

Hot Water Heat Pump Unit

CAHV

Installation/Operation Manual

CAHV-P500YB-HPB

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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.

Safety Precautions

- 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.

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, 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.

CAUTION

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

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.

Transportation

WARNING

Lift the unit by placing the slings at designated locations. Support the outdoor 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.
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To reduce the risk of injury, products weighing 20 kg or more should be carried by two or more people.
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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.

CAUTION

Do not install the unit on or over things that are vulnerable to water damage.

When the indoor humidity exceeds 80% or if the drain water outlet becomes clogged, condensation may drip from the indoor unit onto the ceiling or floor.

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.

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.

Pipe installation

WARNING

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

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 (R407C) 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.

Electrical wiring

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 inverter circuit breaker on the power supply to each unit.

Use properly rated breakers and fuses (inverter breaker, Local Switch <Switch + Type-B fuse>, or no-fuse breaker).

The use of improperly rated breakers may result in malfunctions 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.

⚠ 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.

Proper grounding must be provided by a licensed electrician. 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.

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

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.

⚠ 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.

IMPORTANT

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

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

Recover all refrigerant from the unit.

It is punishable by law to release refrigerant into the atmosphere.

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.

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

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 air conditioners in hospitals or facilities with radio communication capabilities.

Inverter, high-frequency medical, or wireless communication equipment as well as power generators may cause the air conditioning system to malfunction. Air conditioning system 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.

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

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. Selecting the Installation Site

[1] Installation Conditions

Select the installation site in consultation with the client.

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

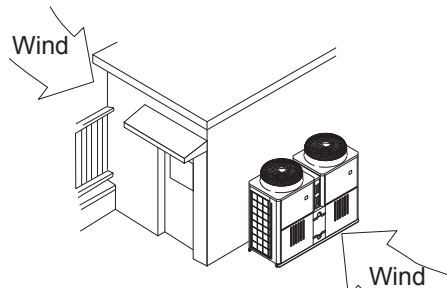
- The unit will not be subject to heat from other heat sources.
- The noise from the unit will not be a problem.
- The unit will not be exposed to strong winds.
- Water from the unit can be drained properly.
- The space requirements (specified on pages 7 through 9) are met.

<1> Providing protection against winds

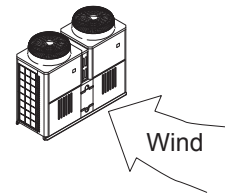
Using the figures at right as a reference, provide adequate protection against winds.

A unit installed alone is vulnerable to strong winds. Select the installation site carefully to minimize the effect of winds.

When installing a unit in a place where the wind always blows from the same direction, install the unit so that the outlet faces away from the direction of the wind.



- Install the outdoor unit in a place where it is not exposed to direct wind, such as behind a building.



- Install the outdoor unit so that the outlet/inlet faces away from the wind.

<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.
- Icicles that may form under the foundation can fall and inflict personal injury or property damage. Select the installation site carefully to reduce these risks, especially when installing the unit on a roof.
- If the units are installed in the direct line of rain, winds, or snow, install the optional snow hood (on both the discharge and suction ducts). 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 is continuously operated for a long time with the outside air temperature below the freezing point, install a heater at the base of the unit to prevent the water from freezing at the unit bottom.

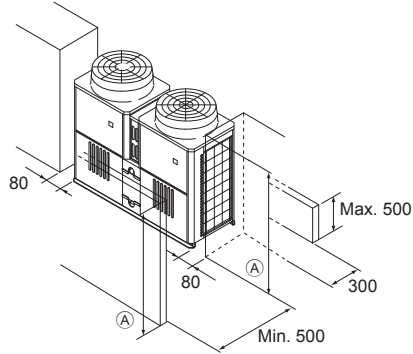
[2] Installation Space Requirements

<1> Single unit installation

Secure enough space around the unit as shown in the figures below.

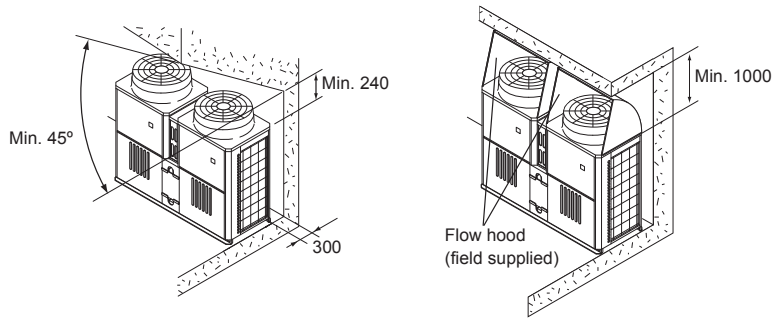
<Unit: mm>

(1) Walls around the unit do not exceed the height limit.

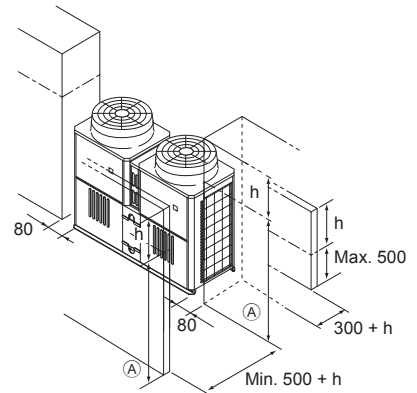
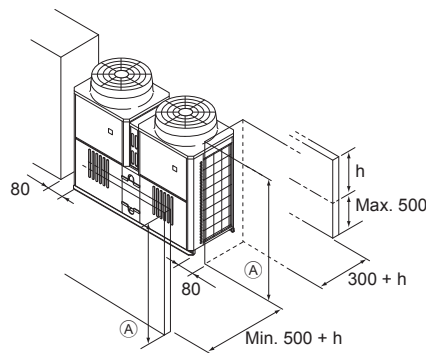
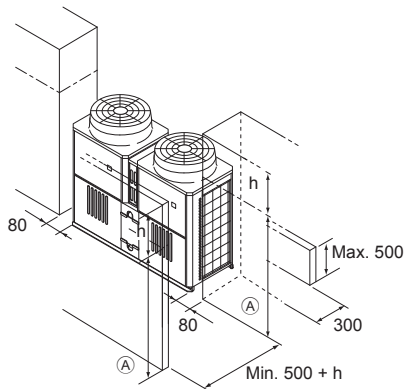


Ⓐ Walls are lower than the unit's height.

