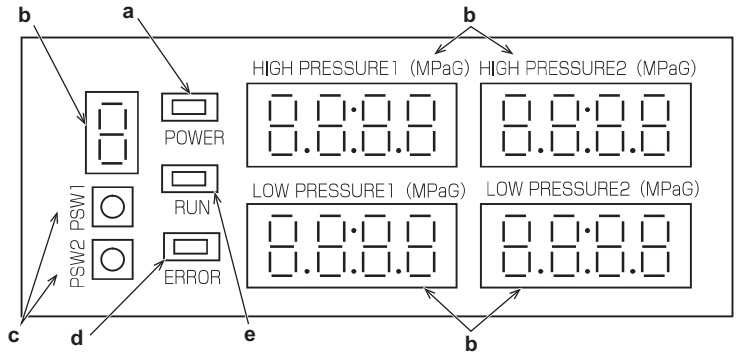


a [ON] Unit operation
[OFF] Unit stop
b [Remote] Controller operation
[Local] Local operation
c [Cooling] Cooling operation
[Heating] Heating operation
d [Forced] When the unit stops, fan operates.
[Normal] When the unit stops, fan does not operate.
e Not used

⚠ CAUTION

♦ Do not open the terminal cover, when selector switches are operated.

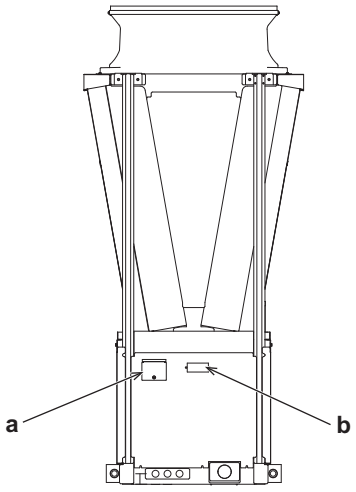
(2) Display



a Power light
b LED display
c Push switch
d Error light
e Run light

(3) The positions of the selector switch and the display

Service side



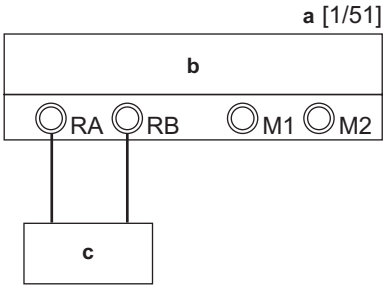
a Selector switch (Inside the unit)
b Display

5-3-4. Setting procedures

[1] System setting

Making the settings for the initial start-up process

(1) Single unit



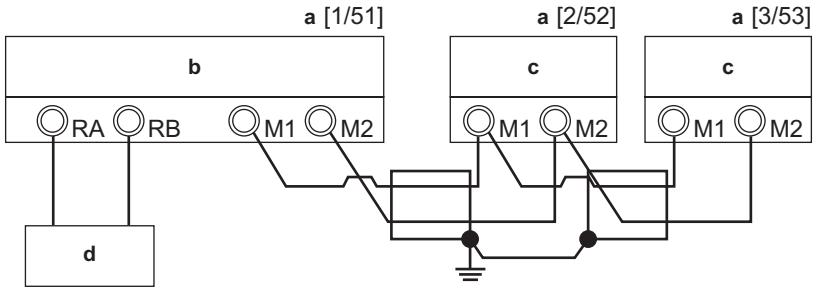
Setting address 1

1) Turn off the power.
2) System leader unit (Address 1 SW5-2, 5-3: ON)
3) Turn the power back on.
Address 1→ LED display [EEEE]
Address 51→ LED display [9999]
4) SW7: 1, 2, 3, 4 ON and ENTER for 5 seconds.
(Initializes the system)
Address 1→ LED display [9999] → [FFFF]
Address 51→ LED display [9999] → [____||_|]
5) SW7: 1, 2, 3, 4 OFF
Start-up process complete
Address 1→ LED display [____||_|]
Address 51→ LED display [____||_|]

- No settings are required for address 51.

a Address
b System leader unit
c Remote controller

(2) One system leader unit and two sub units (1 group, 3 units in the group)



a Address
b System leader unit
c Sub unit
d Remote controller

Setting address 1

1) Turn off the power.
2) System leader unit (Address 1 SW5-2, 5-3: ON)
3) Turn the power back on.
Address 1 → LED display [EEEE]
Address 51 → LED display [9999]
4) Setting the number of units for the group
SW7: 1 ON
SW4: 1, 2, 3, 4, 8, 10 ON
Press ENTER once.
↓
Address 1→ LED display [1]
↓
Press UP twice.
↓
Address 1→ LED display [3]
↓
Press ENTER once.
SW4: 1, 2, 3, 4, 8, 10 OFF

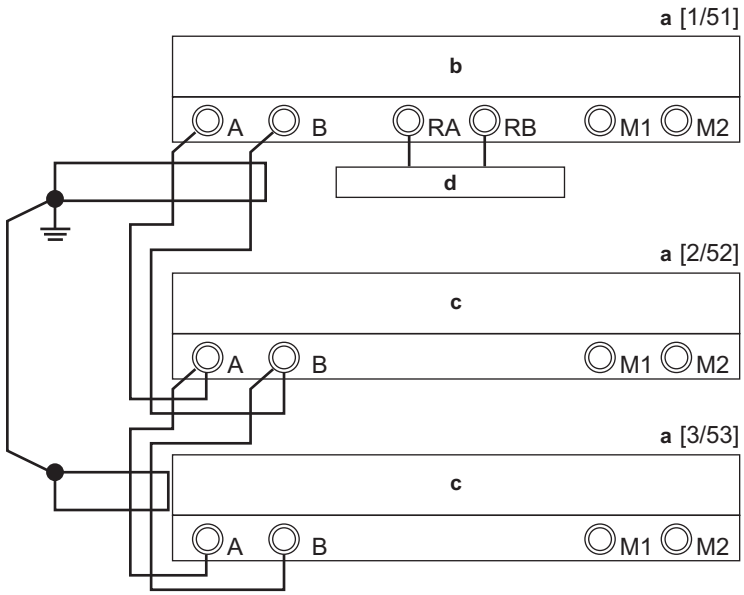
- The default setting for the number of units in a group is 1.
The maximum number of units per group is 6.

5) SW7: 1, 2, 3, 4 ON and ENTER for 5 seconds.
(Initializes the system)
Address 1 → LED display [9999] → [FFFF]
Address 51 → LED display [9999] → [____||_|]
6) SW7: 1, 2, 3, 4 OFF
Start-up process complete
Address 1 → LED display [____||_|]
Address 51 → LED display [____||_|]

- No settings are required for any address other than for address 1.

en

(3) System leader unit and group leader unit (3 groups, 1 unit in each group)



a Address
b System leader unit
c Group leader unit
d Remote controller

Setting address 1

1) Turn off the power.
2) System leader unit (Address 1 SW5-2, 5-3: ON)
3) Turn the power back on.
Address 1 → LED display [EEEE]
Address 51 → LED display [9999]
4) Setting the number of units for each group

- The default setting for the number of units in a group is 1.

5) Setting the number of groups
SW7: 1 ON
SW4: 5, 8, 10 ON
Press ENTER once.
↓
Address 1 → LED display [1]
↓
Press UP twice.
↓
Address 1 → LED display [3]
↓
Press ENTER once.
SW4: 5, 8, 10, OFF

- The default setting for the number of units in a group is 1.
The maximum number of groups is 24.

Setting address 2

1) Turn off the power.
2) Group leader unit (SW5-2: ON)
3) Turn the power back on.
Address 2 → LED display [EEEE]
Address 52 → LED display [9999]
4) Setting the number of units for each group

- The default setting for the number of units in a group is 1.

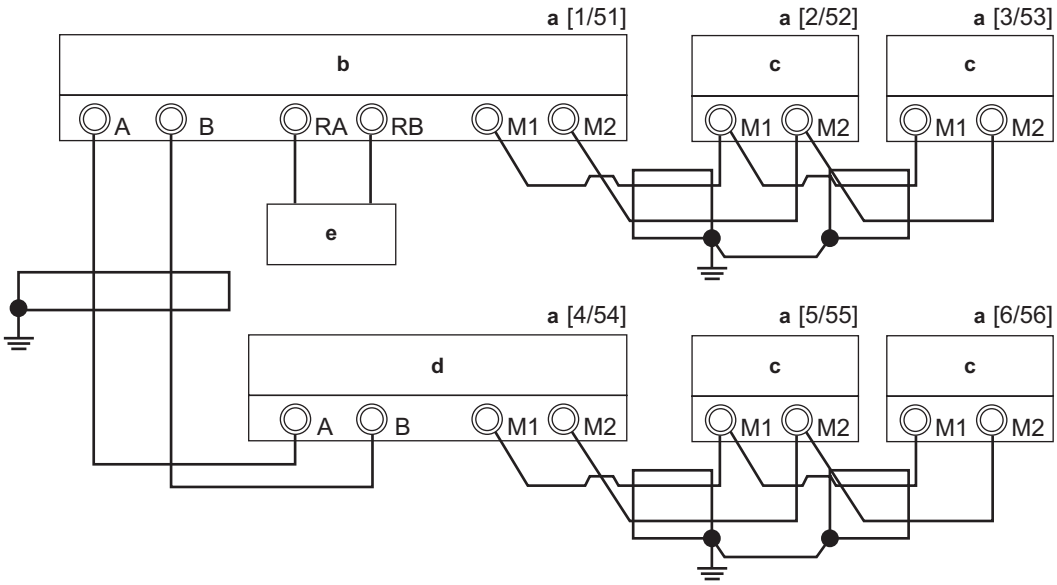
5) SW7: 1, 2, 3, 4 ON and ENTER for 5 seconds.
(Initializes the system)
Address 2 → LED display [9999] → [FFFF]
Address 52 → LED display [9999] → [____||_|]
6) SW7: 1, 2, 3, 4 OFF
Start-up process complete
Address 2 → LED display [____||_|]
Address 52 → LED display [____||_|]

- Address 3 (Group leader unit is set in the same way as above.)

Setting address 1 (second time)

1) SW7: 1, 2, 3, 4 ON and ENTER for 5 seconds.
(Initializes the system. System leader unit initialized last)
Address 1→ LED display [9999] → [FFFF]
Address 51→ LED display [9999] → [____||_|]
2) SW7: 1, 2, 3, 4 OFF
Start-up process complete
Address 1→ LED display [____||_|]
Address 51→ LED display [____||_|]

(4) System leader unit, Group leader unit and Sub unit (2 groups, 3 units in each group)



a Address
b System leader unit
c Sub unit
d Group leader unit
e Remote controller

Setting address 1

1) Turn off the power.
2) System leader unit (Address 1 SW5-2, 5-3: ON)
3) Turn the power back on.
Address 1 → LED display [EEEE]
Address 51 → LED display [9999]
4) Setting the number of units for each group
SW7: 1 ON
SW4: 1, 2, 3, 4, 8, 10 ON
Press ENTER once.
↓
Address 1→ LED display [1]
↓
Press UP twice.
↓
Address 1→ LED display [3]
↓
Press ENTER once.
SW4: 1, 2, 3, 4, 8, 10 OFF

- The default setting for the number of units in a group is 1. The maximum number of units per group is 6.

5) Setting the number of groups
SW7: 1 ON
SW4: 5, 8, 10 ON
Press ENTER once.
↓
Address 1 → LED display [1]
↓
Press UP twice.
↓
Address 1→ LED display [2]
↓
Press ENTER once.
SW4: 5, 8, 10 OFF

- The default setting for the number of units in a group is 1. The maximum number of units per group is 24.

Setting address 4

1) Turn off the power.
2) Group leader unit (SW5-2: ON)
3) Turn the power back on.
Address 4 → LED display [EEEE]
Address 54 → LED display [9999]
4) Setting the number of units for each group
SW7: 1 ON
SW4: 1, 2, 3, 4, 8, 10 ON
Press ENTER once.
↓
Address 4→ LED display [1]
↓
Press UP twice.
↓
Address 4→ LED display [3]
↓
Press ENTER once.
SW4: 1, 2, 3, 4, 8, 10 OFF

- No group number settings are required for address 4 (Group leader unit).

5) SW7: 1, 2, 3, 4 ON and ENTER for 5 seconds.
(Initializes the system)
Address 4→ LED display [9999] → [FFFF]
Address 54→ LED display [9999] → [____||_|]
6) SW7: 1, 2, 3, 4 OFF
Start-up process complete
Address 4→ LED display [____||_|]
Address 54→ LED display [____||_|]

Setting address 1 (second time)

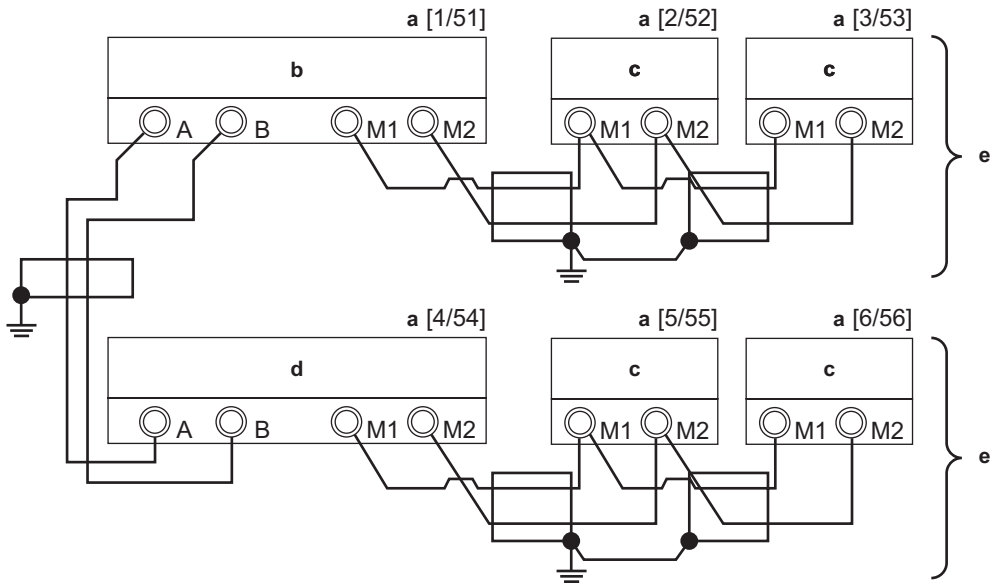
1) SW7: 1, 2, 3, 4 ON and ENTER for 5 seconds.
(Initializes the system. System leader unit initialized last)
Address 1→ LED display [9999] → [FFFF]
Address 51→ LED display [9999] → [____||_|]
2) SW7: 1, 2, 3, 4 OFF
Start-up process complete
Address 1→ LED display [____||_|]
Address 51→ LED display [____||_|]

- No settings are required for any address other than for addresses 1 and 4.

[2] Multiple unit control

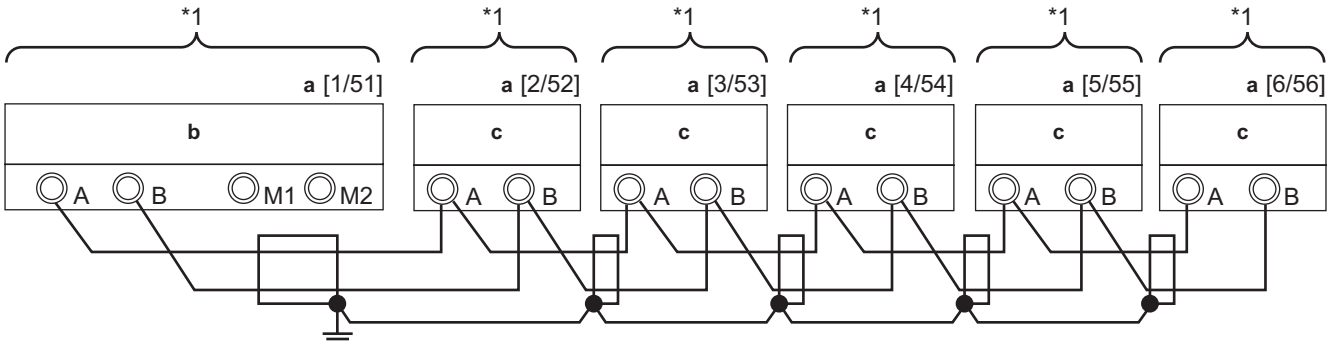
By setting SW5-6 to ON for address 1, optimum control of number of operating units will be performed.
All units will simultaneously operate when SW5-6 is set to OFF.

(1) System leader unit, group leader unit, and sub unit



a Address
b System leader unit
c Sub unit
d Group leader unit
e The unit by which the number of devices in the system is controlled

(2) System leader unit and group leader unit

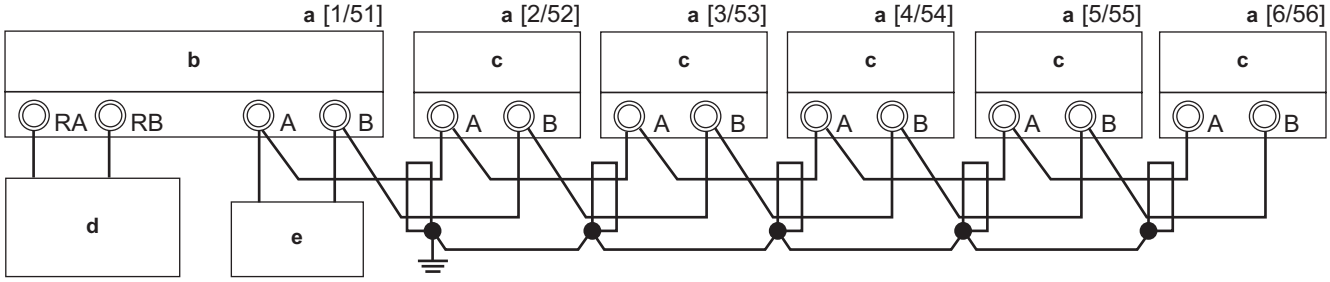


*1:The unit by which the number of devices in the system is controlled

a Address
b System leader unit (Address 1 SW5-6 ON)
c Group leader unit

[3] Example of system configuration

(1) Optimum control of number of operating units

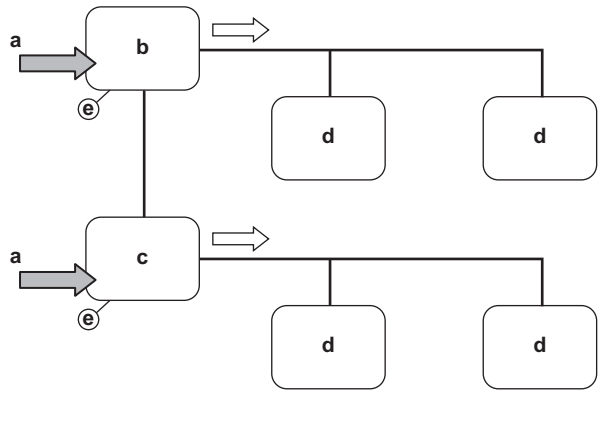
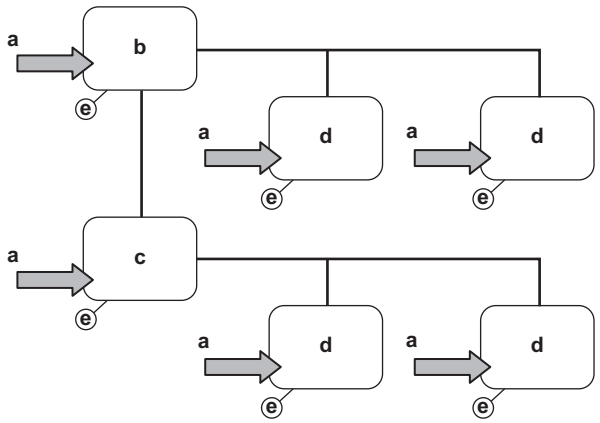


a Address
b System leader unit
c Group leader unit
d Remote controller (PAR-W31MAA)
e System controller (AE-200, AE-C400, EW-C50)

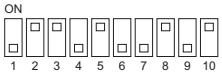
Setting item	SW7-1	DIPSW	SW4	Setting timing	System leader unit		Simultaneous operation Group leader unit		Simultaneous operation Group leader unit		Simultaneous operation Group leader unit		Simultaneous operation Group leader unit		Simultaneous operation Group leader unit	
					1		2		3		4		5		6	
					MAIN	SUB	MAIN	SUB	MAIN	SUB	MAIN	SUB	MAIN	SUB	MAIN	SUB
M-NET address	–	–	–	At a reset	1	51	2	52	3	53	4	54	5	55	6	56
M-NET power supply	–	–	–	–	CN40	CN41	CN41	CN41	CN41	CN41	CN41	CN41	CN41	CN41	CN41	CN41
System settings	–	5-2	–	At a reset	ON	–	ON	–	ON	–	ON	–	ON	–	ON	–
	–	5-3	–	At a reset	ON	–	OFF	–	OFF	–	OFF	–	OFF	–	OFF	–
Number of groups	ON	–		At a reset	6	–	1	–	1	–	1	–	1	–	1	–
Number of units per group	ON	–		At a reset	1	–	1	–	1	–	1	–	1	–	1	–
Multiple unit control	–	5-6	–	At a reset	ON	–	OFF	–	OFF	–	OFF	–	OFF	–	OFF	–

*1:The shaded cells indicate the settings that requires changes from the default settings.
*2:Some settings require the following after the settings were changed: A power reset, or setting SW7: 1, 2, 3, 4 ON, and pressing and holding ENTER for 5 seconds.
*3:When using an AE-200, AE-C400, EW-C50 as the centralized controller, leave the M-NET power supply connector as it is.