(2) There is a wall above the unit.

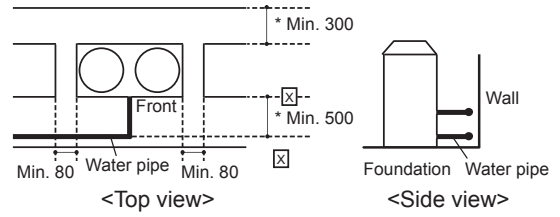
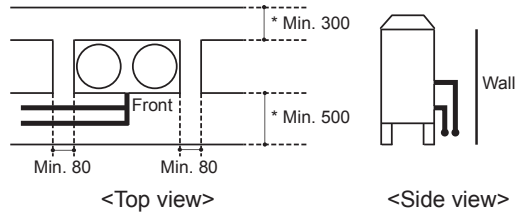


(3) One or more of the walls around the unit are taller than the maximum allowable height h.



Ⓐ Walls are lower than the unit's height.

(4) Water pipe installation



Leave a space of at least 500 between the unit and the water pipe if it is not possible to install the unit on a raised foundation. (See ☒ in the figure.)

<2> Grouped and side-by-side installation

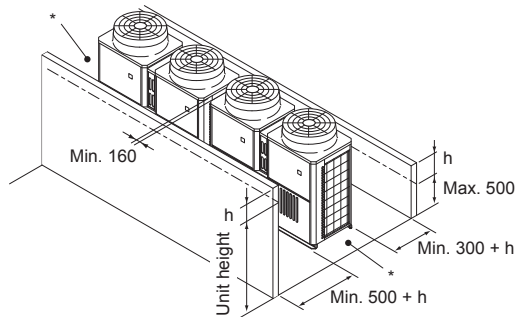
When multiple units are installed adjacent to each other, allow enough space for air circulation and a walk way between groups of units as shown in the figures below.

* Leave both sides of each group of units open.

As with individual installation, if the wall height exceeds the height limit, widen the space in the front and the back of a given group of units by the amount that exceeds the limit (labeled h in the figure).

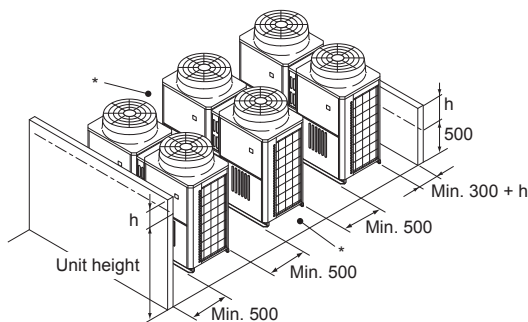
<Unit: mm>

(1) Side-by-side installation

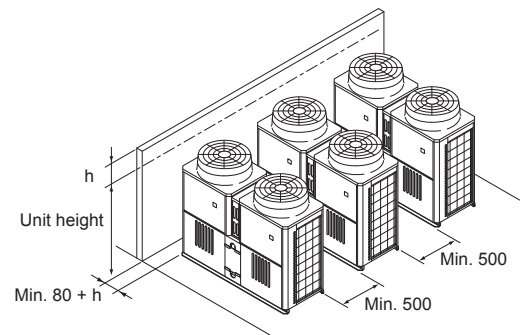


(2) Face-to-face installation

- There are walls in the back and the front of a given group of units.

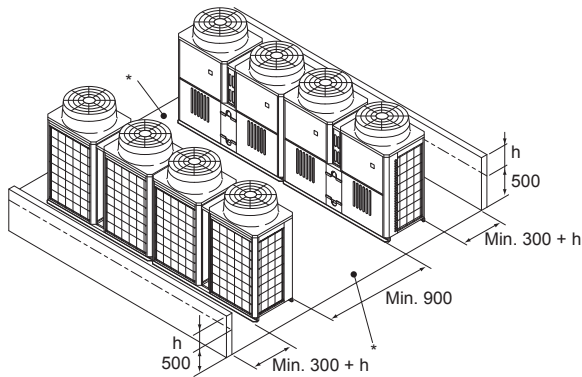


- There is a wall on one side.

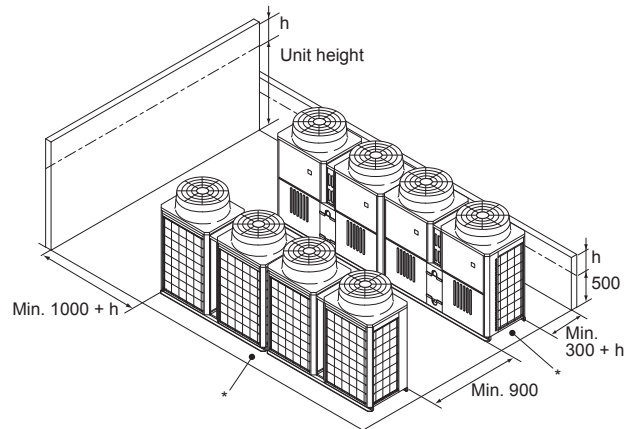


(3) Combination of face-to-face and side-by-side installations

- There are walls in the back and the front of a given group of units.

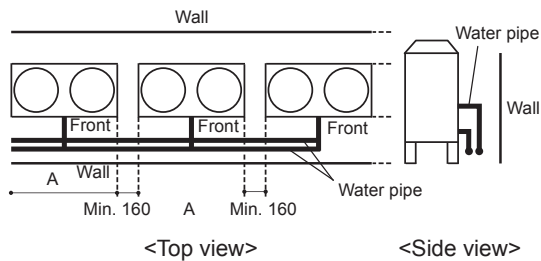


- There is a wall on one side and either the front or the back of a given group of unit.



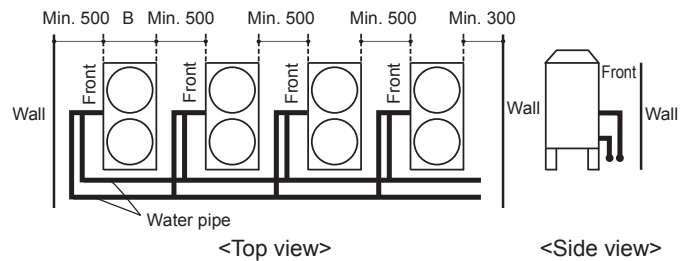
(4) Water pipe installation

Pattern A



If the product width (labeled A in the figure) times the number of units that are installed side by side exceeds 6 m, leave a space of 1000 mm between each block. Each block is defined as a group of units that fit within 6 m.

Pattern B



If the product depth (labeled B in the figure) times the number of units that are installed in rows exceeds 6 m, leave a space of 1000 mm between each block. Each block is defined as a group of units that fit within 6 m.

2. Unit Installation

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

- Securely fix the unit with bolts to keep the unit from falling down during earthquakes or due to strong winds.
- 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.
- Build the foundation in such way that the corners of the installation legs are securely supported as shown in the figure below. When using rubber vibration isolators, make sure they are large enough to cover the entire width of the unit's legs. If the corners of the legs are not firmly seated, the legs may bend.
- The projecting length of the anchor bolt should be less than 30 mm.
- This unit is not designed to be installed using hole-in anchor bolts unless brackets are used to support the four corners of the unit.
- The legs on the unit are detachable.
- Detaching the legs
Loosen the three screws on the legs to detach each leg (two each in the front and back). If the finish coat becomes damaged when detaching the legs, be sure to touch it up.

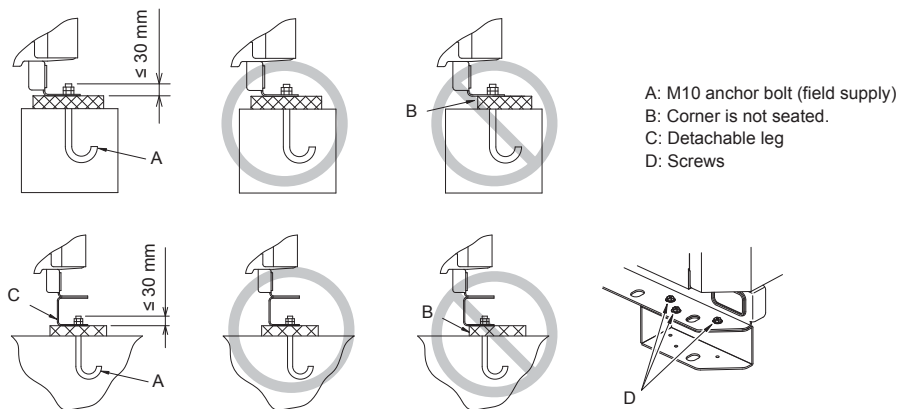
⚠ Warning:

- **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 strong winds and earthquakes. Improper installation may cause the unit to fall down, resulting in personal injury.**

When building the foundation, take the floor strength, water drainage during operation, and piping and wiring routes into consideration.

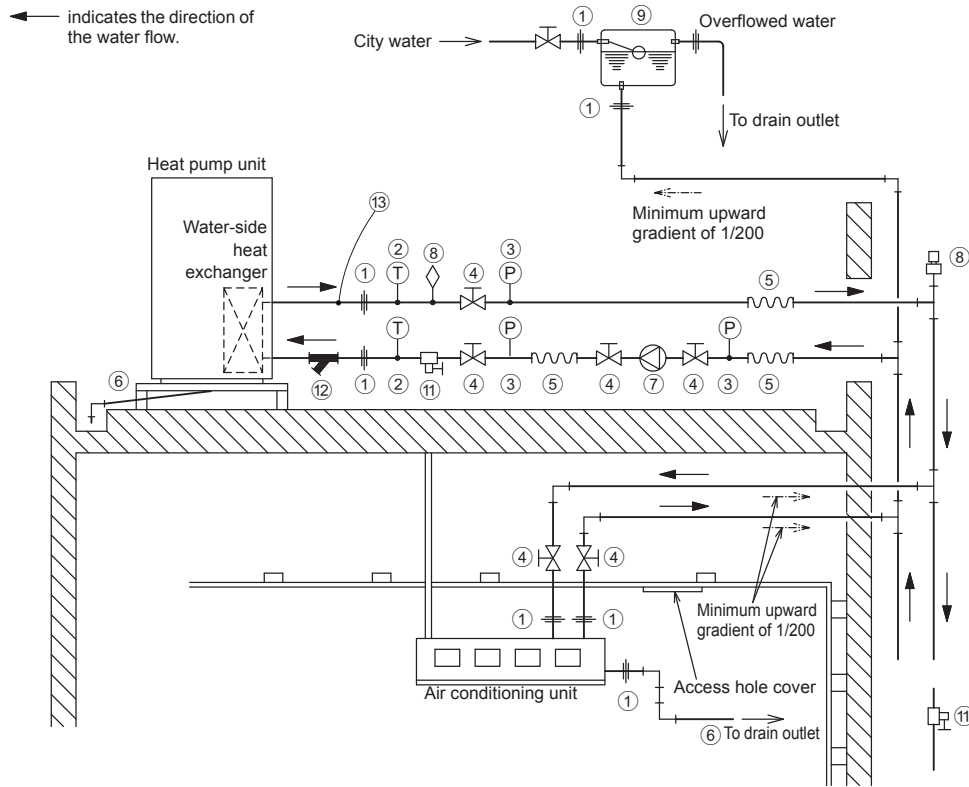
Precautions for routing the pipes and wires underneath the unit without detachable legs

When routing the pipes and wires underneath the unit, make sure that the foundation will not block the piping access holes. Also, make sure the foundation is at least 100 mm high so that the piping can pass under the unit.