[4] Setting the pump system

Pattern 1	Pattern 2
	

a Pump
b System leader unit
c Group leader unit
d Sub unit
e Flow switch

Setting item	SW7-1	DIPSW	SW4	Factory setting		Note
				MAIN	SUB	
Pump setting	ON	–		0	–	0: Pattern 1, 1: Pattern 2
Flow switch settings	ON	–		0	–	0: Pattern 1, 1: Pattern 2

*1:Pump settings must be made on the MAIN circuit on all units.
*2:Flow switch settings must be made on the MAIN circuit on all units.

5-3-5. Priority order of the water-temperature-setting-input-signal sources

Water temperature can be controlled by using the signals from the four types of input sources listed below. The setting for the item with higher priority will override the settings for the items with lower priorities. The water temperature will be controlled according to the temperature setting in the "Target water temperature" column that corresponds to a specific combination of the settings for the four items.

[1] No-voltage contact input K91-K93 ON: Heating (EAHV)

Priority 1	Priority 2	Priority 3	Priority 4			Target water temperature
No-voltage contact input K40-K41	Analog input or BMS (SW 5-9: ON)	No-voltage contact input K40-K42	Remote controller PAR-W31MAA Input from centralized controller AE-200, AE-C400, EW-C50 or BMS (*3)			
Anti-freeze		Mode change	No remote controller	Manual setting	Schedule setting	
ON	Ineffective	Ineffective	–	Ineffective	Ineffective	25°C
OFF	SW5-7: ON	Ineffective	–	Ineffective	Ineffective	Temperature setting for the analog signal input
	SW5-7: OFF	ON (Heating ECO)	–	Ineffective	Ineffective	Heating ECO
		OFF (Heating)	When no RC is used	–	–	Heating
			–	Anti-freeze	–	25°C
			–	Heating ECO	–	Heating ECO
			–	Heating	–	Heating
			–	Cooling (*1)	–	Cooling
			–	–	When schedule has been set (*2)	Target water temp. is controlled according to the setting on the remote controller.

*1:This mode is disabled in EAHV.
*2:EAHV can also set Cooling.
*3:AE-200, AE-C400, EW-C50 and BMS cannot both be simultaneously connected. Only connect one or the other.

[2] No-voltage contact input K91-K93 OFF: Cooling (EAHV, EACV)

When the operation mode is Cooling, K40-K41 (Anti-freeze) and K40-K42 (Mode change) are disabled.

Priority 1	Priority 2	Priority 3			Target water temperature
Analog input or BMS (SW5-9: ON)	No-voltage contact input K01-K03	Remote controller PAR-W31MAA Input from centralized controller AE-200, AE-C400, EW-C50 or BMS (*3)			
	Mode Change (Cooling ECO)	No remote controller	Manual setting	Schedule setting	
SW5-7: ON	Ineffective	–	Ineffective	Ineffective	Temperature setting for the analog signal input
SW5-7: OFF	ON (Cooling ECO)	–	Ineffective	Ineffective	Cooling ECO
	OFF (Cooling)	When no RC is used	–	–	Cooling
		–	Anti-freeze (*1)	–	25°C
		–	Heating ECO (*1)	–	Heating ECO
		–	Heating (*1)	–	Heating
		–	Cooling	–	Cooling
		–	–	When schedule has been set (*2)	Target water temp. is controlled according to the setting on the remote controller.

*1:This mode is disabled in EACV.
*2:EAHV can also set Heating or Heating ECO.
*3:AE-200, AE-C400, EW-C50 and BMS cannot both be simultaneously connected. Only connect one or the other.

[3] Priority order of the operation signal sources

		No-voltage contact	Remote controller PAR-W31MAA	Input from centralized controller AE-200, AE-C400, EW-C50 or BMS
Unit operation (Run/Stop)		The last setting has priority.		
Operation mode	Cooling *1	The last setting has priority.		
	Cooling ECO *1*2	OFF	Cooling ECO can not be set from the remote controller or the centralized controller.	
		ON		
	Heating *1	The last setting has priority.		
	Heating ECO *1*3	OFF	The last setting has priority.	
		ON	Ineffective	
	Anti-freeze *3	OFF	The last setting has priority.	
		ON	Ineffective	
Fan mode (The contact ON has priority.)		OFF	The last setting has priority.	
		ON	Ineffective	

*1:When the Anti-freeze contact is ON during heating operation, the setting change is ineffective.
*2:Changing by contact is effective during cooling operation.
*3:Changing by contact is effective during heating operation.

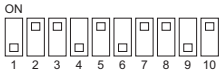
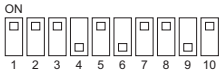
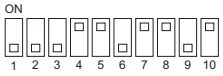
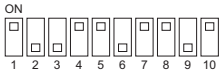
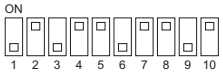
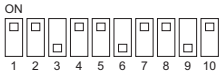
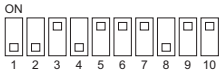
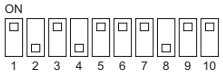
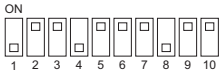
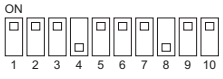
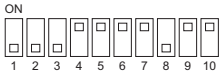
5-3-6. Water-temperature setting

Different water temperature settings can be set for different modes.

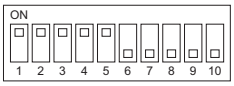
Set the dip switches on the circuit board as follows to make the settings for the items described in this section.

Press the push switch SWP3 to enable the configuration changes.
Press the push switches SWP1 (↑) or SWP2 (↓) to increase or decrease the value.
When the desired value is displayed, press SWP3 to save the setting value.

Settings table

No.	Dip switch setting *1	Dip switch setting (SW4)	Setting Item	Initial value	Unit	Setting			Setting change from an optional remote controller (PAR-W31MAA) *2
						Increments	Lower limit	Upper limit	
1	SW7-1 ON		Setting temp. 1 (Cooling mode) *3	7	ºC	0.1°C	4	30	Possible
2	SW7-1 ON		Setting temp. 2 (Cooling mode) *4	7	ºC	0.1°C	4	30	Possible
3	SW7-1 ON		Setting temp. 1 (Heating mode) *3	45	ºC	0.1°C	25	55	Possible
4	SW7-1 ON		Setting temp. 2 (Heating mode) *4	45	ºC	0.1°C	25	55	Possible
5	SW7-1 ON		Setting water temp. A at Heating ECO mode	52	ºC	0.1°C	25	55	Not possible
6	SW7-1 ON		Setting outdoor temp. A at Heating ECO mode	-7	ºC	0.1°C	-30	50	Not possible
7	SW7-1 ON		Setting water temp. B at Heating ECO mode	30	ºC	0.1°C	25	55	Not possible
8	SW7-1 ON		Setting outdoor temp. B at Heating ECO mode	12	ºC	0.1°C	-30	50	Not possible
9	SW7-1 ON		Setting water temp. C at Heating ECO mode	42	ºC	0.1°C	25	55	Not possible
10	SW7-1 ON		Setting outdoor temp. C at Heating ECO mode	2	ºC	0.1°C	-30	50	Not possible
11	SW7-2 ON		Setting water temp. D at Cooling ECO mode	11.5	ºC	0.1°C	4	30	Not possible
12	SW7-2 ON		Setting outdoor temp. D at Cooling ECO mode	20	ºC	0.1°C	-20	55	Not possible
13	SW7-2 ON		Setting water temp. E at Cooling ECO mode	7	ºC	0.1°C	4	30	Not possible
14	SW7-2 ON		Setting outdoor temp. E at Cooling ECO mode	35	ºC	0.1°C	-20	55	Not possible
15	SW7-2 ON		Setting water temp. F at Cooling ECO mode	10	ºC	0.1°C	4	30	Not possible
16	SW7-2 ON		Setting outdoor temp. F at Cooling ECO mode	25	ºC	0.1°C	-20	55	Not possible

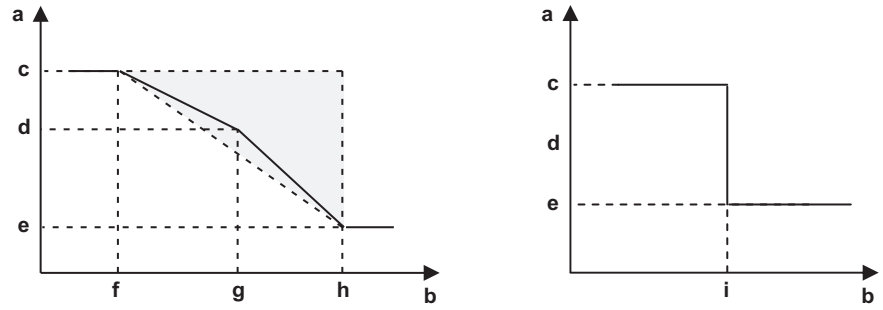
*1:Only the switches designated in the table must be set to ON. (The other switches must be OFF.)
*2:Temperature setting increments: 0.5ºC
*3:No-voltage contact KN51-KN61: OFF
*4:No-voltage contact KN51-KN61: ON



The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

Heating ECO

When the outdoor temp. A and B are set to the same value, the Heating ECO line will be as follows.

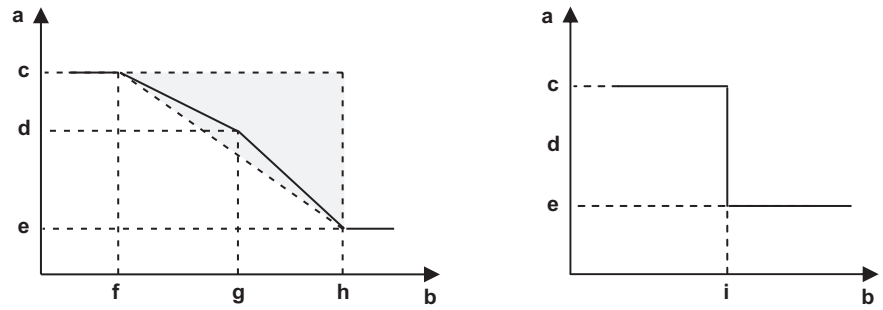


a Water temp.
b Outdoor temp.
c Setting water temp. A
d Setting water temp. C
e Setting water temp. B
f Setting outdoor temp. A
g Setting outdoor temp. C
h Setting outdoor temp. B
i Setting outdoor temp. A, B

*1:Always use a value for setting C that is between setting value A and setting value B.

Cooling ECO

When the outdoor temp. D and E are set to the same value, the Cooling ECO line will be as follows.



a Water temp.
b Outdoor temp.
c Setting water temp. D
d Setting water temp. F
e Setting water temp. E
f Setting outdoor temp. D
g Setting outdoor temp. F
h Setting outdoor temp. E
i Setting outdoor temp. D, E

*1:Always use a value for setting C that is between setting value D and setting value E.

5-3-7. Peak-demand control operation

Peak-demand control is a function used to control the power consumptions of the units.

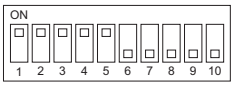
The compressor's maximum operating frequency will be controlled according to the peak-demand control signal.

Set the dip switches on the circuit board as follows to make the settings for the items described in this section.

Press the push switch SWP3 to enable the configuration changes.
Press the push switches SWP1 (↑) or SWP2 (↓) to increase or decrease the value.
When the desired value is displayed, press SWP3 to save the setting value.

Settings table

No.	Dip switch setting (SW7-1)	Dip switch setting (SW4)	Setting Item	Initial value	Unit	Setting			Setting change from an optional remote controller (PAR-W31MAA)
						Increments	Lower limit	Upper limit	
1	ON		Peak-demand control signal input source	0	−	1	0	1	Not possible
2	ON		Maximum peak-demand capacity	100	%	1%	60	100	Possible



The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

5-3-8. Remote water temperature or capacity control ratio setting input signal type

When SW5-7 is ON, SW5-8 is OFF, and SW5-9 is OFF, external analog signals can be used to set the water temperatures.

When SW5-7 and SW5-8 are ON, external analog signals can be used to set the capacity control ratio.

Analog input type can be selected from the following four types:

4-20 mA

1-5 V

0-10 V

2-10 V

Select SW6-1 and SW6-2 to set the type of analog input signal from a remote location.

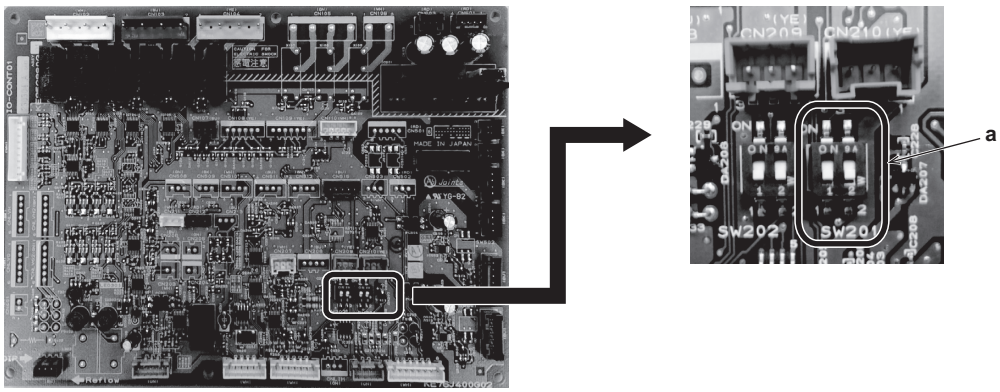
Set the dip switches on the circuit board as follows to change the settings.

	SW201-1	SW201-2	SW6-1	SW6-2
4-20 mA	ON	ON	OFF	OFF
1-5 V	OFF	ON	ON	OFF
0-10 V	OFF	OFF	OFF	ON
2-10 V	OFF	OFF	ON	ON

*1:Incorrectly setting SW201 may cause damage to the circuit board.

IO cont board

Enlarged view of operation area



a Dip switch (SW201)

5-3-9. Setting the water temperature using analog signal input

When dip switch SW5-7 is set to ON (Enable external input), SW5-8 is set to OFF, and SW5-9 is set to OFF, the target water temperature varies with the preset temperatures A and B and the type of analog input signal.

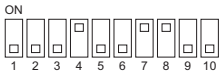
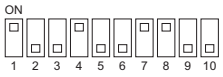
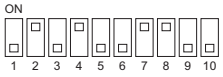
Set the dip switches on the circuit board as follows to make the settings for the items described in this section.

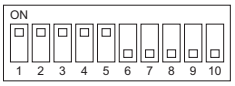
Press the push switch SWP3 to enable the configuration changes.
Press the push switches SWP1 (↑) or SWP2 (↓) to increase or decrease the value.
When the desired value is displayed, press SWP3 to save the setting value.

Settings table

No.	Dip switch setting (SW7-1)	Dip switch setting (SW4)	Setting Item	Initial value	Unit	Setting			Setting change from an optional remote controller (PAR-W31MAA)
						Increments	Lower limit	Upper limit	
1	ON		Preset temp. A (Cooling)	4	ºC	1ºC	4	30	Not possible
2	ON		Preset temp. B (Cooling)	30	ºC	1ºC	4	30	Not possible
3	ON		Preset temp. A (Heating)	25	ºC	1ºC	25	55	Not possible
4	ON		Preset temp. B (Heating)	55	ºC	1ºC	25	55	Not possible

*1:Due to the resistance of the wire that is connected to the analog input, the preset temperature may not properly be sent. If this is the case, check the current value of the analog input, and adjust the output value of the connected signal output device.
Refer to the table below for how to display the value of the analog input.

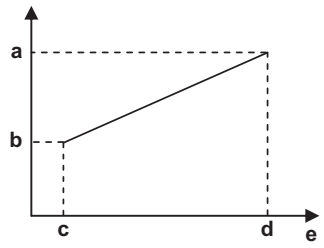
No.	Dip switch setting (SW7-1)	Dip switch setting (SW4)	Monitorable items	Unit
1	OFF		Current value (4-20 mA)	mA
2	OFF		5V voltage value (1-5 V)	V
3	OFF		10V voltage value (0-10 V or 2-10 V)	V



The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

(1) When the water temperature setting input signal type is 4-20 mA

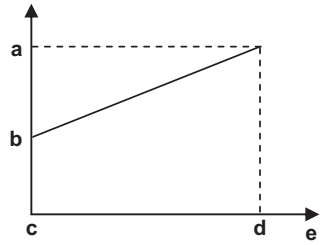
- External analog input signal of 4 mA: Preset temp. A
- External analog input signal of 20 mA: Preset temp. B
- External analog input signal of between 4 and 20 mA: the preset temperature will be linearly interpolated.



a Preset temp. B
b Preset temp. A
c 4 mA
d 20 mA
e Input current

(2) When the water temperature setting input signal type is 0-10 V

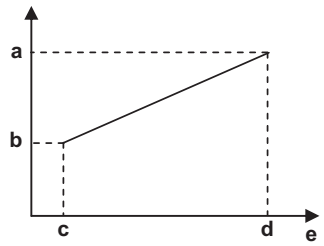
- External analog input signal of 0 V: Preset temp. A
- External analog input signal of 10 V: Preset temp. B
- External analog input signal of between 0 and 10 V: the preset temperature will be linearly interpolated.



a Preset temp. B
b Preset temp. A
c 0 V
d 10 V
e Input voltage

(3) When the water temperature setting input signal type is 1-5 V

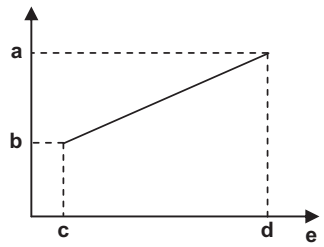
- External analog input signal of 1 V: Preset temp. A
- External analog input signal of 5 V: Preset temp. B
- External analog input signal of between 1 and 5 V: the preset temperature will be linearly interpolated.



a Preset temp. B
b Preset temp. A
c 1 V
d 5 V
e Input voltage

(4) When the water temperature setting input signal type is 2-10 V

- External analog input signal of 2 V: Preset temp. A
- External analog input signal of 10 V: Preset temp. B
- External analog input signal of between 2 and 10 V: the preset temperature will be linearly interpolated.