3. Water Pipe Installation

[1] Schematic Piping Diagram and Piping System Components



① Union joints/flange joints	Required to allow for a replacement of equipment.
② Thermometer	Required to check the performance and monitor the operation of the units.
③ Water pressure gauge	Recommended for checking the operation status.
④ Valve	Required to allow for a replacement or cleaning of the flow adjuster.
⑤ Flexible joint	Recommended to prevent the noise and vibration from the pump from being transmitted.
⑥ 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.
⑦ Pump	Use a pump that is large enough to compensate for the total water pressure loss and supply sufficient water to the unit.
⑧ Air vent valve	Install air venting valves to the places where air can accumulate. Automatic air vent valves (such as ⑧') are effective.
⑨ Expansion tank	Install an expansion tank to accommodate expanded water and to supply water.
⑩ Water pipe	Use pipes that allow for easy air purging, and provide adequate insulation.
⑪ Drain valve	Install drain valves so that water can be drained for servicing.
⑫ Strainer	Install a strainer near the unit to keep foreign materials from entering the water-side head exchanger (supplied).
⑬ Flow switch	Required to protect the unit.

[2] Notes on Pipe Corrosion

Water treatment and water quality control

Poor-quality circulating water can cause the water-side heat exchanger to scale up or corrode, 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 on the air-conditioner side. 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. ≤ 60°C		Higher mid-range temperature water system Water Temp. > 60°C		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 SO ₄ 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		○
Reference items	Ionic silica (mg SiO ₂ /ℓ)	30 or less	30 or less	30 or less	30 or less		○
	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	1.0 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	○	
Ryzner 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 an air conditioner (including when only the heat exchanger is replaced), first analyze the water quality and check for possible corrosion.

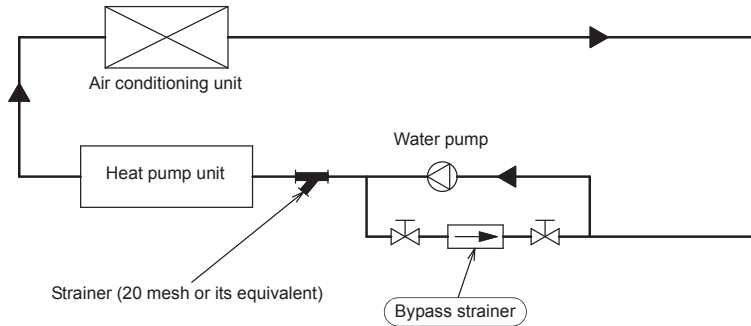
Corrosion can occur in water systems in which there has been no signs of corrosion. If the water quality level has dropped, adjust the water quality before replacing the unit.

(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 better) 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.



(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.

[3] Installing the Strainer and Flow Switch

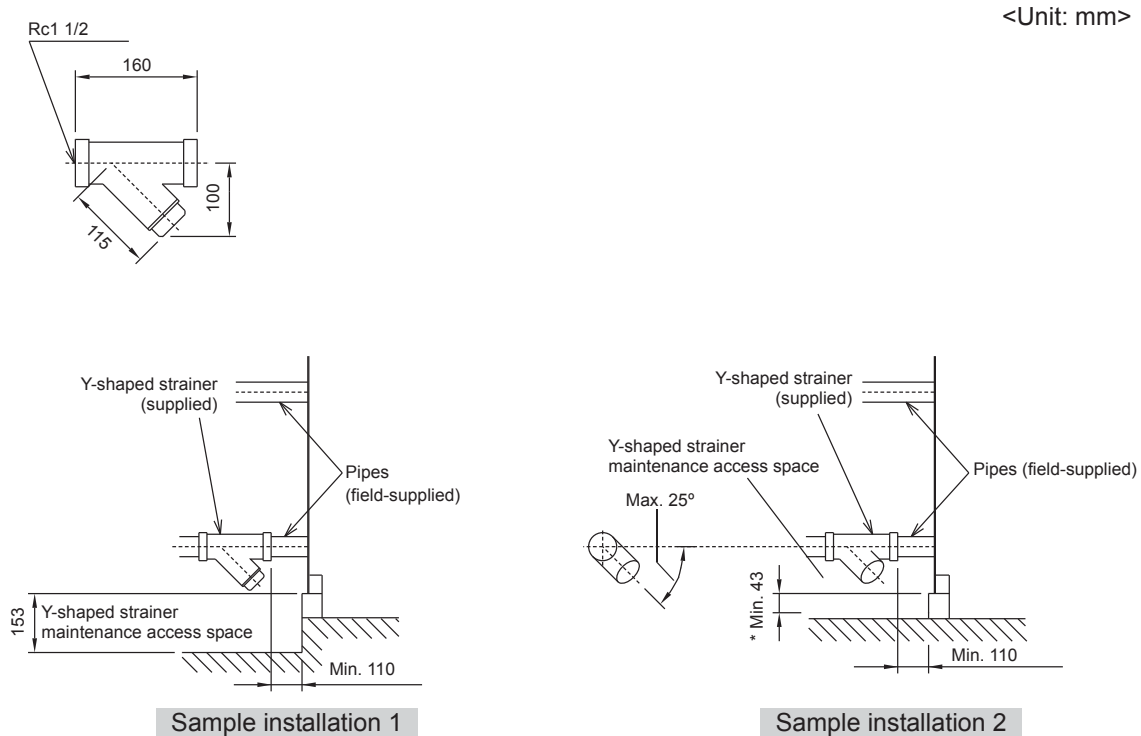
<1> Installing the strainer

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

Install the 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.

* The dimensions given below indicate the amount of space necessary when screwing in a Y-shaped strainer.



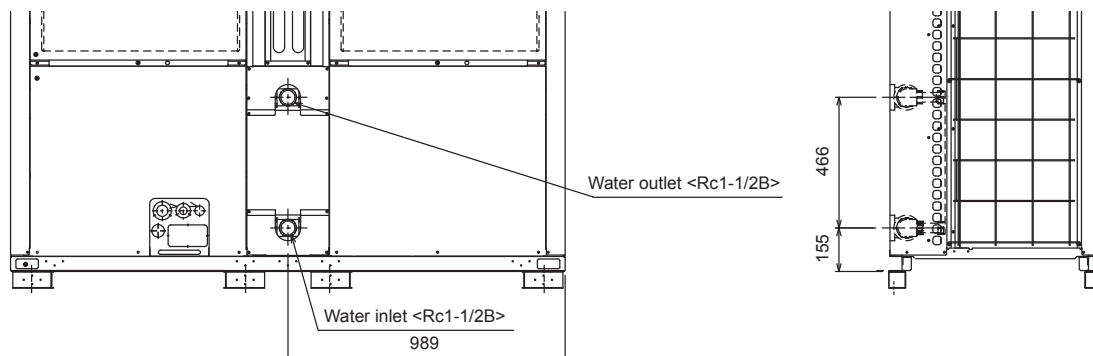
<2> Installing a flow switch

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= 7.5 m³/h (125 L/min)

Unit usage range (water flow rate): 7.5 - 15.0 m³/h

[4] Water Pipe Hole Size and Location

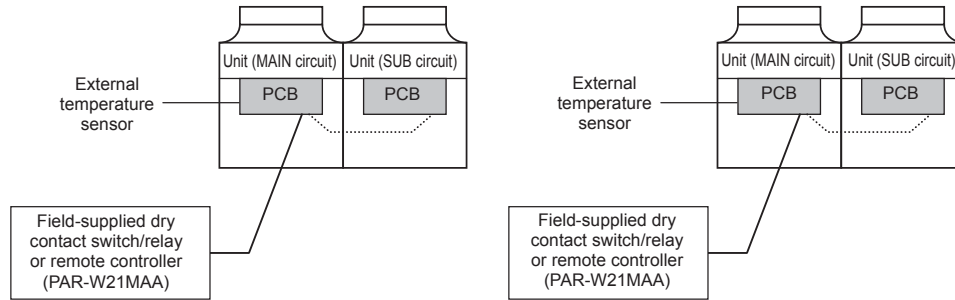


4. System Configurations

[1] Schematic Diagrams of Individual and Multiple Systems

(1) Individual system

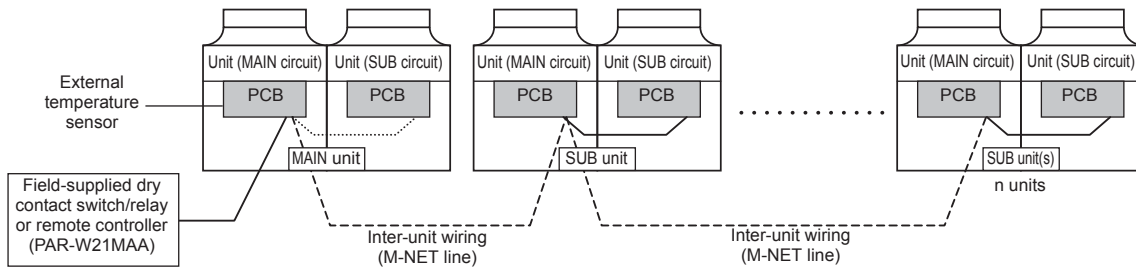
* Each unit is operated individually by connecting a dry contact switch/relay to each unit.



Refer to the sections "Switch Types and the Factory Settings" on the next page and "System configuration procedures: Individual system" (page 20) for further details.

(2) Multiple system (2-16 units)

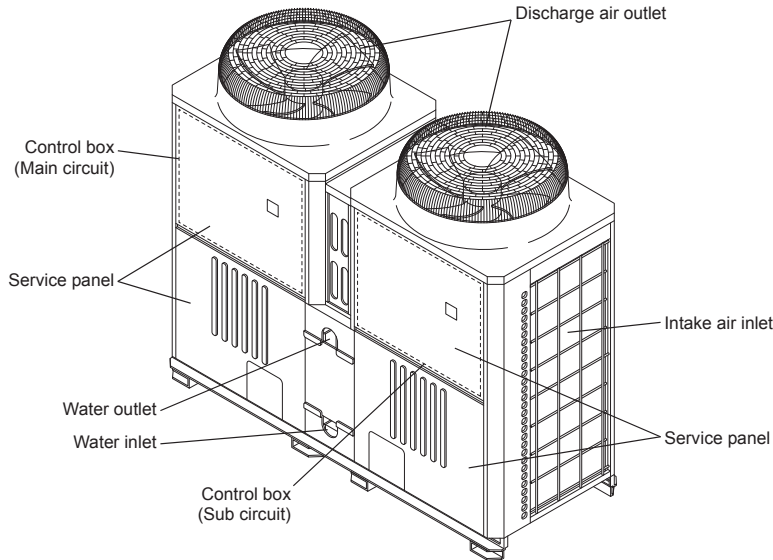
* A group of unit that consists of one main unit and up to 15 sub units is operated collectively by connecting an external water temperature sensor and a dry contact switch/relay to the main unit.