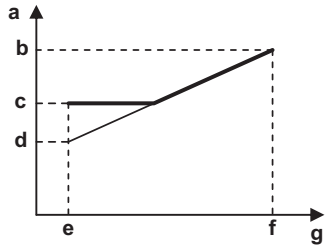
a Preset temp. B
b Preset temp. A
c 2 V
d 10 V
e Input voltage

5-3-10.Setting the capacity control ratio using analog signal input

When dip switch SW5-7 is set to ON (Enable external input), SW5-8 is set to ON, and SW5-9 is set to OFF, the capacity control ratio varies with the type of analog input signal.

(1) When the capacity control setting input signal type is 4-20 mA

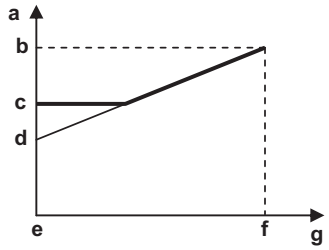
- External analog input signal of 4 mA: 0%
- External analog input signal of 20 mA: 100%
- External analog input signal of between 4 and 20 mA: the percent will be linearly interpolated.



a Load ratio
b 100%
c *%
d 0%
e 4 mA
f 20 mA
g Input current

(2) When the capacity control setting input signal type is 0-10 V

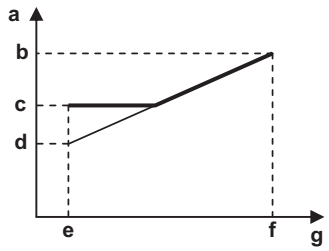
- External analog input signal of 0 V: 0%
- External analog input signal of 10 V: 100%
- External analog input signal of between 0 and 10 V: the percent will be linearly interpolated.



a Load ratio
b 100%
c *%
d 0%
e 0 V
f 10 V
g Input voltage

(3) When the capacity control setting input signal type is 1-5 V

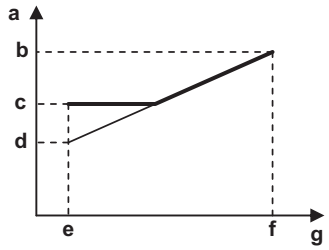
- External analog input signal of 1 V: 0%
- External analog input signal of 5 V: 100%
- External analog input signal of between 1 and 5 V: the percent will be linearly interpolated.



a Load ratio
b 100%
c *%
d 0%
e 1 V
f 5 V
g Input voltage

(4) When the capacity control setting input signal type is 2-10 V

- External analog input signal of 2 V: 0%
- External analog input signal of 10 V: 100%
- External analog input signal of between 2 and 10 V: the percent will be linearly interpolated.



a Load ratio
b 100%
c *%
d 0%
e 2 V
f 10 V
g Input voltage

*%: The compressor runs at the lowest frequency.

5-3-11.Setting the supplementary heater signal output conditions

A temperature at which the signal output to operate supplementary heaters can be selected.

Supplementary heater signal output conditions

The operation command signal is ON and at least one of the following two conditions is met.

1) Water-temperature control option (SW5-4) is set to OFF, the inlet water temperature drops below a set water temperature, and the outdoor temperature drops below a set outdoor temperature.
2) Water-temperature control option (SW5-4) is set to ON, the external water temperature sensor reading (TH117) drops below a set water temperature, and the outdoor temperature drops below a set outdoor temperature.

The supplementary heater signal is output from RP1-RP2.

Supplementary heater signal output stop conditions

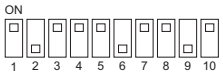
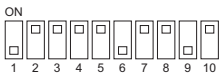
The operation command signal is OFF or at least one of the following two conditions is met.

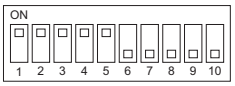
1) The inlet water temperature is at or above a set water temperature +2°C or the outdoor temperature is at or above a set outdoor temperature +2°C.
2) External water temperature sensor reading (TH117) is at or above a set water temperature +2°C.

Set the dip switches on the circuit board as follows to make the settings for the items described in this section.

Press the push switch SWP3 to enable the configuration changes.
Press the push switches SWP1 (↑) or SWP2 (↓) to increase or decrease the value.
When the desired value is displayed, press SWP3 to save the setting value.

Settings table

No.	Dip switch setting (SW7-1)	Dip switch setting (SW4)	Setting Item	Initial value	Unit	Setting			Setting change from an optional remote controller (PAR-W31MAA)
						Increments	Lower limit	Upper limit	
1	ON		Supplementary heater operation water temp.	40	ºC	0.1ºC	0	55	Not possible
2	ON		Supplementary heater operation outdoor temp.	−10	ºC	0.1ºC	−30	50	Not possible



The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

5-3-12.Setting the drain pan heater signal output condition

A temperature at which the signal output to operate drain pan heaters can be selected.

Drain pan heater signal output condition

The following condition is met.

1) The outdoor temperature drops below a set outdoor temperature.

The drain pan signal is output from KB1-KB2.

Drain pan heater signal output stop condition

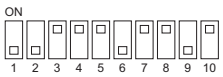
The following condition is met.

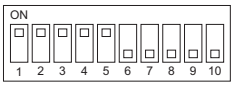
1) The outdoor temperature is at or above a set outdoor temperature +2ºC.

Set the dip switches on the circuit board as follows to make the settings for the items described in this section.

Press the push switch SWP3 to enable the configuration changes.
Press the push switches SWP1 (↑) or SWP2 (↓) to increase or decrease the value.
When the desired value is displayed, press SWP3 to save the setting value.

Settings table

No.	Dip switch setting (SW7-1)	Dip switch setting (SW4)	Setting Item	Initial value	Unit	Setting			Setting change from an optional remote controller (PAR-W31MAA)
						Increments	Lower limit	Upper limit	
1	ON		Drain pan heater operation outdoor temp.	0	ºC	1ºC	−40	20	Not possible



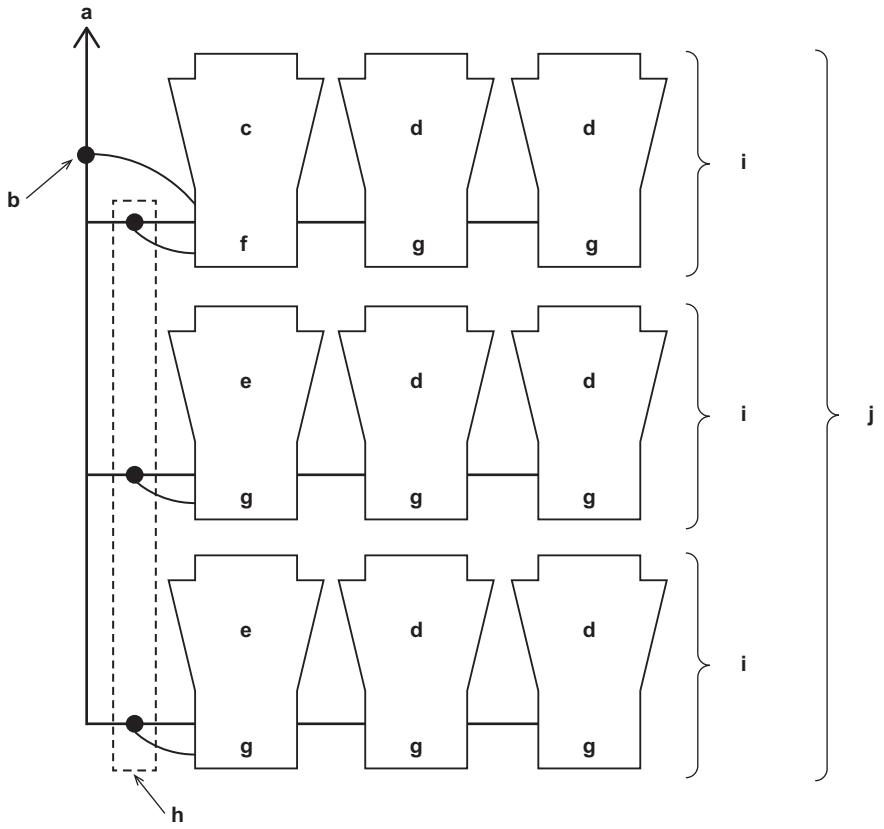
The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

5-3-13.External temperature sensor control

Water temperature can be controlled in the following way.

	SW5-4	SW5-5
Outlet-water-temperature-based control	OFF	OFF
External temperature sensor 1 (TH117)	ON	-
External temperature sensor 2 (TH116)	-	ON

An optional External temperature sensor (TW-TH16) is required.



a Outlet water
b External temperature sensor 2 (TH116) (SW5-5 ON)
c System leader unit
d Sub unit
e Group leader unit
f SW5-5 ON, SW5-4 ON
g SW5-4 ON
h External temperature sensor 1 (TH117) (SW5-4 ON)
i Simultaneous operating group
j Identical water system group

en

External temperature sensor 1 (Enable only TH117)

When only TH117 is enabled, the Simultaneous operating group is controlled so that the TH117 will reach the target water temperature.

External temperature sensor 2 (Enable only TH116)

When only TH116 is enabled, the target outlet water temperature will be corrected to approximate TH116 to the target water temperature.

External temperature sensor 1 and 2 (Enable TH117 and TH116)

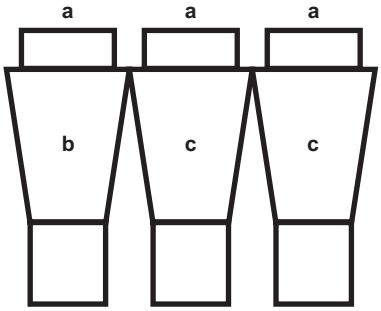
When both TH117 and TH116 are enabled, the target water temperature of TH117 will be corrected to approximate TH116 to the target water temperature. Simultaneous operating group will be controlled to meet the corrected TH117.

5-3-14.Demand operation

The demand function can reduce the power consumption.

Single unit control

In the case of single unit control, the unit is operated up to the specified demand limit.

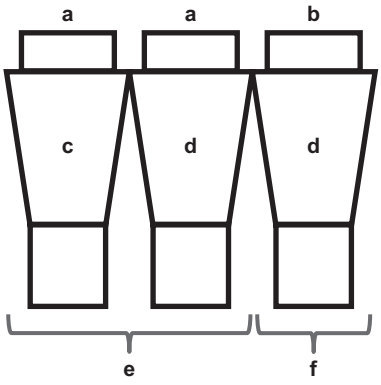


a 60%
b System leader unit
c Sub unit

Multiple unit control

In the case of multiple unit control, the number of operating units are limited by demand value.
When the demand value is 70%, the group operate such as below figure.

3 groups x demand 70% ≥ 2 groups operation (=2.1 (→ round down to the decimal point →) ≈2)



a 100%
b 0%
c System leader unit
d Group leader unit
e Operation
f Stop

In the case of multiple unit control, the demand capacity may not actually be the capacity because it sets the number of operable units.

Other examples

Even if you set demand capacity to 90% in the case of 2 sets, the number of operable units will be only 1 (round down to the decimal point).

The operating capacity of one group is 50%.

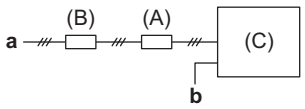
(In the case of multiple unit control, the frequency of each unit is controlled within the range of 0 to 100% regardless of the demand capacity.)

6. Electrical Wiring Installation

6-1. Main Power Supply Wiring and Switch Capacity

Schematic Drawing of Wiring (Example)

a 3N~380–415V
L1, L2, L3, N
b PE (Protective Earth)



(A) Switch (with current breaking capability)
(B) Current leakage breaker
(C) Unit

Main power supply wire size, switch capacities, and system impedance

Model	Minimum wire size (mm^2)			Current leakage breaker	Local switch (A)		No-fuse breaker (A)	Max. Permissive System Impedance
	Main cable	Branch	Ground		Capacity	Fuse		
EACV/EAHV-M1500/1800YCL	35	–	35	160 A 200 mA 0.1 sec. or less	150	150	160	0.06 Ω

en

1) Use a dedicated power supply for each unit. Ensure that each unit is wired individually.
2) When installing wiring, consider ambient conditions (e.g., temperature).
3) The wire size is the minimum value for metal conduit wiring. If voltage drop is a problem, use a wire that is one size thicker.
Make sure the power-supply voltage does not drop more than 5%.
4) Specific wiring requirements should adhere to the wiring regulations of the region.
5) Power supply cords of appliances shall not be lighter than polychloroprene sheathed flexible cord (design 60245 IEC57).
6) A switch with at least 3 mm contact separation in each pole shall be provided by the Chilling Unit installer.
7) Do not install a phase advancing capacitor on the motor. Doing so may damage the capacitor and result in fire.

⚠ WARNING

- **Be sure to use specified wires and ensure no external force is imparted to terminal connections. Loose connections may cause overheating and fire.**
- **Be sure to use the appropriate type of overcurrent protection switch. Note that overcurrent may include direct current.**

⚠ CAUTION

- **Some installation sites may require an installation of an earth leakage breaker for the inverter. If no earth leakage breaker is installed, there is a danger of electric shock.**
- **Only use properly rated breakers and fuses. Using a fuse or wire of the wrong capacity may cause malfunction or fire.**

Note:

- **This device is intended for the connection to a power supply system with a maximum permissible system impedance shown in the above table at the interface point (power service box) of the user's supply.**
- **Ensure that this device is connected only to a power supply system that fulfills the requirements above. If necessary, consult the public power supply company for the system impedance at the interface point.**
- **This equipment complies with IEC 61000-3-12 provided that the short-circuit power S_{SC} is greater than or equal to S_{SC} (*1) at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to ensure, in consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with a short-circuit power S_{SC} greater than or equal to S_{SC} (*1).**

*1

S_{SC} (MVA)
10.35

Control cable specifications

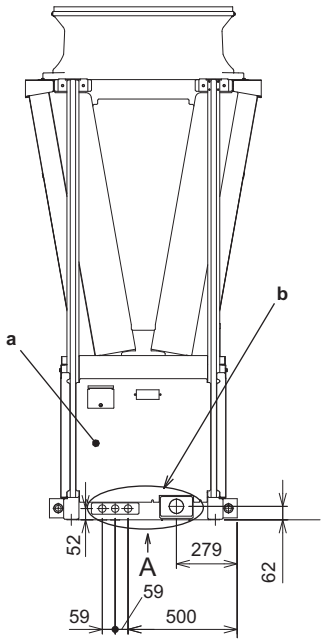
Remote controller cable	Size	0.3 mm^2 (Max. 250 m total)
	Recommended cable types	2-core sheathed cable
M-NET cable between units *2	Size	Min. 1.25 mm^2 (Max. 200 m total)
	Recommended cable types	Shielded cable CVVS, CPEVS or MVVS
External input wire size		Min. 0.3 mm^2
External output wire size		1.25 mm^2

*2 Use a CVVS or CPEVS cable (Max. total length of 250 m) if there is a source of electrical interference nearby (e.g., factory) or the total length of control wiring exceeds 200 m.

6-2. Cable Connections

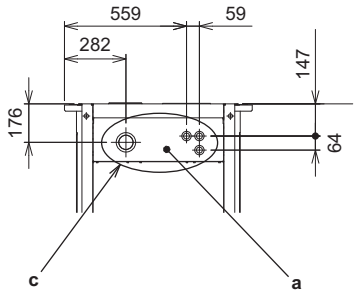
[1] Schematic Diagram of a Unit and Terminal Block Arrangement

Unit: mm



Service side

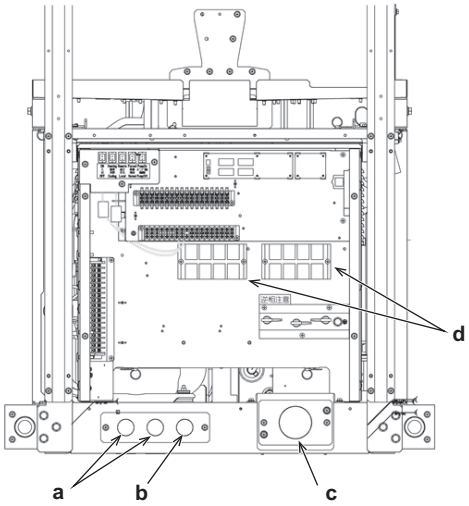
A (Service side)

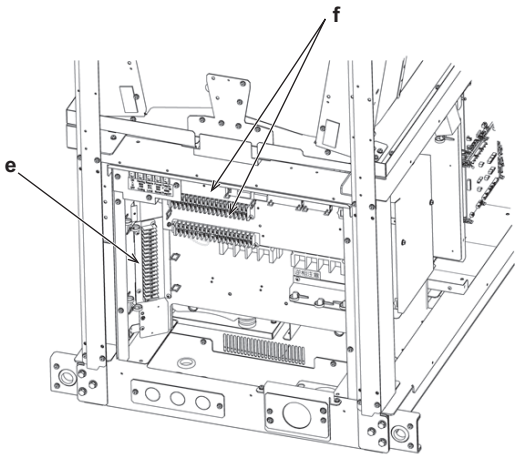


Unit bottom

a Terminal box
b Power supply wiring (from the side)
c Power supply wiring (from the bottom)

Detailed drawing





a ø34 Control wiring under 24 VAC
b ø34 Control wiring over 100 VAC
c ø66 Power supply wiring
d Power supply terminal box (terminal size: M8)
e Control wiring over 100 VAC
f Control wiring under 24 VAC

1) Remove the front terminal box cover.
2) Wire the power supply and control wires. The terminal box is covered with a bush.
Cut the bush before connecting wires to the terminal box.
3) Fasten the power supply wires by the cable strap.
4) Secure the cable conduit, and then waterproof the area around the pipe with silicon, etc.
5) Reattach the terminal box cover.

6-3. Precautions when fastening screws

- Faulty contacts due to loose screws may cause overheating and fire.
- Using the circuit board while it is damaged may cause overheating and fire.

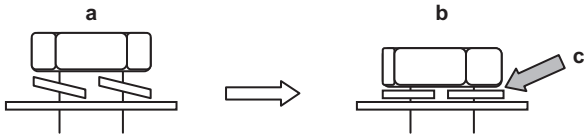
(1) Screw fastening torque

Power supply terminal block, M8 screw: 10 to 13.5 N·m

Use the following methods to check that the screws have been fastened.

1) Check that the spring washer is in a parallel position.

- If the screw is biting into the washer, simply fastening the screw to the specified torque cannot determine whether it has been installed properly.



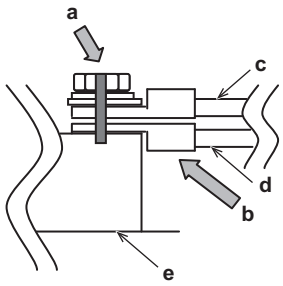
a Loose screws
b Properly installed
c Spring washer is in a **parallel position**

2) Check that the wiring does not move at the screw terminal.

(2) Take extra care not to ruin the screw thread due to fastening the screw at an angle.

- To prevent fastening the screw at an angle, install the round terminals so they are back to back.

(3) After fastening the screw, use a permanent marker to tick off the screw head, washer and terminal.



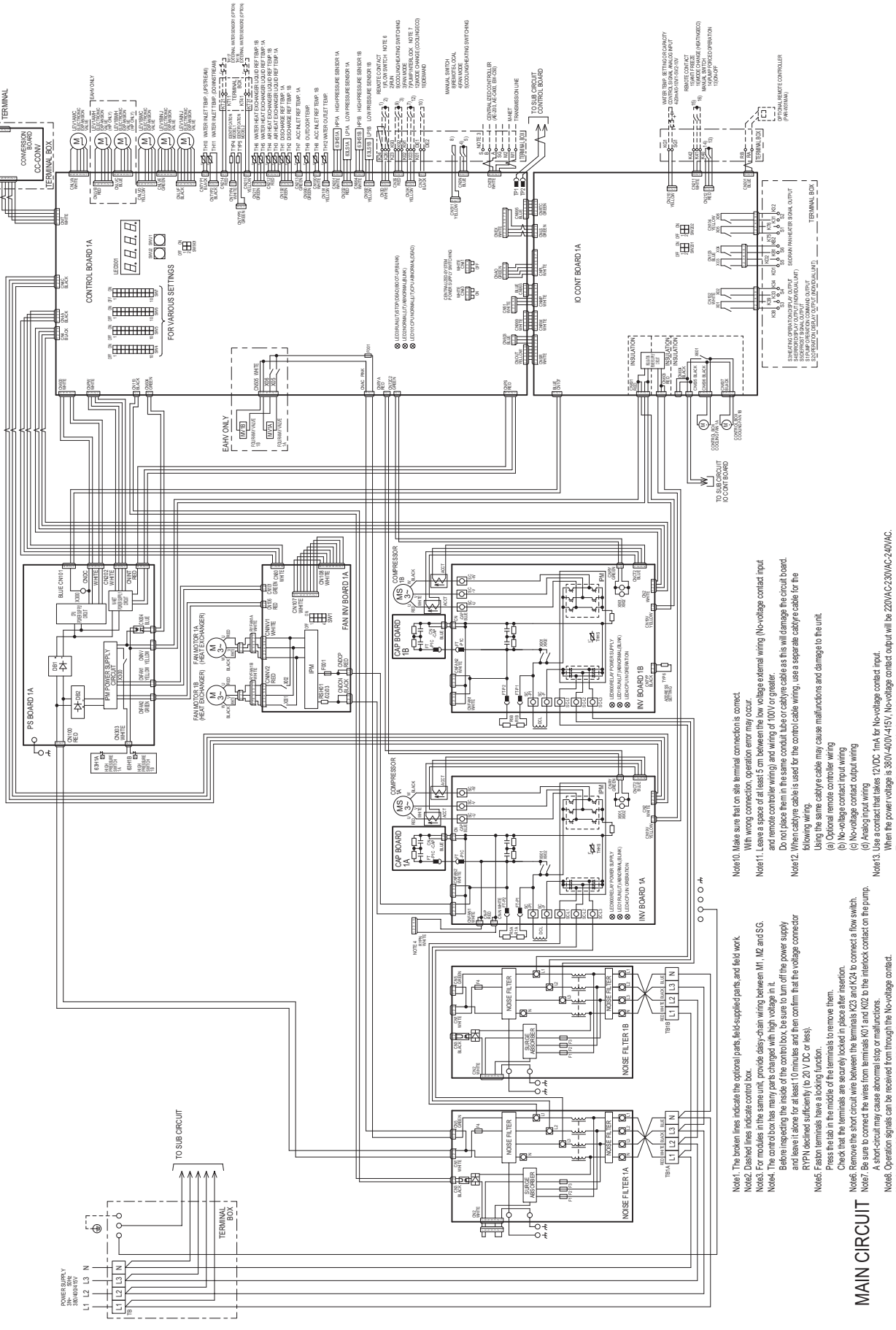
a Ticked with marker
b Install the round terminals so they are **back to back**.
c For transition wiring
d Power supply wiring
e Power supply terminal block

6-4. Installing the conduit tube

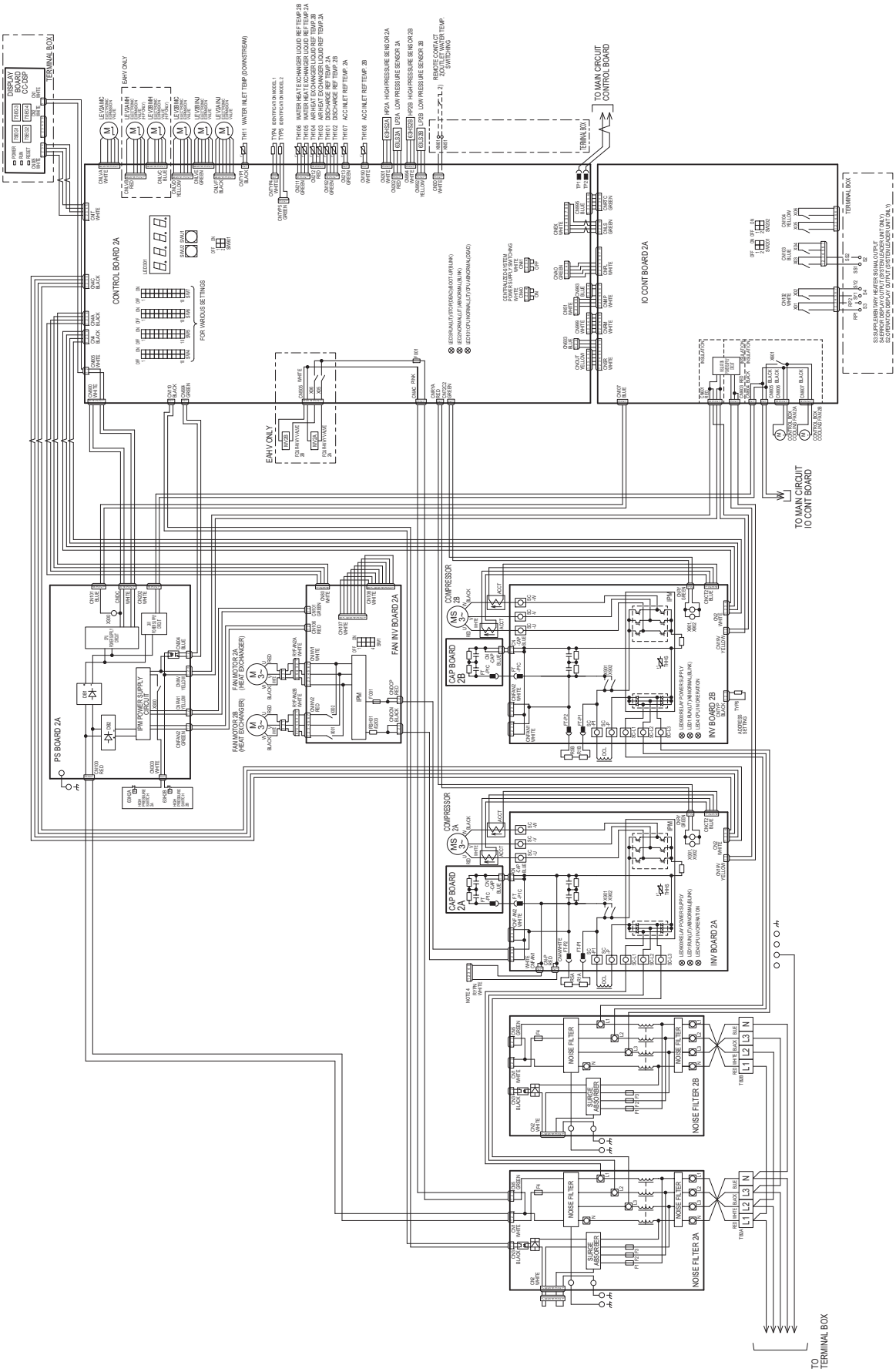
- Always use a conduit to run the power supply wiring.
- Select the conduit size based on the hole.
- The cable conduits must be prepared locally.
- Do not store the 24VDC or less low-voltage circuit and 100VAC or higher main circuit and control circuit cables in the same multi-core cable, or bundle them together.
- Attach cable conduits securely to the foundation, etc. to ensure that excessive loads are not applied to the power supply terminal box.
- Seal the area around the cable conduit connection to ensure that no water penetrates the cable conduit connection port.

6-5. Electrical Wiring Diagram

EAHV-M1500, 1800YCL (-N)(-BS)
EACV-M1500, 1800YCL (-N)(-BS)



EAHV-M1500, 1800YCL (-N)(-BS)
EACV-M1500, 1800YCL (-N)(-BS)



6-6. External Input/Output

When using a local controller, refer to the table below for the types of input/output signals that are available and the operations that correspond to the signals.

Input type

Dry contact		**ON (Close)**	**OFF (Open)**	**Terminal block**
(a) UNIT OPERATION	Run/Stop	The unit will go into operation when the water temperature drops below the preset temperature.	The unit will stop except when the unit is in the Anti-Freeze mode.	K23-K26
(b) MODE CHANGE (Heating ECO) * EAHV	Heating Eco/ Heating	Heating ECO mode (EAHV: When "COOLING/ HEATING SWITCHING" contact (item (j) below) is ON, this mode is enabled.)	Heating mode (EAHV: When "COOLING/ HEATING SWITCHING" contact (item (j) below) is ON, this mode is enabled.)	K40-K42
(c) MODE CHANGE (Cooling ECO)	Cooling ECO/ Cooling	Cooling ECO mode (When "COOLING/HEATING SWITCHING" contact (item (j) below) is OFF, this mode is enabled.)	Cooling mode (When "COOLING/HEATING SWITCHING" contact (item (j) below) is OFF, this mode is enabled.)	K01-K03
(d) FAN MODE	Forced/Normal	When the outdoor temperature is 5ºC or less, the fan will remain in operation after the compressor has stopped.	The fan will stop when the compressor stops.	K91-K92
(e) ANTI FREEZE * EAHV	On/Off	The unit will operate in the Anti-Freeze mode (with the target temperature 25ºC) when the contact status of (a) "UNIT OPERATION" is "Stop" or the ON/OFF button on the remote controller is turned off. (EAHV: When "COOLING/HEATING SWITCHING" contact (item (j) below) is ON, this mode is enabled.)	The unit will operate according to the status of the "UNIT OPERATION" contact (item (a) above) or the ON/OFF command from the remote controller.	K40-K41
(f) FLOW SWITCH	Normal/Error	The unit is allowed to operate.	The unit will not operate.	K23-K24
(g) PUMP INTERLOCK	Normal/Error	The unit is allowed to operate.	The unit will not operate.	K01-K02
(h) PEAK-DEMAND CONTROL	On/Off	The unit will operate at or below the maximum capacity level that was set for the Peak-demand control setting.	The unit will operate at or below the maximum capacity.	DE1-DE2
(i) OUTLET WATER TEMP. SWITCHING	2nd/1st	Setting temp. 2 (Refer to the following page(s) for detail. "Water-temperature setting" (p. 50))	Setting temp. 1 (Refer to the following page(s) for detail. "Water-temperature setting" (p. 50))	KN51-KN61
(j) COOLING/HEATING SWITCHING * EAHV	Heating/Cooling	Heating mode	Cooling mode	K91-K93

Analog		**Terminal block**
Input type	**Action**	
(k) WATER TEMP. SETTING/ CAPACITY CONTROL SIGNAL	Water temperature or capacity control signal can be set by using the external analog input to the CN421 on the MAIN circuit board. One analog input type can be selected from the following types: 4-20 mA, 1-5 V, 0-10 V, or 2-10 V. * Use a 4-20 mA signal output device with insulation.	SG1(+)-KG1(-)
(l) EXTERNAL WATER SENSOR 1 (option)	For simultaneous operating group	KT11-KT21
(m) EXTERNAL WATER SENSOR 2 (option)	For identical water system group	KT31-KT41

Output type

Contact type		**Conditions in which the contact closes (turns on)**	**Conditions in which the contact opens (turns off)**	**Terminal block**
(n) ERROR INDICATOR (Individual unit)	Close/Open	The unit has made an abnormal stop.	During normal operation	K33-K34
(o) ERROR INDICATOR (System leader unit only)	Close/Open	The unit in the system has made an abnormal stop.	During normal operation	SY1-SY2
(p) OPERATION INDICATOR (Individual unit)	Close/Open	The unit operation output is ON.	The unit operation output is OFF.	K31-K32
(q) OPERATION INDICATOR (System leader unit only)	Close/Open	The "UNIT OPERATION" contact (item (a) above) or the ON/OFF button on the remote controller is ON.	The "UNIT OPERATION" contact (item (a) above) or the ON/OFF button on the remote controller is OFF.	SS1-SS2
(r) PUMP OPERATION COMMAND	Close/Open	The pump will operate according to the status of the "UNIT OPERATION" contact or the ON/OFF button on the remote controller button.	Under all conditions other than the ones listed on the left	K75-K76
(s) SUPPLEMENTARY HEATER SIGNAL	Close/Open	Water and outdoor temperature has dropped below a setting water temperature and a set outdoor temperature.	Water temperature is at or above a set water temperature +2ºC or the outdoor temperature is at or above a set outdoor temperature +2ºC.	RP1-RP2
(t) DEFROST SIGNAL	Close/Open	The unit is in defrost mode.	The unit is not in defrost mode.	KD1-KD2
(u) DRAIN PAN HEATER SIGNAL	Close/Open	Outdoor temperature has dropped below a set outdoor temperature.	Outdoor temperature is at or above a set outdoor temperature +2ºC.	KB1-KB2
(v) HEATING OPERATION DISPLAY	Close/Open	The unit is in heating mode.	The unit is in cooling mode.	K38-K39

RC/M-NET

REMOTE CONTROLLER	PAR-W31MAA	RA-RB
Centralized controller	AE-200, AE-C400, EW-C50	A-B
M-NET	–	M1-M2

6-6-1. Input and output correspondence table

When wiring on site, check the operation during the commissioning.

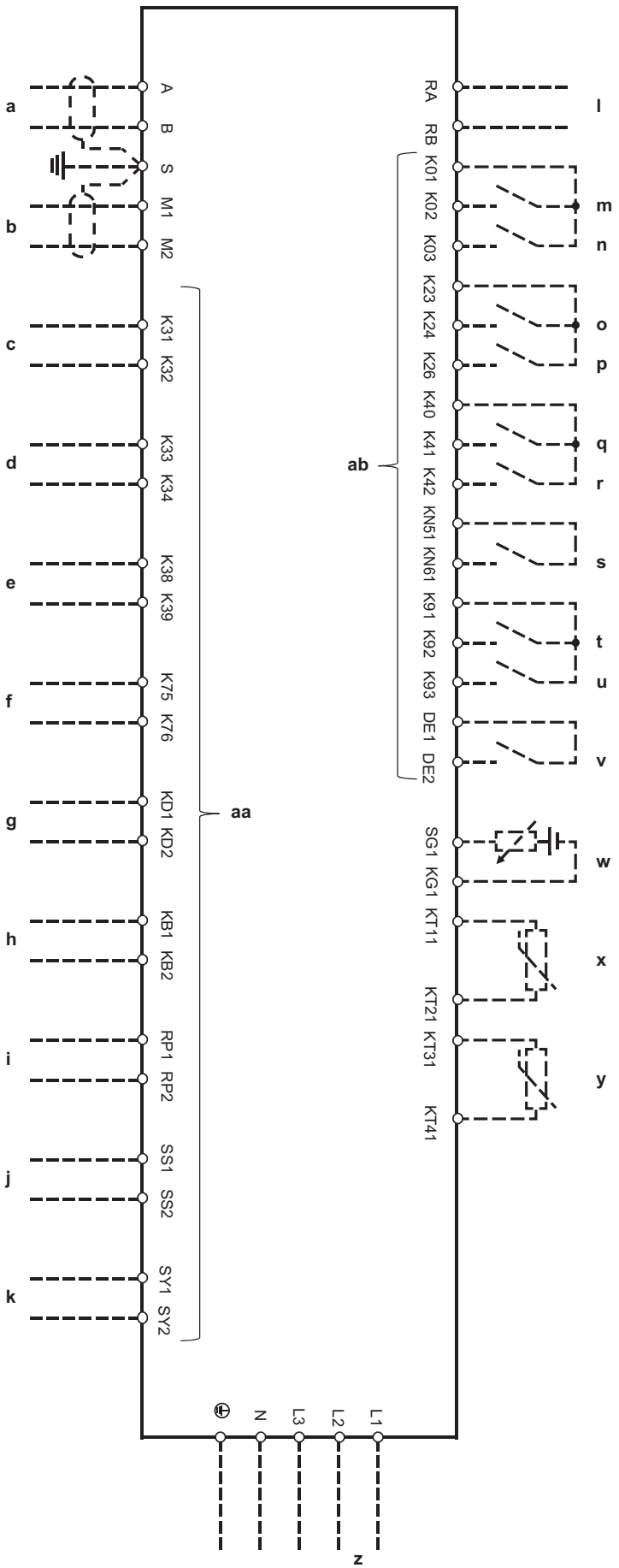
		Terminal block	ON	OFF	System leader unit	Group leader unit	SUB unit
No-voltage contact input	Run	K23-K26	Run	Stop	○	−	−
	Fan mode	K91-K92	Forced	Normal	○	−	−
	Cooling/Heating switching	K91-K93	Heating	Cooling	○	−	−
	Pump interlock	K01-K02	Normal	Error	○	○	○*1
	Anti-freeze	K40-K41	ON	OFF	○	−	−
	Flow switch	K23-K24	Normal	Error	○	○	○*1
	Outlet water temp. switching	KN51-KN61	2nd	1st	○	−	−
	Demand	DE1-DE2	ON	OFF	○	−	−
	Mode change (Heating ECO)	K40-K42	Heating ECO	Heating	○	−	−
	Mode change (Cooling ECO)	K01-K03	Cooling ECO	Cooling	○	−	−
Analog input	Water temp. setting / Capacity control signal	SG1(+)-KG1(-)	4-20mA, 0-10V, 2-10V, 1-5V		○	−	−
	External water sensor 1 (Option)	KT11-KT21	For simultaneous operating group		○	○	−
	External water sensor 2 (Option)	KT31-KT41	For identical water system group		○	−	−
No-voltage contact output	Supplementary heater signal output	RP1-RP2	During the low outdoor and water temperature is ON.		○	○	○
	Defrost signal output	KD1-KD2	During the defrosting operation is ON.		○	○	○
	Heating operation display	K38-K39	Heating	Cooling	○	○	○
	Operation display output (Individual unit)	K31-K32	ON while the unit is operating.		○	○	○
	Error display output (Individual unit)	K33-K34	While abnormally stop is ON.		○	○	○
	Pump operation command output	K75-K76	ON is when the pump is required.		○	○	○*1
	Drain pan heater signal output	KB1-KB2	During the low outdoor temperature is ON.		○	○	○
	Operation display output (System leader unit only)	SS1-SS2	ON while any of the units is operating.		○	−	−
	Error display output (System leader unit only)	SY1-SY2	ON when any of the units in the system has come to an abnormal stop.		○	−	−
RC	Remote controller	RA-RB	PAR-W31MAA		○	−	−
	Centralized controller	A-B	AE-200, AE-C400, EW-C50		○	−	−

○: Input and output signal is enabled.

−: Invalid

*1:Invalid when the one pump system

6-6-2. External signal interface



a Centralized controller (AE-200, AE-C400, EW-C50)
b M-NET Transmission line
c Operation display output (Individual unit)
d Error display output (Individual unit)
e Heating operation display output
f Pump operation command output
g Defrost signal output
h Drain pan heater signal output
i Supplementary heater signal output
j Operation display output (System leader unit only)
k Error display output (System leader unit only)
l Optional remote controller (PAR-W31MAA)
m Pump interlock (Normal/Error)
n Mode change (Cooling ECO) (Cooling ECO/ Cooling)
o Flow switch (Normal/Error)
p Run (Run/Stop)
q Anti-freeze (ON/OFF)
r Mode change (Heating ECO) (Heating ECO/ Heating)
s Outlet water temp. switching (2nd/1st)
t Fan mode (Forced/Normal)
u Cooling/Heating switching (Heating/Cooling)
v Demand (ON/OFF)
w Water temp. setting or Capacity control signal
Analog input 4-20mA/ 0-10V/1-5V/2-10V
x External water sensor 1 (option)
y External water sensor 2 (option)
z Power supply
aa No-voltage contact output
ab No-voltage contact input

en

7. Troubleshooting

Troubleshooting must be performed only by personnel certified by Mitsubishi Electric.