Refer to the sections "Switch Types and the Factory Settings" on the next page and "System configuration procedures: Multiple system" (page 21) for further details.

[2] Switch Types and the Factory Settings

(1) Switch names and functions



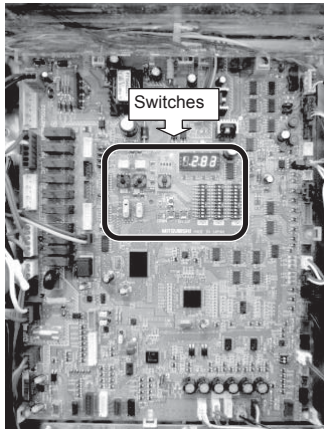
There are four main ways to set the settings as follows:

- ① Dip switches (SW1 - SW3)
- ② Dip switches used in combination with the push switches
- ③ Rotary switches
- ④ Slide switches

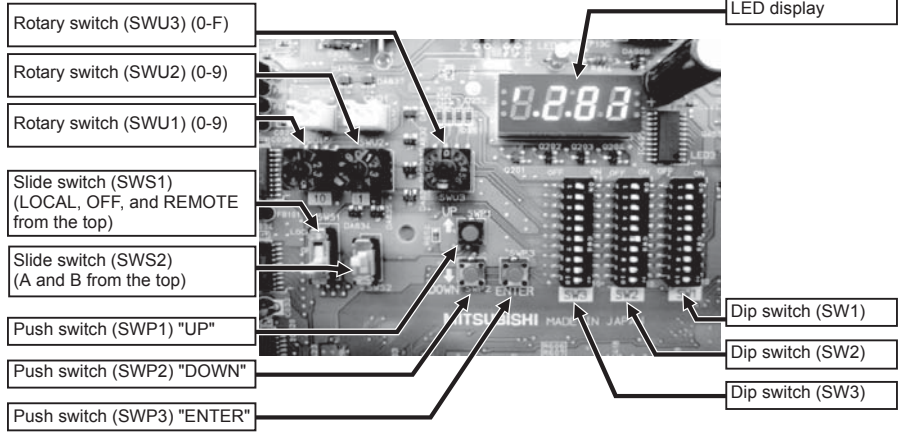
See below for how these switches are used to set certain items.

Different types of switches on the PCB

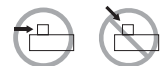
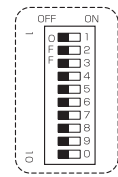
[Entire view of a PCB]



[Enlarged view of the switches]



		Initial Setting				
		MAIN circuit	SUB circuit			
Rotary switch (SWU1)	Sets the 10's digit of the unit address (Multiple system).	"0"	"5"			
Rotary switch (SWU2)	Sets the 1's digit of the unit address (Multiple system).	"1"	"1"			
Rotary switch (SWU3)	Starts up or resets the system (when set to F).	"0"	"0"			
Slide switch (SWS1)	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>LOCAL</td></tr> <tr><td>OFF</td></tr> <tr><td>REMOTE</td></tr> </table> The action that the switch takes when set to a certain position depends on the type of system configuration (e.g., individual or multiple system)	LOCAL	OFF	REMOTE	REMOTE	REMOTE
LOCAL						
OFF						
REMOTE						
Slide switch (SWS2)	Unused	A	A			
Push switch (SWP1)	Switches the display between the item code and the current value for a specific item. Increases value.	-	-			
Push switch (SWP2)	Switches the display between the item code and the current value for a specific item. Decreases value.	-	-			
Push switch (SWP3)	Advances the item code. Saves the changed value.	-	-			
Dip switches (SW1-3)	Switches the LED display contents.					



Slide the dip switches; do not push down the switches.

(2) Factory Switch Settings (Dip switch settings table)

SW	Function	Usage	Factory setting		OFF setting	ON setting	Setting timing	
			MAIN circuit	SUB circuit				
SW1	1	Model setting	Depends on the unit	-	Leave the setting as it is.		At a reset	
	2							
	3							
	4							
	5							
	6							
7	Fan output mode	Selects ON or OFF depending on the external static pressure.	OFF	OFF	When the external static pressure drops below 10Pa, select OFF.	When the external static pressure exceeds 10Pa, select ON. (The fan output increases.)	At a reset	
8	Model setting		Depends on the unit	-	Leave the setting as it is.		At a reset	
9								
10								
SW2	1	Freeze-up protection setting	OFF	-	Starts the pump when both the outside and water temperatures drop to prevent water pipe freeze up.	Same as when set to OFF	At a reset	
	2	Scheduled operation display	OFF	-	Leaves the operation display on during the period in which the unit is scheduled to be stopped.	Turns off the operation display during the period in which the unit is scheduled to be stopped.	At a reset	
	3	Model setting	OFF	-	Leave the setting as it is.		At a reset	
	4	Model setting	OFF	OFF	Leave the setting as it is.		At a reset	
	5	Recovery conditions after forced stoppage	Selects what the operation restoration condition will be based on after the unit was forced to stop based on the external thermistor reading (water outlet temperature).	OFF	-	External thermistor	Built-in thermistor	At a reset
	6	Power supply option to the communication circuit	Switches between supplying or not supplying power to the communication circuit.	-	ON	Does not supply power to the communication circuit.	Supplies power to the communication circuit.	Any time
	7	Remote water-temperature setting	Allows or disallows the water temperature to be set using analog signals from a remote location.	OFF	-	Disallows the water temperature to be set using external analog signals.	Allows the water temperature to be set using external analog signals.	At a reset
	8	Water-temperature control option	Selects either the external water temperature sensor or the built-in sensor to be used to control water temperature.	OFF	-	Built-in sensor on the unit	External water temperature sensor	At a reset
	9	Individual/Multiple system	Selects between individual and Multiple system	OFF	-	Individual system	Multiple system	At a reset
	10	Display mode switch 7	This switch is used in combination with dip switches SW3-5 through 3-10 and push switches SWP 1, 2, and 3 to configure or view the settings when performing a test run or changing the system configuration.	OFF	OFF	Changes the 7-segment LED display mode.		Any time
SW3	1	Remote reset	ON	-	Disables the error to be reset from a remote location.	Enables the error to be reset from a remote location.	At a reset	
	2	Auto restart after power failure	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.	At a reset	
	3	Water-temperature control	OFF	-	Outlet-water-temperature-based control	Inlet-water-temperature-based control	At a reset	
	4	Pump-thermistor interlock setting	OFF	-	The pump turns on when the operation switch is turned on regardless of the Thermo-ON/Thermo-OFF status.	Interlocks the operation of the pump with the Thermo-ON/Thermo-OFF status.	At a reset	
	5	Display mode switch 1	These switches are used in combination with dip switches SW2-5 and push switches SWP 1, 2, and 3 to configure or view the settings when performing a test run or changing the system configuration.	OFF	OFF	Changes the 7-segment LED display mode.		Any time
	6	Display mode switch 2		OFF	OFF	Changes the 7-segment LED display mode.		Any time
	7	Display mode switch 3		OFF	OFF	Changes the 7-segment LED display mode.		Any time
	8	Display mode switch 4		OFF	OFF	Changes the 7-segment LED display mode.		Any time
	9	Display mode switch 5		OFF	OFF	Changes the 7-segment LED display mode.		Any time
	10	Display mode switch 6		OFF	OFF	Changes the 7-segment LED display mode.		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. Refer to page 25 for how to reset errors.