7-1. Diagnosing Problems for which No Error Codes Are Available

If a problem occurs, please check the following. If a protection device has tripped and brought the unit to stop, resolve the cause of the error before resuming operation.

Resuming operation without removing the causes of an error may damage the unit and its components.

Problem	Check item		Cause	Solution
The unit does not operate.	The fuse in the control box is not blown.	The power lamp on the circuit board is not lit.	The main power is not turned on.	Switch on the power.
		The power lamp on the circuit board is lit.	The pump interlock circuit is not connected.	Connect the pump interlock circuit wiring to the system.
			The flow switch wiring is not connected.	Connect the flow switch wiring to the system.
	The fuse in the control box is blown.	Measure the circuit resistance and the earth resistance.	Short-circuited circuit or ground fault	Resolve the cause, and replace the fuse.
	Automatic Start/Stop thermistor has tripped.	Water temperature is high. (Cooling)	The setting for the automatic Start/Stop thermistor is too high.	Change the setting for the automatic Start/Stop thermistor.
		Water temperature is low. (Heating)	The setting for the automatic Start/Stop thermistor is too low.	Change the setting for the automatic Start/Stop thermistor.
The unit is in operation, but the water does not heat up. (Heating)	Water temperature is low.	The water inlet/outlet temperature differential is normal.	The water-heating load is too high.	Install more units.
			Low refrigerant charge due to a leak.	Perform a leakage test, repair the leaks, evacuate the system, and charge the refrigerant circuit with refrigerant.
		The water inlet/outlet temperature differential is small.	LEV fault in the main circuit	Replace the LEV in the main circuit.
			Compressor failure	Replace the compressor.
			High pressure is too high, or low pressure is too low.	Operate the units within the specified pressure range.
	Water temperature is high.	–	Water flow shortage	Increase the water flow rate.
			Problem with the external devices	Repair the devices.
The unit is in operation, but the water does not heat up. (Cooling)	Water temperature is low.	–	Water flow shortage	Increase the water flow rate.
			Problem with the external devices	Repair the devices.
	Water temperature is high.	The water inlet/outlet temperature differential is normal.	The water-cooling load is too high.	Install more units.
			Low refrigerant charge due to a leak.	Perform a leakage test, repair the leaks, evacuate the system, and charge the refrigerant circuit with refrigerant.
		The water inlet/outlet temperature differential is small.	LEV fault in the main circuit	Replace the LEV in the main circuit.
			Compressor failure	Replace the compressor.
			High pressure is too high, or low pressure is too low.	Operate the units within the specified pressure range.

7-2. Diagnosing Problems Using Error Codes

If a problem occurs, please check the following before calling for service.

1) Check the error code against the table below.
2) Check for possible causes of problems listed in the "Cause" column that correspond to the error code.
3) If the error codes that appear on the display are not listed in the table below, or no problems were found with the items listed in the "Cause" column, please consult your dealer or servicer.

7-2-1. Diagnosing Problems Using Error Codes

Error code *1	Error type	Cause (Installation/Setting error)	Cause (Parts problems)	Error reset *2	
				Operation SW	
				Selector switch	Remote controller
4106	Power supply fault *3	Power supply fault occurred when the operation switch is switched on.	−	A	A
2503	Water supply cutoff (Flow switch has been triggered.)	The water flow rate dropped below the flow switch threshold. Water supply cutoff	Open-circuited flow switch Broken flow switch wiring	B	B
2501	Water supply cutoff (detection by sensor) 101, 201: Upstream side 102, 202: Downstream side 203: Inlet/outlet of unit	No water Water supply cutoff	Inlet water thermistor fault Outlet water thermistor fault	B	B
1302 1303	High pressure fault 101: A circuit 102: B circuit	No water Water supply cutoff	Linear expansion valve fault High-pressure sensor fault	A	A
1176	Discharge SH fault 101: A circuit 102: B circuit	−	Low-pressure sensor fault ACC inlet refrigerant temperature thermistor fault High-pressure sensor fault Discharge refrigerant temperature thermistor fault Linear expansion valve fault	A	A
1301	Low pressure fault 101: A circuit 102: B circuit	The outdoor temperature was below the operating range.	Low-pressure sensor fault ACC inlet refrigerant temperature thermistor fault Linear expansion valve fault Refrigerant deficiency (refrigerant gas leak)	A	A
1189	ACC inlet SH fault 101: A circuit 102: B circuit	−	ACC inlet refrigerant temperature thermistor fault Linear expansion valve fault Low-pressure sensor fault	A	A
Thermistor fault (5109, 5110, 5111, 5112, 5107, 5108, 5103, 5104, 5105, 5106, 5101, 5102, 5116, 5117)					
5109	Outdoor temperature (TH9)	−	Broken or shorted thermistor wiring	A	A
5110	Inlet water temperature (TH10)	−	Same as above	A	A
5111	Inlet water temperature (TH11)	−	Same as above	A	A
5112	Outlet water temperature (TH12)	−	Same as above	A	A
5107 5108	ACC inlet refrigerant temperature (TH7, 8/TH107, 108)	−	Same as above	A	A
5103 5104	Air heat exchanger refrigerant temperature (TH3, 103/TH4, 104)	−	Same as above	A	A
5105 5106	Water heat exchanger refrigerant temperature (TH5, 105/TH6, 106)	−	Same as above	A	A
5101 5102	Discharge refrigerant temperature (TH1, 101/TH2, 102) 101: Sensor error 103: Installation error	−	Same as above	A	A
5116	External water sensor 2 fault (TH116)	−	Same as above	A	A
5117	External water sensor 1 fault (TH117)	−	Same as above	A	A
5201	High-pressure sensor fault/high-pressure fault 101: A circuit 102: B circuit	−	Broken or shorted pressure sensor wiring	A	A
5202	Low-pressure sensor fault/low-pressure fault 101: A circuit 102: B circuit	−	Same as above	A	A
7102	Connection count error	−	Setting of connection count fault	B	B
7113	Model setting error 1	Dip switches on the PCB were set incorrectly during maintenance.	−	A	A
7117	Model setting error 2	−	CNTYP1 resistor fault (connected to the Main control board)	A	A
4102	Open phase	There is an open phase.	Circuit board fault	B	B

Error code *1	Error type	Cause (Installation/Setting error)	Cause (Parts problems)	Error reset *2	
				Operation SW	
				Selector switch	Remote controller
1102	Discharge temperature fault (A discharge refrigerant temperature of 120ºC or above is detected momentarily while the compressor is in operation.) 101: A circuit 102: B circuit	No water Abrupt change in water temperature (5K/min. or greater) Pump failure	High-pressure sensor fault Linear expansion valve fault Refrigerant deficiency (refrigerant gas leak)	A	A
1138	Hot water abnormal rise	Drop in water flow or water supply cutoff Water temperature rise	−	A	A
1503	Cold water abnormal drop *4	Drop in water flow or water supply cutoff Water temperature drop	−	B	B
1510	Gas leak fault	−	High pressure sensor fault Refrigerant deficiency (refrigerant gas leak)	A	A
1512	Low evaporation temperature fault	Drop in water flow Water temperature drop	−	B	B
426*	Cooling fan fault	−	Cooling fan fault	A	A
4122	Fan interlock fault	Disconnection of wiring	Fan motor fault FAN INV board fault	A	A
INV fault					
425* (101)	IPM error	−	INV board, Fan INV board fault Ground fault of the compressor Coil problem IPM error (loose terminal screws, cracked due to swelling) Items listed under "Heatsink overheat protection" below	A	A
425* (102)	ACCT overcurrent	−	INV board fault Ground fault of the compressor Coil problem IPM error (loose terminal screws, cracked due to swelling)	A	A
425* (107)	Overcurrent relay trip (effective value)(During operation)	−		A	A
425* (106)	Overcurrent relay trip (momentary value)(During operation)	−		A	A
425* (104)	Short-circuited IPM/ground fault (During operation)	−	INV board, Fan INV board fault Ground fault of the compressor IPM error (loose terminal screws, cracked due to swelling)	A	A
425* (105)	Overcurrent error due to a short-circuited (During operation)	Inter-phase voltage drop	INV board, Fan INV board fault Ground fault of the compressor Shorted output wiring	A	A
425* (137)	Fan motor stepping out error	Fan motor stepping out	Fan motor fault Fan INV board, wiring fault	A	A
INV fault **Voltage related problems during operation (108, 109, 111, 129, 131)**					
422* (108)	Bus voltage drop protection	Momentary power failure/power failure Power supply voltage drop	INV board fault 72C fault R1, R5 fault	A	A
422* (109)	Bus voltage rise protection	Incorrect power supply voltage	INV board fault	A	A
422* (111)	Logic error	Malfunction due to external noise interference • Faulty grounding • Improper transmission and external wiring installation (Shielded cable is not used.) • Low-voltage signal wire and highvoltage wire are in contact. (Placing the signal wire and power wire in the same conduit)	INV board, Fan INV board fault	A	A
422* (129)	Control power supply error	Control power supply failure	INV board, main board fault Broken wiring between INV and main control board	A	A
422* (131)	Inverter bus voltage fault	Power supply voltage drop	MAIN board fault Power supply voltage drop	A	A
INV fault					
423* (125)	Heatsink fault (Heatsink overheat protection)	Power supply voltage drop Clogged heatsink cooling air passage	Cooling fan fault INV board fault IPM error (loose terminal screws, cracked due to swelling)	A	A
424*	Overload protection	Clogged heatsink cooling air passage Power supply voltage drop	Cooling fan fault Current sensor fault INV circuit fault Compressor fault	A	A
530* (115)	ACCT sensor fault	−	INV board fault Ground fault of the compressor and IPM error	A	A

Error code *1	Error type	Cause (Installation/Setting error)	Cause (Parts problems)	Error reset *2	
				Operation SW	
				Selector switch	Remote controller
530* (117)	ACCT sensor/circuit fault	−	INV board fault	A	A
530* (119)	Open-circuited IPM/loose ACCT sensor	−	ACCT sensor fault Broken compressor wiring INV circuit fault (IPM error etc.)	A	A
530* (120)	Faulty wiring	−	INV board fault	A	A
5114 (0*)	THHS sensor/circuit fault	−	INV board fault	A	A
0403 (0*)	Serial communication error	−	Communication error between control board and INV board, Fan INV board (noise interference, broken wiring)	A	A
Remote controller error (incl. remote controller wiring fault)(6831, 6832, 6834, 6833)					
6831	Remote controller signal reception error 1	Remote controller cable is not connected. Broken wiring	Broken remote controller wiring Main control board communication circuit fault	−	−
6832	Remote controller signal transmission error	Communication error due to external noise interference	Main control board communication circuit fault	−	−
6834	Remote controller signal reception error 2	Communication error due to external noise interference	Main control board communication circuit fault	−	−
6833	Remote controller over current	Remote controller cable short circuit Remote controller malfunction	Broken remote controller wiring	−	−
4126	Analog input error (Control board (MAIN) CN210)	Analog input type fault (SW6-1, SW6-2)	Broken or open analog signal output device wiring (CN210)	−	−
6500	Communication error between the main and sub units Communication error between the MAIN and SUB circuits	−	−	−	−
6600	Transmission line power supply PCB fault Communication error between the main and sub units (Simple multiple unit control mode)	Communication error due to external noise interference	Broken wiring to the transmission power supply circuit board (between the main and sub units) Transmission power supply PCB communication circuit fault	−	−
6602 6603 6606 6607 6608				−	−
0206	Expansion board error	Control failure	Wiring, connector fault between expansion and main control board Expansion board, main control board fault	B	B
7100	Capacity code error	Other capacity units in a group	Group setting fault	−	−
7105	Address setting error	Address setting except for 01 - 50	Main control board fault	A	A
7109	Prevention error of malfunction	Change setting value that requires power supply reset	System and switch setting check	A	A
7130	Combination error	Different model in system	Different model check Main control board fault	A	A
8000	Normal	−	−	−	−

*1: If an error occurs, error codes shown above will appear in the 4-digit digital display on the PCB and the remote controller.
*2: Definition of symbols in the "Error reset" column.
A: Errors that can be reset if the remote reset setting on the unit is set to "Enable" (factory setting)
Errors that cannot be reset if the remote reset setting on the unit is set to "Disable"
B: Errors that cannot be reset
−: Errors that will be automatically cancelled once its cause is removed
*3: Power failure will be detected as an error only when the "Automatic recovery after power failure" setting on the unit is set to "Disable." (The default setting for the "Automatic recovery after power failure" setting is "Enable.")
*4: Before resetting this error, remove its causes. Resuming operation without removing the causes of heat exchanger freeze up will cause heat exchanger damage.
5: "" shows types of components. (0/1: COMP A, 2: COMP B, 5: FAN A, 6: FAN B)

7-2-2. Abnormal stop condition table

Error code	Error type	Preliminary error code	One side circuit can be operated	Another unit can be operated in the group
1102	Discharge temperature fault	1202	A	B
1138	Hot water abnormal rise	–	C	B
1176	Discharge SH fault	1276	A	B
1189	ACC inlet SH fault	1289	A	B
1301	Low pressure fault	1401	A	B
1302 1303	High pressure fault	1402	A	B
1503	Cold water abnormal drop	–	C	B
1510	Gas leak fault	–	C	B
1512	Low evaporation temperature fault	1612 or none	A	B
2503	Water supply cutoff (Flow switch)	–	C	C *1
2501	Water supply cutoff (Sensor)	–	C	B
4102	Open phase	4152 or none	C	B
4106	Power supply fault	–	C	B
4122	Fan interlock fault	4172	C	B
4126	Analog input error	–	–	–
422*	Inverter bus voltage fault	432*	A	B
423*	Inverter overheat protection fault	433*	A	B
424*	Inverter overload protection	434*	COMP: A/ FAN: C	B
425*	IPM error (inclusive)/overcurrent relay	435*	COMP: A/ FAN: C	B
426*	Cooling fan fault	–	A	B
5101	Discharge refrigerant temp. (TH1, 101)	1201	A	B
5102	Discharge refrigerant temp. (TH2, 102)	1202	A	B
5103	Air heat exchanger refrigerant temp. (TH3, 103)	–	A	B
5104	Air heat exchanger refrigerant temp. (TH4, 104)	–	A	B
5105	Water heat exchanger refrigerant temp. (TH5, 105)	–	A	B
5106	Water heat exchanger refrigerant temp. (TH6, 106)	–	A	B
5107	ACC inlet refrigerant temp. (TH7, 8)	–	A	B
5108	ACC inlet refrigerant temp. (TH107, 108)	–	A	B
5109	Outdoor temp. (TH9)	–	C	B
5110	Inlet water temp. (TH10)	–	C	B
5111	Inlet water temp. (TH11)	–	C	B
5112	Outlet water temp. (TH12)	–	C	B
5114	THHS sensor/Circuit fault	1214	A	B
5116	External water sensor 2 fault (TH116)	–	C	B
5117	External water sensor 1 fault (TH117)	–	C	B
5201	High pressure sensor fault	–	C	B
5202	Low pressure sensor fault	–	C	B
530*	ACCT sensor fault/Circuit fault	430*	COMP: A/ FAN: C	B
0403	Serial communication error	430*	COMP: A/ FAN: C	B
6500	Communication error between the MAIN and SUB units	–	C *2	B
6600	Communication error between the MAIN and SUB units	–	C	B
6602	Communication error between the MAIN and SUB units	–	C	B
6603	Communication error between the MAIN and SUB units	–	C	B
6606	Communication error between the MAIN and SUB units	–	C	B
6607	Communication error between the MAIN and SUB units	–	C	B
6608	Communication error between the MAIN and SUB units	–	C	B
6831	Remote controller signal reception error 1	–	–	–
6832	Remote controller signal transmission error	–	–	–
6834	Remote controller signal reception error 2	–	–	–
6833	Remote controller over current	–	C	B
0206	Expansion board error	–	C	B
7100	Capacity code error	–	C	C
7102	Connection count error	–	C	B
7105	Address setting error	–	C	B
7109	Prevention error of malfunction	–	C	B
7113 7117	Model setting error	–	C	B
7130	Combination error	–	C	B

A: One side circuit can be operated.
B: Another unit can be operated.
C: Operation impossible
−: Not abnormal stop
*1:Case of the one pump system
*2:Case of the communication error between the MAIN and SUB circuits
3:"" shows types of components. (0/1: COMP A, 2: COMP B, 5: FAN A, 6: FAN B)

7-3. Calling for Service

If the problem cannot be solved by following the instructions provided in the table. Refer to the following page(s) for detail. "Abnormal stop condition table" (p. 74)

Please contact your dealer or servicer along with the types of information listed below.

(1) Model name

The model name is a string that starts with "EAHV" or "EACV" and is found on the lower part of the unit.

(2) Serial number

Example: 75W00001

(3) Error code

(4) Nature of the problem in detail

Example: The unit stops approximately one minute after it was started.

8. Operating the Unit

8-1. Initial Operation

1) Make sure the Run/Stop switch that controls the unit on the local control panel is switched off.
2) Switch on the main power.
3) Leave the main power switched on for at least 12 hours before turning on the Run/Stop switch that controls the unit on the on-site control panel to warm up the compressor.
4) Switch on the Run/Stop switch that controls the unit on the on-site control panel.

8-2. Daily Operation

To start an operation

Switch on the Run/Stop switch that controls the unit on the local control panel, or press the ON/OFF button on the remote controller. (*1)

Note

The unit described in this manual features a circuit that protects the compressor from short-cycling. Once the compressor stops, it will not start up again for up to 12 minutes. If the unit does not start when the ON/OFF switch is turned on, leave the switch turned on for 12 minutes. The unit will automatically start up within 12 minutes.

To stop an operation

Switch off the Run/Stop switch that controls the unit on the on-site control panel, or press the ON/OFF button on the remote controller. (*1)

*1: For how to use the remote controller. Refer to the following page(s) for detail. "Remote Controller Operation" (p. 78)

IMPORTANT

- Keep the main power turned on throughout the operating season, in which the unit is stopped for three days or shorter (e.g., during the night and on weekends).
- Unless in areas where the outdoor temperature drops to freezing, switch off the main power when the unit will not be operated for four days or longer. (Switch off the water circulating pump if the pump is connected to a separate circuit.)
- When resuming operation after the main power has been turned off for a full day or longer, follow the steps under “Initial Operation”.
- If the main power was turned off for six days or longer, make sure that the clock on the unit is correct.

8-3. Using the Unit in Sub-freezing

⚠ CAUTION

In areas where temperature drops to freezing during the periods of non-use, blow the water out of the pipes or fill the pipes with anti-freeze solution.

- Not doing so may cause the water to freeze, resulting in burst pipes and damage to the unit or the furnishings.

In areas where temperature drops to freezing, use an anti-freeze circuit and leave the main power turned on to prevent the water in the water circuit from freezing and damaging the unit or causing water leakage and resultant damage to the furnishings.

In areas where temperature can drop low enough to cause the water in the pipes to freeze, operate the unit often enough to prevent the water from freezing.

- Frozen water in the water circuit may cause the water to freeze, resulting in burst pipes and damage to the unit or the furnishings.