[3] Configuring the Settings

The settings must be set only by a qualified personnel.

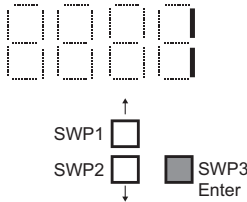
<1> Making the settings

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 switches SW2 and SW3 have been set.

①



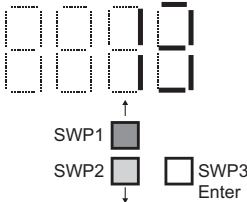
Normally an item code appears on the display.

(The figure at left shows the case where item code 1 is displayed.) Press SWP3 (Enter) to advance the item code.



Press SWP3 (Enter) until the item code appears that corresponds to the item to change or monitor its value.

②

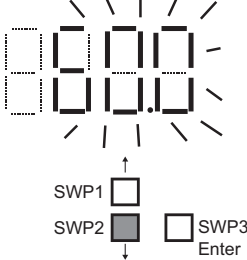


The left figure shows a display example (Code 13 Built-in thermistor temperature setting 2).



Press either SWP1 (↑) or SWP2 (↓) to display the value that corresponds to the selected item.

③



The current setting value will blink.

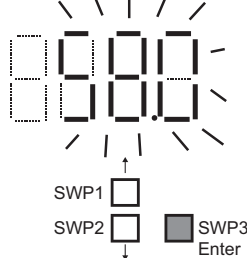


The left figure shows that the current setting value is "60.0."

To decrease this value to 58.0, for example, press SWP2 (↓).

Press SWP1 (↑) to increase the value.

④



<To change the settings>

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.

If SWP3 is not pressed within one minute, the change will not be saved and the display will return to the item code display mode.

Press and hold SWP1 (↑) or SWP2 (↓) for one second or longer to fast forward through the numbers.

<To view the monitored data>

Press SWP3 (Enter) while the LED display is blinking (see step 3 above) to stop the blinking.

* The values of the items that can only be monitored will not change when SWP1 (↑) or SWP2 (↓) is pressed.

The display will stop blinking and stay lit after a minute, and the display will automatically return to the item code display regardless of the type of values displayed.

To change the values of other items, repeat the steps from step 2 above.

(2) Table of settings items

Set the dip switches SW2 and SW3 as shown in the table below to set the value for the items in the "Setting item" column.

SW2 and SW3 settings				Setting Item	Item Code	Default	Notes
SW2-1	SW3-8	SW3-9	SW3-10				
OFF	OFF	ON	OFF	Maximum peak-demand capacity	2	100%	
				Peak-demand control start time	3	13:00	
				Peak-demand control end time	4	13:00	
				Remote water temperature input signal type	21	0	0: 4-20 mA; 1: 0-10V; 2: 0-5 V; 3: 2-10V
				Setting temp D,E for analog input	11 13	D=45°C, E=65°C	When SW2-7 is set to ON
				Setting temp A (Heating mode)	11	45°C	Range 25-70
				Setting temp B (Hot water mode)	13	65°C	Range 25-70
				Heating ECO mode/2-point system or Curve	20	1	0: 2-point system 1: Curve
				Setting temp C1,C2,C3,C4,C5,C6 for Setting temp C for Heating ECO mode	22-25	C1=60°C; C2=0°C C3=35°C; C4=25°C C5=47.5°C; C6=12.5°C	
				Enable/disable schedule setting	5	0	Set to "1" to enable scheduled operation.
				ON-time 1 (schedule mode without remote)	6	0:00	
				OFF-time 1 (schedule mode without remote)	7	0:00	
				ON-time 2 (schedule mode without remote)	8	0:00	
				OFF-time 2 (schedule mode without remote)	9	0:00	
				ON-time 3 (schedule mode without remote)	18	0:00	
				OFF-time 3 (schedule mode without remote)	19	0:00	
				Current time	1		Set the current time.
				TWL1	1057	40	Water temperature 1 for emergency signal 1
				TAL1	1058	-10	Outside temperature 1 for emergency signal 1
				TWL2	1059	30	Water temperature 2 for emergency signal 2
TAL2	1060	-15	Outside temperature 2 for emergency signal 2				
Drain pan heater/Defrost signal	1056	0	Selects between drain pan output and defrost output for MAIN circuit board (CN512 5-7) output.				
Water temperature/Capacity control	1051	0	0: Water temperature input 4-20 mA 1: Capacity control input 4-20 mA 2: Water temperature input IT terminal 3: Capacity control input IT terminal				
OFF	ON	OFF	OFF	Setting temp selection 1 (ON-time 1-OFF-time 1)	1218	A (1)	A=1; B=2; C=3
				Setting temp selection 2 (ON-time 2-OFF-time 2)	1219	A (1)	A=1; B=2; C=3
				Setting temp selection 3 (ON-time 3-OFF-time 3)	1220	A (1)	A=1; B=2; C=3
				Control Sensor selection (Target Setting temp A)	1215	TH14	Selectable from TH14 or TH15
				Control Sensor selection (Target Setting temp B)	1216	TH14	Selectable from TH14 or TH15
				Control Sensor selection (Target Setting temp C)	1217	TH14	Selectable from TH14 or TH15
				Thermo differential 2	1016	2.0	Range 0-8
				Multiple System Thermo-ON/OFF prohibition periods	1020	1	Range 1-5
				Outdoor temperature input source selection	1080	0	0: Outdoor temperature sensor (TH9) 1: IT terminal