- In areas where the air around the unit drops below freezing, leave the main switch turned on even when the unit will not be operated for four days or longer. Leave the switch on the water circulation pump turned on if the pump is connected to a separate circuit.
- If the unit is left turned off for a while (e.g., overnight) when the temperature around the unit drops below freezing, the water in the water circuit will freeze and damage the pipes and the heat exchanger.
- The recommended electric circuit has an anti-freeze circuit. For this circuit to function, the main power must be turned on.
- If the water circulation pump is connected differently from the recommended way, make sure the circuit has some type of anti-freeze function. *1

*1: A function that automatically operates the water circulation pump to prevent the water in the circuit from freezing when the water temperature drops.

8-4. Remote Controller Operation

Button functions

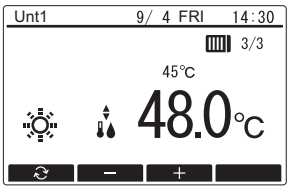
: Returns to the menu screen

: Saves the settings

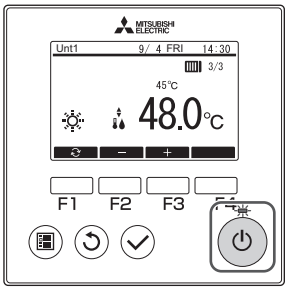
: Returns to the previous screen

: Turns on/off the power

Main screen



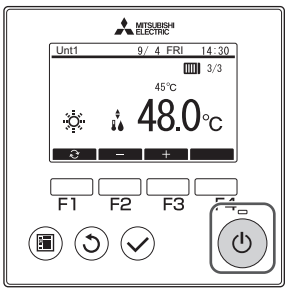
8-4-1. Power ON/OFF



To start

Press [⏻].

The LED above [⏻] will light up in green, and operation will start.



To stop

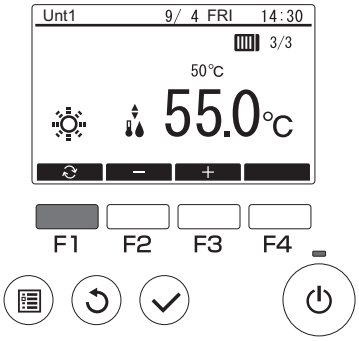
Press [⏻].

Press [F3] on the confirmation screen.

[⏻] will light off, and the operation will stop.

8-4-2. Setting the operation mode and temperature

[1] Operation mode



Press [F1] to select the operation mode from Heating, Heating ECO, Cooling and Anti-Freeze.
Each press advances the mode.

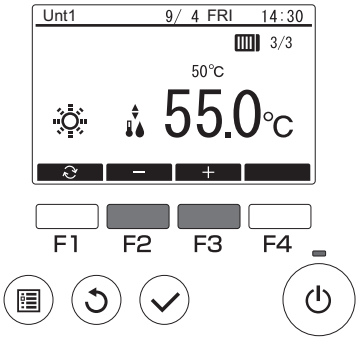

Heating


Heating ECO


Cooling


Anti-Freeze

[2] Temperature



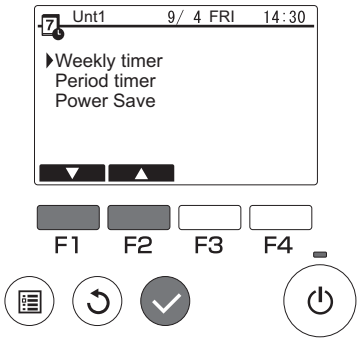
Press [F2] to decrease the temperature, and [F3] to increase.

8-4-3. Using the Weekly timer

Use the Weekly timer to set the ON/OFF schedule, operation mode, and temperature for each day of the week.
Weekly timer will be disabled when the schedule function is disabled and when the period timer is enabled.
Weekly timer may not be executed under certain system configurations.

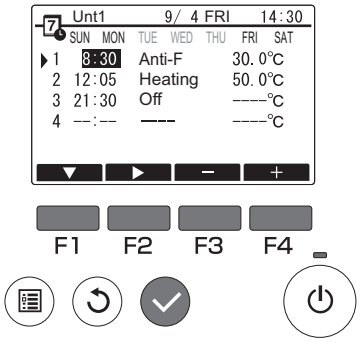
Steps

Step 1



Press [▤].
Press [F3] to select [7].
Press [⊘].
On the Schedule menu, press [⊘] to select Weekly timer.

Step 2

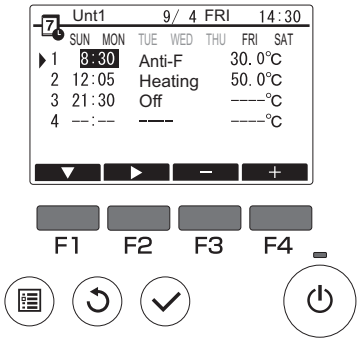


Weekly timer screen will appear.

To view the settings:
Press [F1] or [F2] to view the settings for each day.
Press [F4] to see the next page.

To change the settings:
Press [F1] or [F2] to toggle through the days. Press [F3] select a day, and press [⊘].
Multiple days are selectable by repeating the steps above.

Step 3



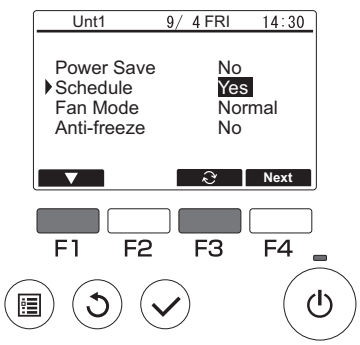
Pattern setting screen will appear.
Press [F1] to select a pattern to be set.
Press [F2] to select the item to change its settings.
Press [F3] or [F4] to change the setting for the selected item.

1) Time
Set in 5-minute increments.
Hold down the button to fast-forward.

2) Operation selection mode or Off
Available options vary with the connected unit.
Connected unit will operate unless set to Off.

3) Temperature
Settable in 0.5°C increments
Press [⊘] to save the change.

Step 4



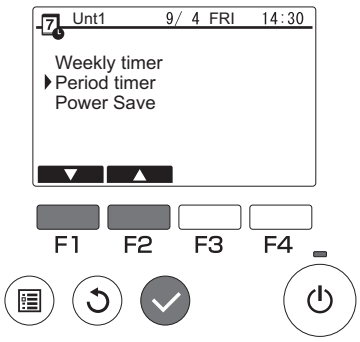
To enable schedule
Return to the main screen, and press [F4].
Press [F1] to move the cursor to Schedule.
Operation setting screen will appear.
Press [F3] to select Yes.

8-4-4. Using the Period timer

Use the Period timer to set the daily operation schedule (ON/OFF, operation mode, temperature) for specific periods.
If the periods 1 and 2 overlap, only period 1 will be valid.
Weekly timer will be disabled when the Schedule function is disabled:
When the Schedule function is disabled from the centralized controller or the connected unit, Schedule settings cannot be made from the remote controller.

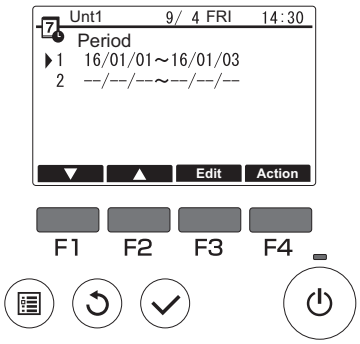
Steps

Step 1



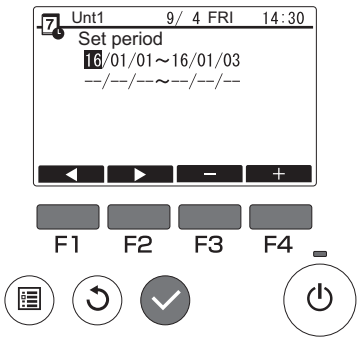
From the Schedule menu press [F1] or [F2] to select Period timer, and press [⊛].
Refer to the following page(s) for detail. "Using the Weekly timer" (p. 80)

Step 2



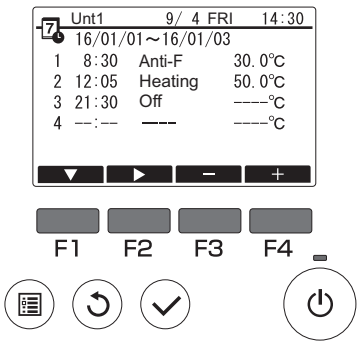
Pre-set periods will appear, if any.

Step 3



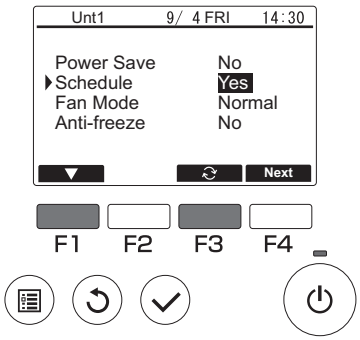
To select a period
Press [F1] or [F2] to select a period to set, and press [F3].
Press [F1] or [F2] to select the year, month, or date.
Press [F3] or [F4] to change the year, month, or date.
Press [⊛] to save the setting.

Step 4



To set the operation
Press [F1] or [F2] to select a period to set, and press [F4].
Operation pattern setting screen will appear.
Set the time, mode, and temp.
(Select an item with [F1] and [F2]. Change the value with [F3] and [F4].)
Press [⊘] to save the change.

Step 5



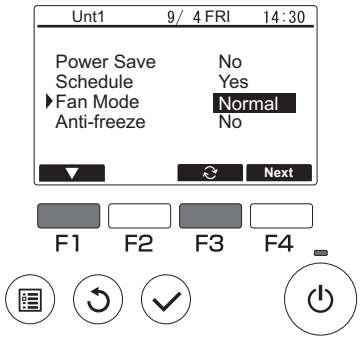
To enable schedule
Refer to the following section. "Using the Weekly timer" (p. 80)

8-4-5. Fan mode

- The following two fan modes are available.
  Normal: Fan stops when compressor stops.
  Snow: Fan keeps operating after compressor has stopped to keep snow off the unit.

Steps

Step 1



Press [F4] on the Menu screen.
Operation setting screen will appear.
Press [F1] to select Fan mode.
Press [F3] to select Normal or Snow.

8-4-6. Using power save

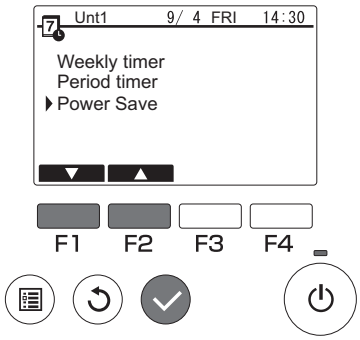
Power save is a function that regulates the compressor's rotation count and reduces power consumption during high load on a daily schedule, during specific time periods, or based on the regulated unit capacity.

Definition of a Day in using power save

Each Day starts with the time specified by the user. No periods can be specified that spans the Day. Refer to "Unit Setting" in the Installation Manual for detail.

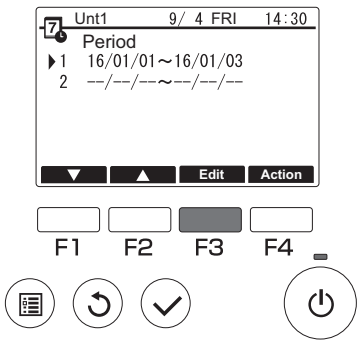
Steps

Step 1



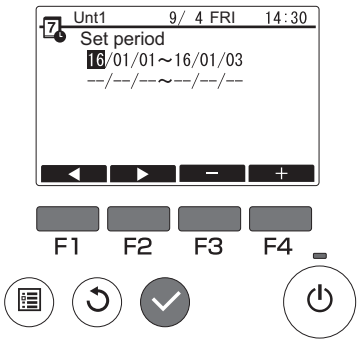
From the Menu screen, select Schedule, then power save.
Press [⊘].

Step 2



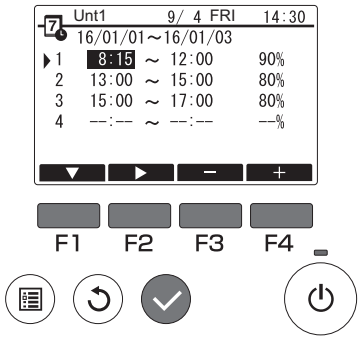
Two different periods can be set by specifying the start and end dates.

- If the dates specified in periods 1 and 2 overlap, only the dates specified in period 1 will be valid.



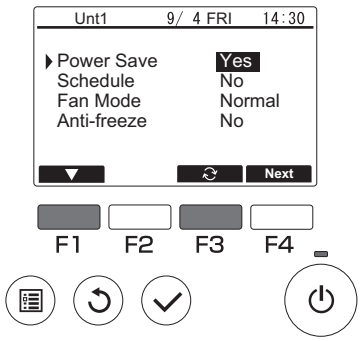
Refer to Step 3 of the section on using the period timer for how to set the periods.
Refer to the following page(s) for detail. "Using the Period timer" (p. 81)

Step 3



Refer to Step 4 of the section on using the period timer for how to set the power save start/end time and the demand control value.
Refer to the following page(s) for detail. "Using the Period timer" (p. 81)
Press [⊘] to save the change.

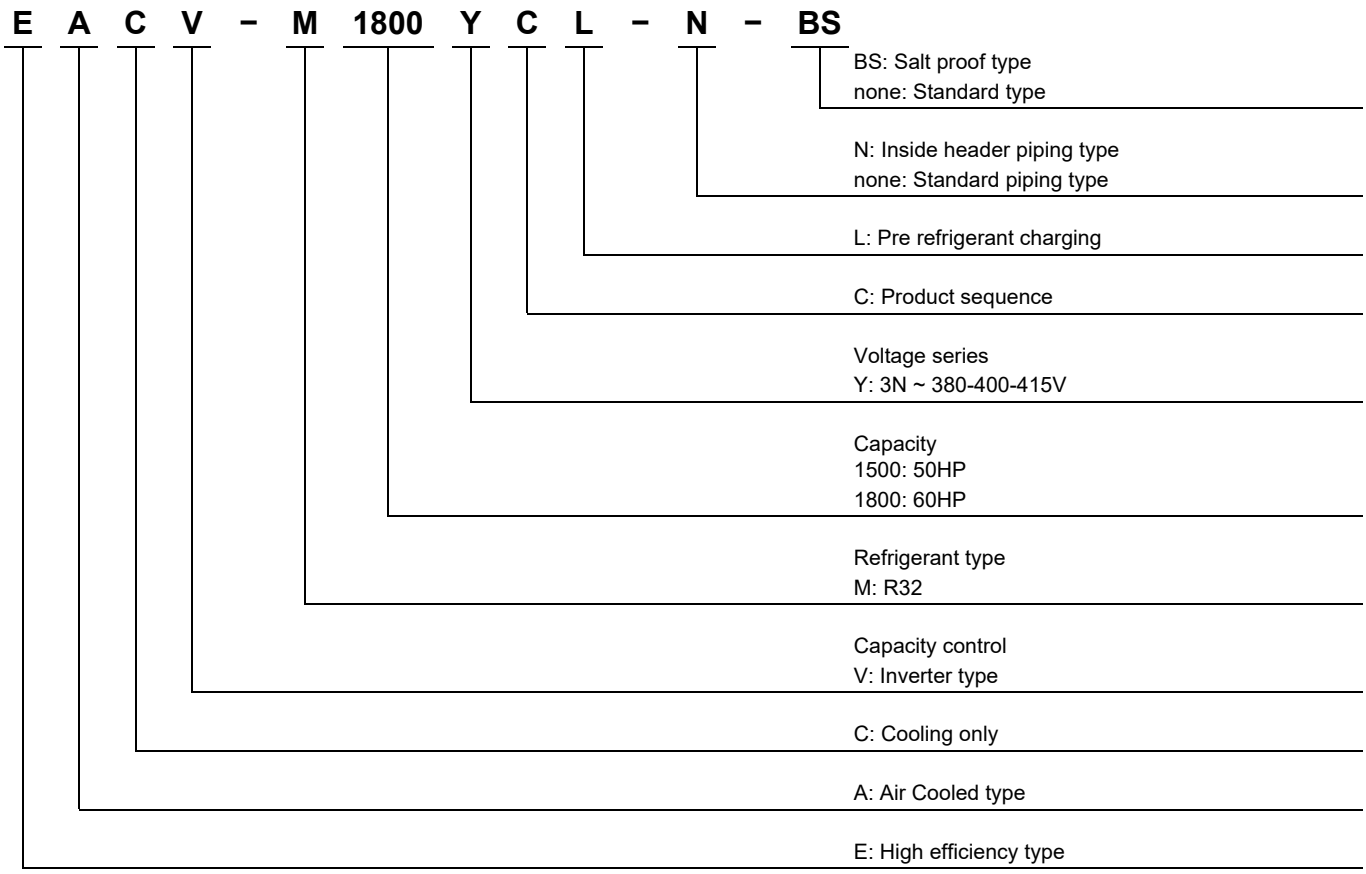
Step 4

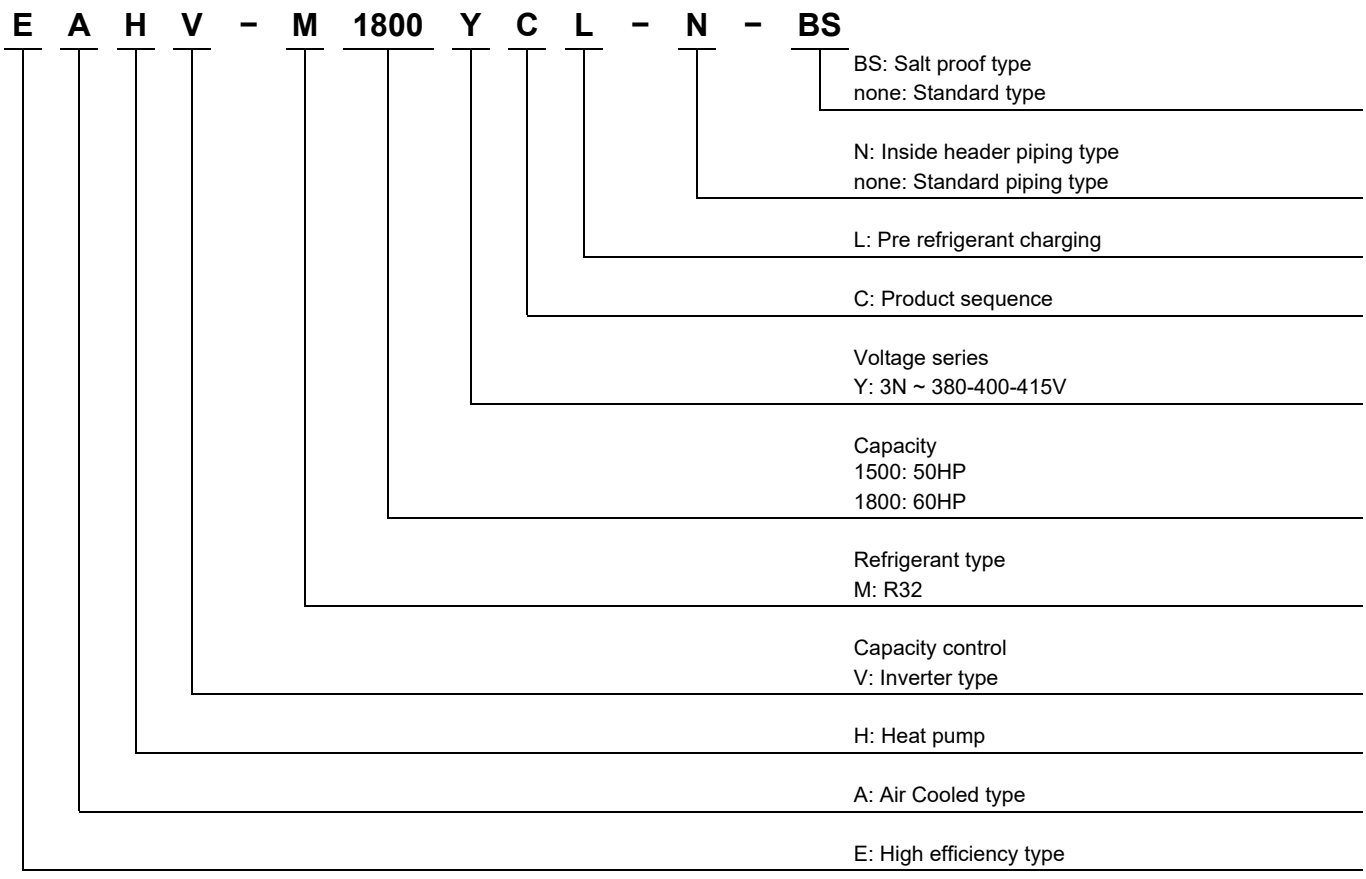


Refer to Step 4 of the section on using the weekly timer for how to enable power save.
Refer to the following page(s) for detail. "Using the Period timer" (p. 81)

9. Main Specifications

9-1. Model name





en

9-2. Specifications

Model			EAHV-M1500YCL(-N)(-BS), EACV-M1500YCL(-N)(-BS)	EAHV-M1800YCL(-N)(-BS), EACV-M1800YCL(-N)(-BS)
Power source			3-phase 4-wire 380-400-415V 50/60Hz	
Cooling capacity *1		kW	150.00	180.00
		kcal/h	129,000	154,800
		BTU/h	511,800	614,160
	Power input	kW	44.73	57.02
	EER		3.35	3.16
	IPLV *6		6.42	6.31
	Water flow rate	m^3/h	25.8	31.0
Cooling capacity (EN14511) *2		kW	149.18	178.80
		kcal/h	128,295	153,768
		BTU/h	509,002	610,066
	Power input	kW	45.55	58.22
	EER		3.28	3.07
	SEER		5.52	5.36
	ηsc	%	217.8	211.4
	Water flow rate	m^3/h	25.8	31.0
Heating capacity *3		kW	150.00	180.00
<EAHV>		kcal/h	129,000	154,800
		BTU/h	511,800	614,160
	Power input	kW	42.61	53.09
	COP		3.52	3.39
	Water flow rate	m^3/h	25.8	31.0
Heating capacity (EN14511) *4		kW	150.82	181.20
<EAHV>		kcal/h	129,705	155,832
		BTU/h	514,598	618,254
	Power input	kW	43.43	54.29
	COP		3.47	3.34
	SCOP Low/Medium		3.31 / 2.88	
	ηsh Low/Medium	%	129.0 / 112.0	
	Water flow rate	m^3/h	25.8	31.0
Current input	Cooling current 380-400-415V *1	A	76 - 72 - 69	96 - 91 - 88
	Heating current 380-400-415V *3	A	72 - 68 - 66	90 - 85 - 82
	Maximum current	A	120	
Water pressure drop *1	Standard piping	kPa	56	79
	Inside header piping	kPa	134	190
Temp range	Cooling	ºC	Outlet water 4~30 *7	
		ºF	Outlet water 39.2~86 *7	
	Heating	ºC	Outlet water 25~55 *7	
		ºF	Outlet water 77~131 *7	
	Outdoor (Cooling)	ºC	-15~52 *7	
		ºF	5~125.6 *7	
	Outdoor (Heating)	ºC	-20~43 *7	
		ºF	-4~109.4 *7	
Circulating water volume range		m^3/h	12.9~43.0	
Sound pressure level (measured in anechoic room) at 1m *1		dB (A)	65	67
Sound power level (measured in anechoic room) *1		dB (A)	83	85
Diameter of water pipe (Standard piping)	Inlet	mm (in)	65A (2 1/2B) housing type joint	
	Outlet	mm (in)	65A (2 1/2B) housing type joint	
Diameter of water pipe (Inside header piping)	Inlet	mm (in)	150A (6B) housing type joint	
	Outlet	mm (in)	150A (6B) housing type joint	
External finish			Polyester powder coating steel plate	
External dimensions H × W × D		mm	2350 × 3400 × 1080	
Net weight	Standard piping	kg (lbs)	EAHV: 1280 (2822) / EACV: 1039 (2291)	
	Inside header piping	kg (lbs)	EAHV: 1307 (2881) / EACV: 1067 (2352)	
Design pressure	R32	MPa	4.15	
	Water	MPa	1.0	
Heat exchanger	Water side		Stainless steel plate and copper brazing	
	Air side (EAHV)		Salt-resistant cross fin & aluminum tube	
	Air side (EACV)		Salt-resistant corrugated fin & aluminum micro channel	
Compressor	Type		Inverter scroll hermetic compressor	
	Maker		MITSUBISHI ELECTRIC CORPORATION	
	Starting method		Inverter	
	Quantity		4	
	Motor output	kW	11.5 × 4	
	Lubricant		MEL46EH	
Fan	Air flow rate	m^3/min	270 × 4	
		L/s	4500 × 4	
		cfm	9534 × 4	
	Type, Quantity		Propeller fan × 4	
	Starting method		Inverter	
	Motor output	kW	0.92 × 4	
	External static pressure	Pa	20	

Model		EAHV-M1500YCL(-N)(-BS), EACV-M1500YCL(-N)(-BS)	EAHV-M1800YCL(-N)(-BS), EACV-M1800YCL(-N)(-BS)
Protection	High pressure protection	High pressure sensor & High pressure switch at 4.15MPa (601psi)	
	Inverter circuit	Over-heat protection, Over current protection	
	Compressor	Over-heat protection	
Refrigerant	Type × charge (EAHV)	R32 × 11.5 (kg) × 4 *5	
	Type × charge (EACV)	R32 × 4.7 (kg) × 4 *5	
	Control	LEV	

*1:Under normal cooling conditions at outdoor temp 35ºCDB/24ºCWB (95ºFDB/75.2ºFWB) outlet water temp 7ºC (44.6ºF) inlet water temp 12ºC (53.6ºF). Pump input is not included in cooling capacity and power input.

*2:Under normal cooling conditions at outdoor temp 35ºCDB/24ºCWB (95ºFDB/75.2ºFWB) outlet water temp 7ºC (44.6ºF) inlet water temp 12ºC (53.6ºF). Pump input is included in cooling capacity and power input based on EN14511.

*3:Under normal heating conditions at outdoor temp 7ºCDB/6ºCWB (44.6ºFDB/42.8ºFWB) outlet water temp 45ºC (113ºF) inlet water temp 40ºC (104ºF). Pump input is not included in heating capacity and power input.

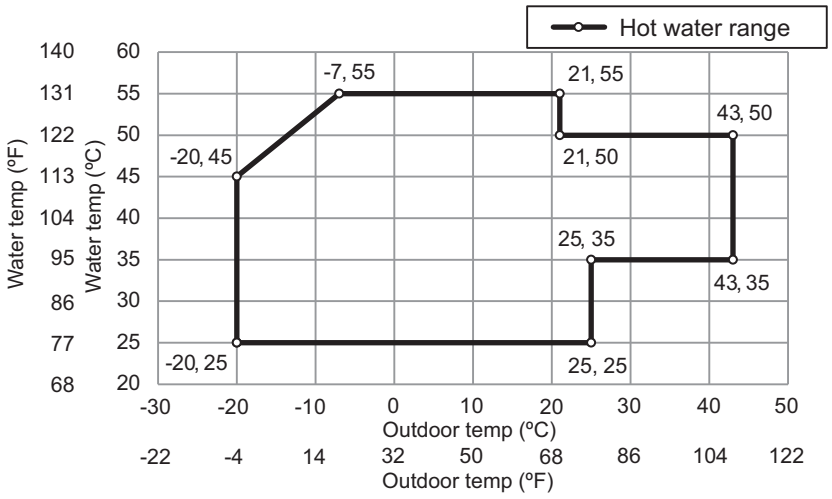
*4:Under normal heating conditions at outdoor temp 7ºCDB/6ºCWB (44.6ºFDB/42.8ºFWB) outlet water temp 45ºC (113ºF) inlet water temp 40ºC (104ºF). Pump input is included in heating capacity and power input based on EN14511.

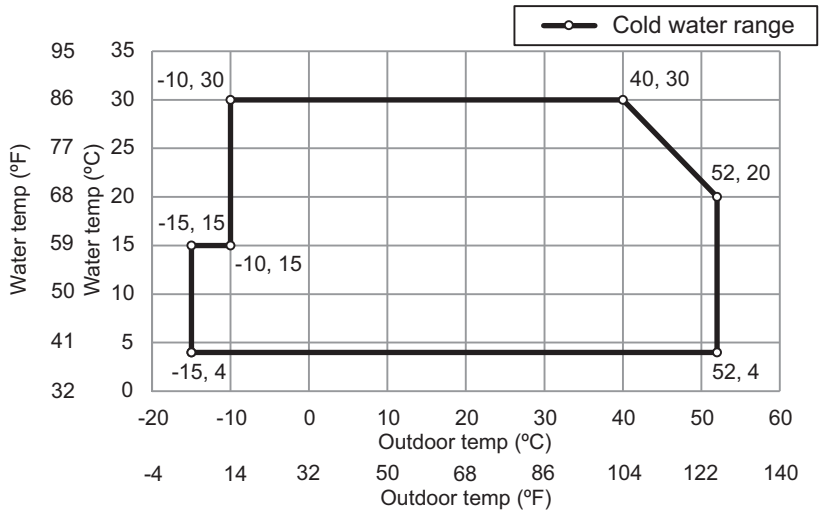
*5:Amount of factory-charged refrigerant is 2.95 (kg) × 4. Please add the refrigerant at the field.

*6:IPLV is calculated in accordance with AHRI 551-591.

- Please do not use the steel material for the water piping.
- Please always make water circulate, or pull the circulation water out completely when not in use.
- Please do not use groundwater or well water in direct.
- The water circuit must be closed circuit.
- Due to continuous improvement, the above specifications may be subject to change without notice.
- This model does not equip with a pump.

*7:





Unit converter

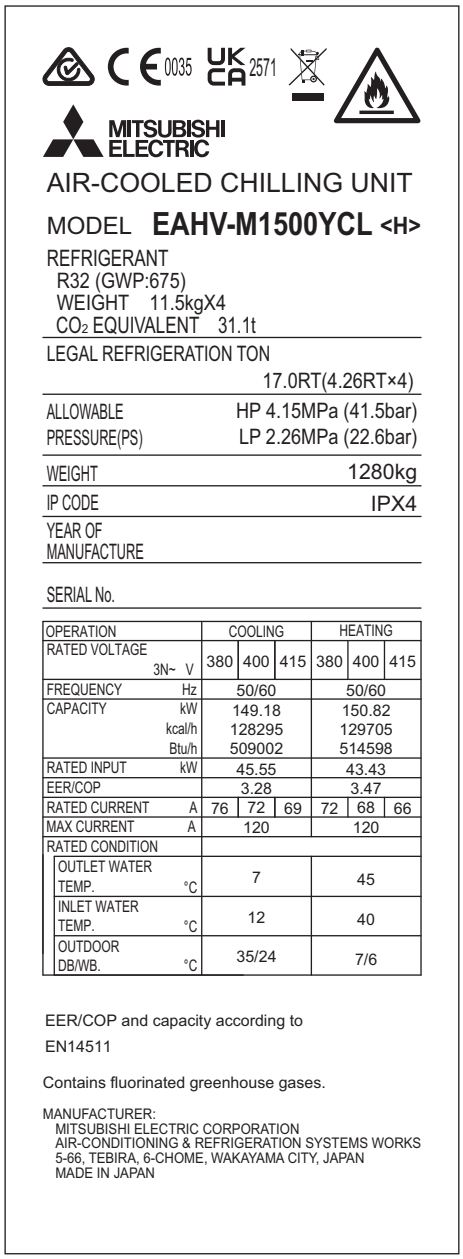
kcal/h = kW × 860

BTU/h = kW × 3,412

lbs = kg/0.4536

cfm = m^3/min × 35.31

Spec label



MITSUBISHI ELECTRIC

AIR-COOLED CHILLING UNIT

MODEL **EAHV-M1500YCL <H>**

REFRIGERANT
R32 (GWP:675)
WEIGHT 11.5kgX4
CO_2 EQUIVALENT 31.1t

LEGAL REFRIGERATION TON
17.0RT(4.26RT×4)

ALLOWABLE PRESSURE(PS)
HP 4.15MPa (41.5bar)
LP 2.26MPa (22.6bar)

WEIGHT 1280kg

IP CODE IPX4

YEAR OF MANUFACTURE

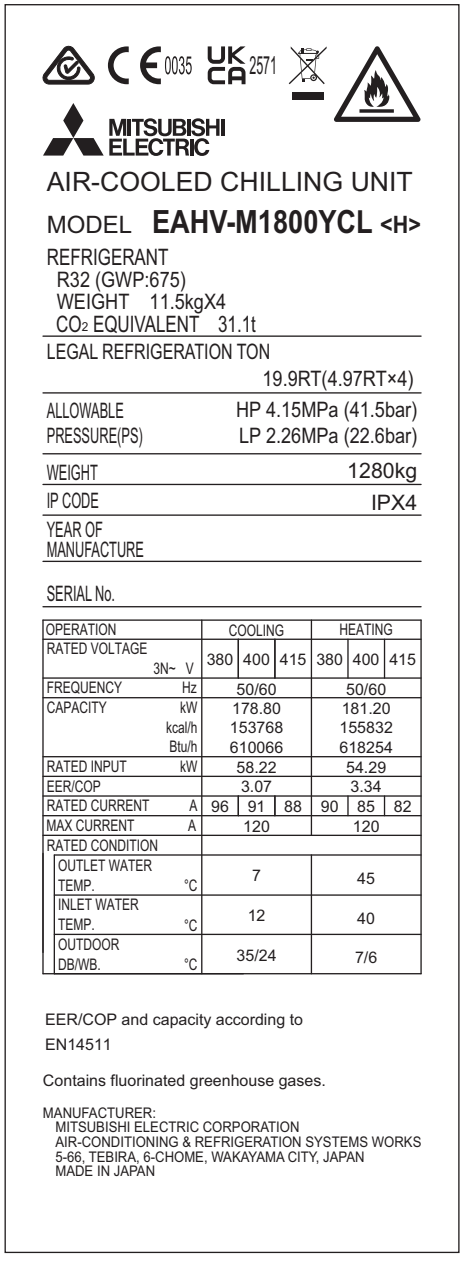
SERIAL No.

OPERATION		COOLING			HEATING		
RATED VOLTAGE 3N~	V	380	400	415	380	400	415
FREQUENCY	Hz	50/60			50/60		
CAPACITY	kW	149.18			150.82		
	kcal/h	128295			129705		
	Btu/h	509002			514598		
RATED INPUT	kW	45.55			43.43		
EER/COP		3.28			3.47		
RATED CURRENT	A	76	72	69	72	68	66
MAX CURRENT	A	120			120		
RATED CONDITION							
OUTLET WATER TEMP.	°C	7			45		
INLET WATER TEMP.	°C	12			40		
OUTDOOR DB/WB.	°C	35/24			7/6		

EER/COP and capacity according to EN14511

Contains fluorinated greenhouse gases.

MANUFACTURER:
MITSUBISHI ELECTRIC CORPORATION
AIR-CONDITIONING & REFRIGERATION SYSTEMS WORKS
5-66, TEBIRA, 6-CHOME, WAKAYAMA CITY, JAPAN
MADE IN JAPAN



MITSUBISHI ELECTRIC

AIR-COOLED CHILLING UNIT

MODEL **EAHV-M1800YCL <H>**

REFRIGERANT
R32 (GWP:675)
WEIGHT 11.5kgX4
CO_2 EQUIVALENT 31.1t

LEGAL REFRIGERATION TON
19.9RT(4.97RT×4)

ALLOWABLE PRESSURE(PS)
HP 4.15MPa (41.5bar)
LP 2.26MPa (22.6bar)

WEIGHT 1280kg

IP CODE IPX4

YEAR OF MANUFACTURE

SERIAL No.

OPERATION		COOLING			HEATING		
RATED VOLTAGE 3N~	V	380	400	415	380	400	415
FREQUENCY	Hz	50/60			50/60		
CAPACITY	kW	178.80			181.20		
	kcal/h	153768			155832		
	Btu/h	610066			618254		
RATED INPUT	kW	58.22			54.29		
EER/COP		3.07			3.34		
RATED CURRENT	A	96	91	88	90	85	82
MAX CURRENT	A	120			120		
RATED CONDITION							
OUTLET WATER TEMP.	°C	7			45		
INLET WATER TEMP.	°C	12			40		
OUTDOOR DB/WB.	°C	35/24			7/6		

EER/COP and capacity according to EN14511

Contains fluorinated greenhouse gases.

MANUFACTURER:
MITSUBISHI ELECTRIC CORPORATION
AIR-CONDITIONING & REFRIGERATION SYSTEMS WORKS
5-66, TEBIRA, 6-CHOME, WAKAYAMA CITY, JAPAN
MADE IN JAPAN

9-3. Technical documentation of fan

TECHNICAL DOCUMENTATION

TECHNICAL DOCUMENTATION & PRODUCT INFORMATION

PRODUCT MODEL	EAHV-M1500YCL(-N)(-BS), EACV-M1500YCL(-N)(-BS) EAHV-M1800YCL(-N)(-BS), EACV-M1800YCL(-N)(-BS)

Requirements		Information
(1)	Overall efficiency (%)	43.83
(2)	Measurement category	A
(3)	Efficiency category	STATIC
(4)	Efficiency grade (N)	40
(5)	VSD	The VSD is integrated within the fan
(6)	Year of manufacture	2020
(7)	Manufacturer	MITSUBISHI ELECTRIC CORPORATION HEAD OFFICE: TOKYO BUILDING 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN AUTHORIZED REPRESENTATIVE IN EU: MITSUBISHI ELECTRIC EUROPE B.V. HARMAN HOUSE, 1GEORGE STREET, UXBRIDGE, MIDDLESEX UB8 1QQ, U.K. COMMERCIAL REGISTRATION NO.33279602
(8)	Model number	EAHV-M1500YCL(-N)(-BS), EACV-M1500YCL(-N)(-BS) EAHV-M1800YCL(-N)(-BS), EACV-M1800YCL(-N)(-BS)
(9)	Motor power input (kW)	0.56
	Flow rate (m^3/s)	3.39
	Pressure (Pa)	72.83
(10)	Rotations per minute	751
(11)	Specific ratio	1.0
(12)	Information relevant for facilitating disassembly, recycling or disposal at end-of-life	Your product should be disposed of separately from household waste in line with local laws and regulations. When this product reaches its end of life, dispose of it at your local waste collection point/recycling centre. The separate collection and recycling of your product at the time of disposal will help conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information for WEEE recyclers please contact us at http://www.mitsubishielectric.eu/contact_us_form
(13)	Information relevant to minimize impact on the environment and ensure optimal life expectancy as regards installation, use and maintenance of the fan	In addition to daily checks (eg cleaning of filters), periodic maintenance and checks by a skilled technician are required to ensure that the unit is maintained in a good condition for a long period of time, and that it may be used with confidence.
(14)	Description of additional items used when determining the fan energy efficiency	−

10. Maintenance

10-1. Operation status check

Operate the unit for at least 30 minutes until the operation is stabilized before checking the operation status.

[1] Voltage

Ensure that the power-supply voltage is normal.

- Ensure that the terminal voltage is within the range between -5% and +5% of the rated voltage at the rated frequency.

[2] Current

Ensure that the operation current <total current of the fan and compressor system> is normal.

Operation current varies with outside temperature, cold-water temperature, and operation conditions. Approximate normal values at 400 V are summarized in the table below.

Model	Cooling	Heating
EACV-M1500YCL	72 A	68 A
EAHV-M1500YCL		
EACV-M1800YCL	91 A	85 A
EAHV-M1800YCL		

*1: Under normal cooling conditions at outdoor temperature 35ºCDB/24ºCWB (95ºFDB/75.2ºFWB)
Outlet water temperature 7ºC (44.6ºF)
Inlet water temperature 12ºC (53.6ºF)

*2: Under normal heating conditions at outdoor temperature 7ºCDB/6ºCWB (44.6ºFDB/42.8ºFWB)
Outlet water temperature 45ºC (113ºF)
Inlet water temperature 40ºC (104ºF)

[3] Pressure

Approximate normal high and low pressures are summarized in the table below.

Pressure varies with operation status and conditions.

Pressure	Operation pressure
High pressure <MPa>	1.5-3.8
Low pressure <MPa>	0.2-1.4

[4] Water temperature

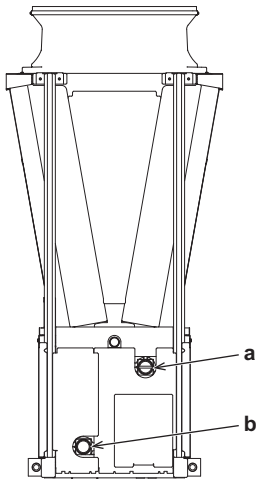
Ensure that the inlet/outlet cold/hot water temperatures match the set temperatures.

When a standard piping type is shared by two or more units, make sure that the temperatures at the inlet/outlet of each unit are approximately equal.

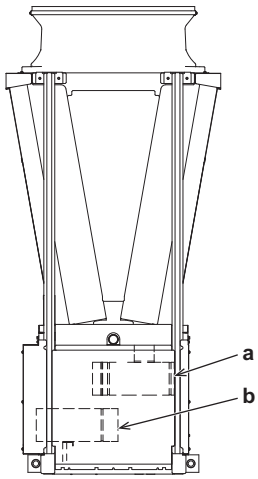
*1: Ensure that the water-flows are well-balanced. Adjust the flows with valves.

*2: Note that the water temperature may abnormally rise from heat generation from the pump if the pump is operated alone for a long time with the unit operation command being set to OFF (operation stop).

Standard piping: opposite side of the maintenance access



Built-in piping: left side

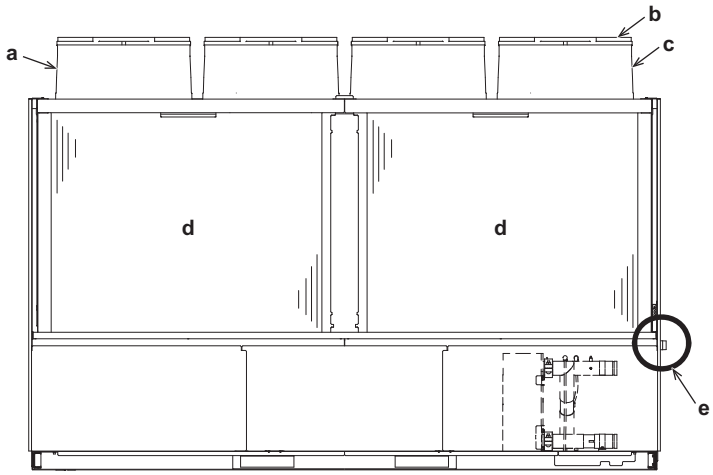


a Cold (hot) water outlet
b Cold (hot) water inlet

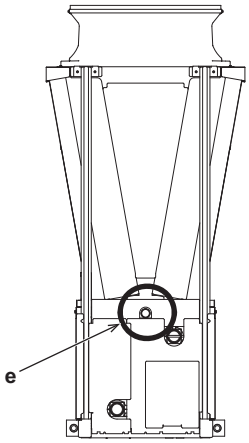
[5] Others

- Check for abnormal operation noise or vibration.
- Ensure that air-side heat exchanger inlet is not clogged with dirt or dead leaves.
- Ensure that the top of the unit is clear of snow.
- Ensure that the drainage of machine compartment is not clogged.

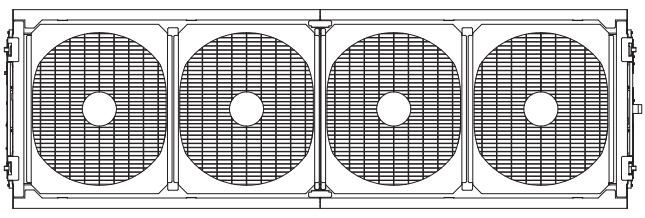
Right side



Opposite side of the maintenance access side



Top view (ceiling side)



a Bell mouth
b Fan guard
c Fan (inside)
d Air heat exchanger
e Drain discharge hole

10-2. Long period of non-use

[1] After the season or during summer

When the units remain turned off for an extended period such as after the season or during summer, turn off the power switch. (Turn off the power switch on the circulation pump if it is connected to a separate circuit.)

- If the power remained turned off for two days or longer, make sure to check that the clock is set correctly when the power is turned on, and re-set the clock as necessary.

[2] When the units remain stopped in winter

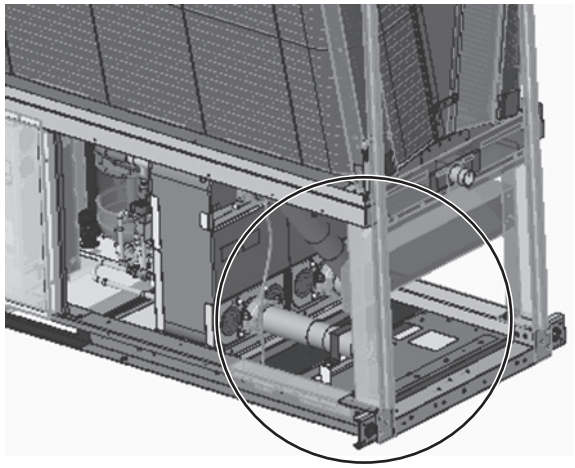
When units remain stopped in cold temperatures, leave the power switch turned on.

- The circulation-water freeze-up-protection circuit will not operate if the power switch is turned off. (If the circulation pump is connected to a separate circuit, leave the power of the circulation pump on.)
- Drain the cold/hot water from the unit that will not be operated in winter according to the instructions below.

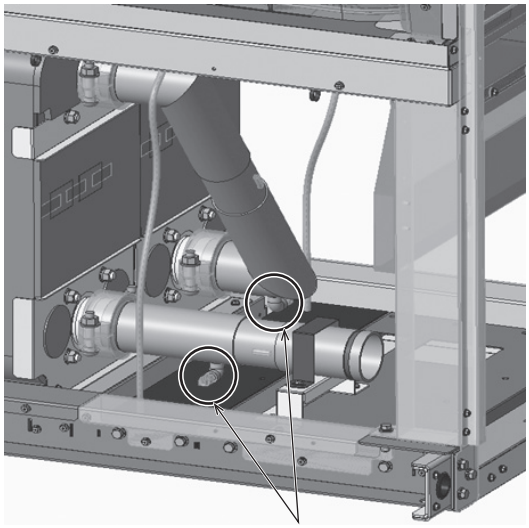
Draining the water from the water-pipes of the unit and from the water heat exchanger

- Drain the water by unplugging the drain plug on the water pipe at the lower part of the water heat exchanger.

Standard water piping specification



The drain plug is at the lower part of the water heat exchanger (where circled in the figure).



The plug has a water-temperature thermistor.
Remove the plug with the thermistor on it when draining water.

10-3. Maintenance

The table below details regular inspection and preventive maintenance, including inspection items, methods, criteria, and schedules.

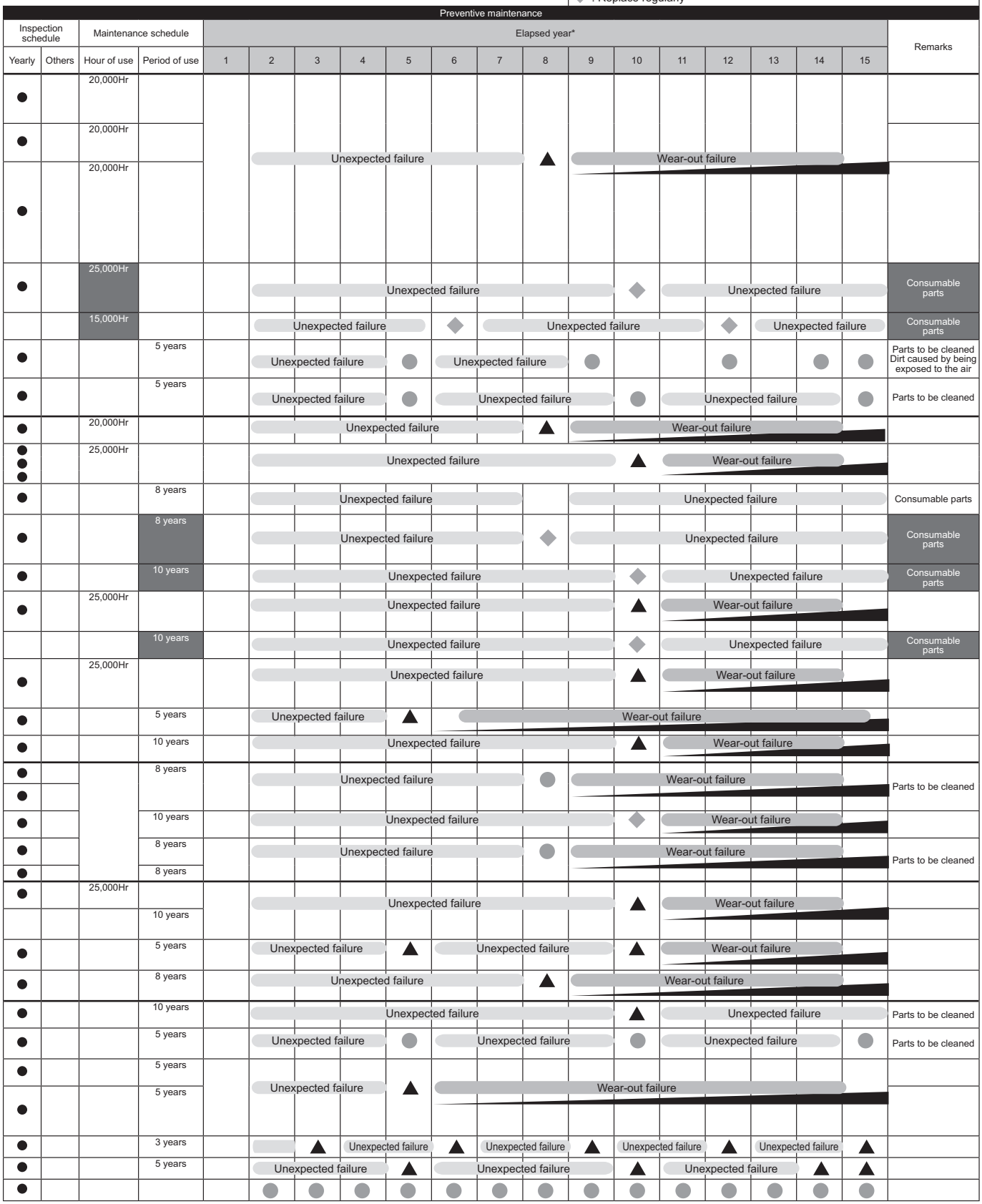
Parts			Regular inspection			Preventive maintenance
Component parts	Parts		Item	Method/tool	Criteria <Reference>	Item
Refrigerant circuit	Compressor		• Sound and vibration at start-up, during operation, during compressor stoppage • Insulation resistance • Terminals, wiring	Visual, auditory, tactile 500 VDC ohmmeter Screwdriver, visual	• No abnormal sound and vibration • ≥ 1 MΩ • No loose terminals and wiring contacts	• Replace if abnormal sound or vibration was detected • Replace if “insulation resistance ≤ 1 MΩ” • Retighten terminals and reconnect connectors
	Electronic expansion valve		• Operation • Operating sound (pressure)	Tactile Auditory and tactile By turning ON/OFF the unit	• Normal refrigerant circulation • Normal operating sound and temp. change	• Replace if stuck
	Refrigerant system	Inner piping	• Sympathetic vibration, contact, corrosion of inner piping • Sympathetic vibration, capillary tubes in contact	Visual Visual	• No abnormal sympathetic vibration, sound, and corrosion • No abnormal sympathetic vibration and contact wear	• Replace or repair if pipes are severely corroded or worn • Replace if “insulation resistance ≤ 1 MΩ” • Paint any corroded surface.
		Solenoid valve, four-way valve	• Operation, insulation • Corrosion, noise	500 VDC ohmmeter Visual, auditory	• Insulation resistance ≥1 MΩ • No abnormal sound and corrosion	
		Container	• Corrosion of accumulator or oil separator	Visual	• No corrosion	
	Protection device	High-pressure switch	• Operating pressure, refrigerant leak, insulation resistance	Pressure gauge	• Operates at the set value • Measured value within the specified range	• Replace regularly
		Fusible plug	• Swollen soluble metal	Visual	• Soluble metal in the normal position	
	Heat exchanger	Air	• Clogging, damage • Refrigerant leak	Visual Refrigerant leak detector	• No clogging and damage • No leaks	• Clean air inlet if clogged • Repair or replace HEX if leaking
		Water	• Water volume, temperature • Refrigerant leak • Drain water in the HEX or pipes	• Thermometer, flowmeter, differential pressure gauge • Refrigerant leak detector	• Tolerance • No refrigerant leaks • Proper nstallation	• Adjust valve and valve operation settings • Repair or replace HEX if leaking • Install a drain valve
Electrical/ Electronic parts	Fan motor		• Noise • Insulation resistance	Auditory 500 VDC ohmmeter	• No abnormal sound • Insulation resistance ≥1 MΩ	• Replace bearing if making loud noise • Replace motor if insulation is eroded
	Switch (incl. FFB and ELB)	Solenoid switch Overcurrent relay Auxiliary relay	• Operation and appearance • Contact	Visual	• No deformation • Normal operation, no deformation • No deformation and discoloration	• Replace switches if malfunctioning, deformed, or discolored
	Oil heater		• Energization • Insulation resistance	• Tester or ammeter • Visual • 500 VDC ohmmeter	• Heats up normally • > 1 MΩ	• Replace
	Crankcase heater		• Energization • Insulation resistance	Tester 500 VDC ohmmeter	• Crankcase heater is powered during compressor stoppage, and heats up normally. • Insulation resistance ≥1 MΩ	• Reconnect wiring • Replace crankcase heater if “insulation resistance ≤ 1 MΩ”
	Fuse		• Appearance	Visual	• No deformation and discoloration	• Replace fuse if blown
	Control box (incl. inverter) Electrolytic capacitor		• Insulation resistance • Dust on circuit board • Terminals, connectors • Appearance of electrolytic capacitor	500 VDC ohmmeter Visual Screwdriver, visual Visual	• Insulation resistance ≥1 MΩ • No dust • All connectors properly connected • No liquid leaks and deformation	• Clean dust with a brush • Replace circuit board if malfunctioning • Re-tighten terminals and reconnect connectors • Replace electrolytic capacitor if leaking.
	Smoothing capacitor		• Capacitance, insulation resistance	Electrostatic meter, 500 VDC ohmmeter	• Insulation resistance ≥ specified value	• Replace regularly
	Electric box (incl. circuit board)		• Insulation resistance of circuit, appearance of capacitor • Terminals, connectors • Self-diagnosis mode, appearance	500 VDC ohmmeter Visual Visual	• Insulation resistance ≥1 MΩ • All connectors properly connected • No errors appear on the display.	• Replace circuit board if malfunctioning • Re-tighten terminals and reconnect connectors • Replace circuit board if leaking
	Pressure sensor, thermistor		• Open- or short-circuit, appearance	Tester, visual	• Within the specified value, no discoloration	• Replace if short-circuited or disconnected
	SW power source		• Output voltage	Tester	• Within the specified range	• Replace SW if voltage is abnormal
Structural parts	Decorative part		• Grime and damage	Visual	• No dirt, damage, and deformation	• Wash panels with neutral detergent, and paint the surface
	Frame, bottom plate		• Rust, insulation material • Peeling coating	Visual	• No rust and insulation damage	• Repair frame or bottom plate if insulation is torn. • Paint the surface
	Propeller fan		• Vibration, appearance	Visual	• No propeller runout and catching	• Replace if propeller runout or balance problem exists
	Drain pan		• Clogging • Peeling paint	Visual	• No clogging • No rust and holes	• Clean drain pan, and check for tilt. • Touch up paint
	Guard panel		• Peeling coating	Visual	• No rust	• Paint the surface
External parts	Remote controller switch		• Controllability	Visual	• Display follows the commands.	• Replace if the display does not follow the commands or wrong display appears
	Central control system		• Controllability • Loose terminal, wiring contact • Insulation resistance	• Visual • 500 VDC ohmmeter	• Display follows the commands • No loose contacts • > 1 MΩ	• Re-tighten terminals and reconnect connectors • Replace if “resistance < 1MΩ”
	Flow switch		• Controllability • Water leak • Insulation resistance	• Visual • 500 VDC ohmmeter	• Display follows the commands • No water leaks • >1 MΩ	• Replace
	Phase-advance capacitor Elapsed time integrator Ammeter		• Insulation resistance	• 500 VDC ohmmeter	• >1 MΩ	• Replace if “resistance < 1MΩ”
Water circuit	Strainer		• Clogging	• Visual	• No stain and clogging	• Clean
	Water pipe		• Water leak • Presence of air • Open air-vent valve	• Visual • Sensory	• No water leaks • No abnormal sound	• Re-tighten terminals and reconnect connectors • Release air, or replace and adjust valve
	Flow regulating valve		• Water temp. difference (flow rate)	• Thermistor	• Proper temp. difference range	• Replace and adjust
	Pump		• Vibration • Insulation resistance • Water leak • Loose terminal, wiring contact • Strainer	• Visual, audibility, tactile • 500 VDC ohmmeter • Visual	• No abnormal sound • > 1 MΩ • No water leaks • No loose contacts • No clogging	• Replace • Re-tighten terminals and reconnect connectors • Reconnect wiring • Clean strainer
	Pressure gauge		• Displayed value	• Visual	• Correct display	• Replace if wrong values are displayed
	Thermistor		• Displayed value	• Surface thermistor	• Correct display	• Replace if wrong values are displayed
	Water		• Water quality	• Water quality analysis	• Water quality standards	• Improve water quality

Note1) Unexpected failure is a sudden and unpredictable failure that occurs randomly before parts or device reaches its lifespan. It is difficult to apply technical measures, leaving applying statistical measures as the only solution.

Note2) Elapsed year refers to the time period in which a given product has been used for 10 hours a day and 2500 hours a year without frequent start-stops.

Note3) shows that the likelihood of wear-out and failure increases over time.

Nomenclature
- ● : Annual
- ● : Clean or adjust as needed
- ▲ : Replace or repair as needed
- ◆ : Replace regularly



This product is designed and intended for use in the residential, commercial and light-industrial environment.

The product at hand is based on the following EU regulations:

- Low Voltage Directive 2014/35/EU
- Electromagnetic Compatibility Directive 2014/30/EU
- Pressure Equipment Directive 2014/68/EU
- Machinery Directive 2006/42/EC
- Restriction of Hazardous Substances 2011/65/EU (with regulation No. 2015/863, 2017. 2102)
- Energy-related Products 2009/125/EC (with Regulation No. 2016/2281, 813/2013, 327/2011)

Please be sure to put the contact address/telephone number on this manual before handing it to the customer.

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