(3) System configuration procedures: Individual system

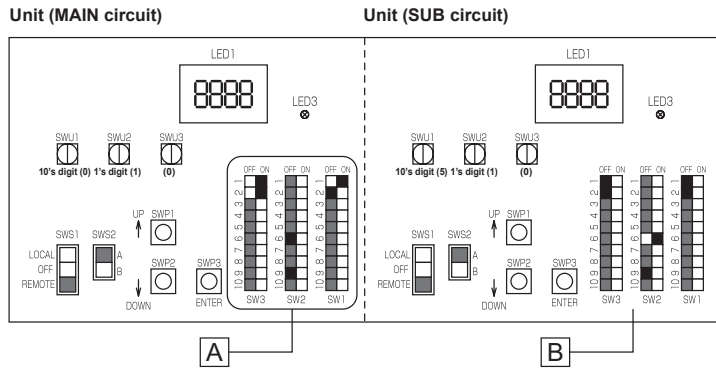
1. Set the dip switches on the MAIN circuit board.

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
- Water temperature control based on the inlet water temperature

Refer to "Dip switch settings table" (page 17) for further details.

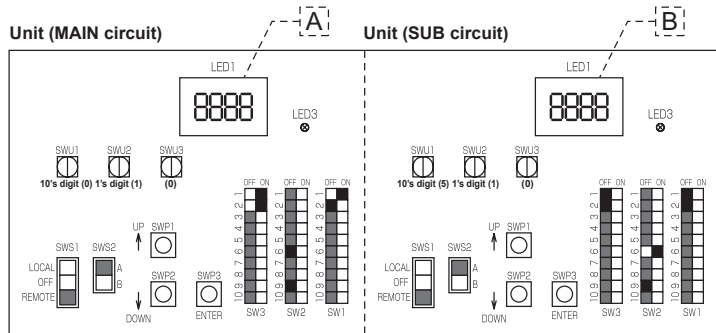


2. Switch on the power to the unit.

Check for loose or incorrect wiring, and then switch on the power to the unit.

When the power is switched on, the following codes will appear on the LED:

- [EEEE] will appear on LED1 in the MAIN circuit board (labeled A in the figure at right).
- [9999] will appear on LED1 in the SUB circuit board (labeled B in the figure at right).

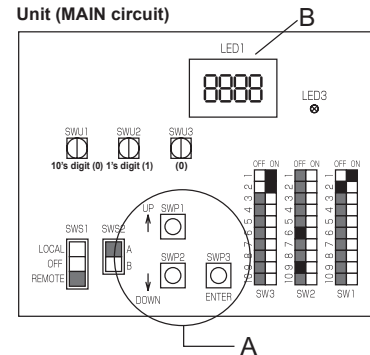


3. Set the preset values with the switches on the MAIN circuit board.

(1) Press either one of the push switches SWP1, 2, or 3 (labeled A in the figure at right) on the MAIN circuit board.

* [EEEE] will disappear, and an item code ([101]) will appear on LED1 (labeled B in the figure at right).

- (2) Use SWP3 to toggle through the item codes and select an item code to change its current value. (The item codes will appear in the following order: [101]→[102]→[104]→[105]→ [107]→[101] (back to the beginning).)
- (3) Use SWP1 to increase the value and SWP2 to decrease the value.
- (4) Press SWP3 to save the changed value.



Following the steps above, set the value for the following items as necessary.

[101] Not used

[102] Not used

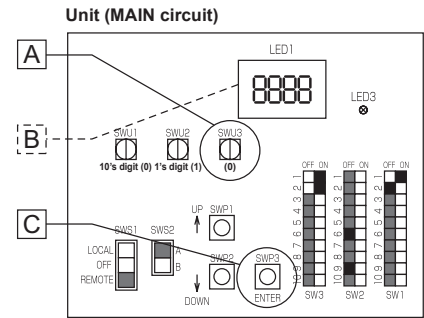
[104] Not used

[105] Not used

[107] Total number of units in the system (Default = 1) (Leave it as it is.)

4. Perform an initial setup. (MAIN circuit side)

- (1) Set the rotary switch SWU3 (labeled A in the figure at right) to "F."
[EEEE] will appear in LED1 (labeled B in the figure at right). *1
- (2) Press and hold the push switch (SWP3) (labeled C in the figure at right) for one second or longer.
 - While the system is starting up [9999] will appear on LED1 (labeled B in the figure at right).
 - When start-up is complete, a control property [0012] will appear.
 - Then five seconds later [FFFF] will appear.
- (3) Set the rotary switch SWU3 (labeled A in the figure at right) back to "0."
The start-up process is complete, and the settings for such items as clock, peak-demand control, schedule, and thermistor settings can now be made.



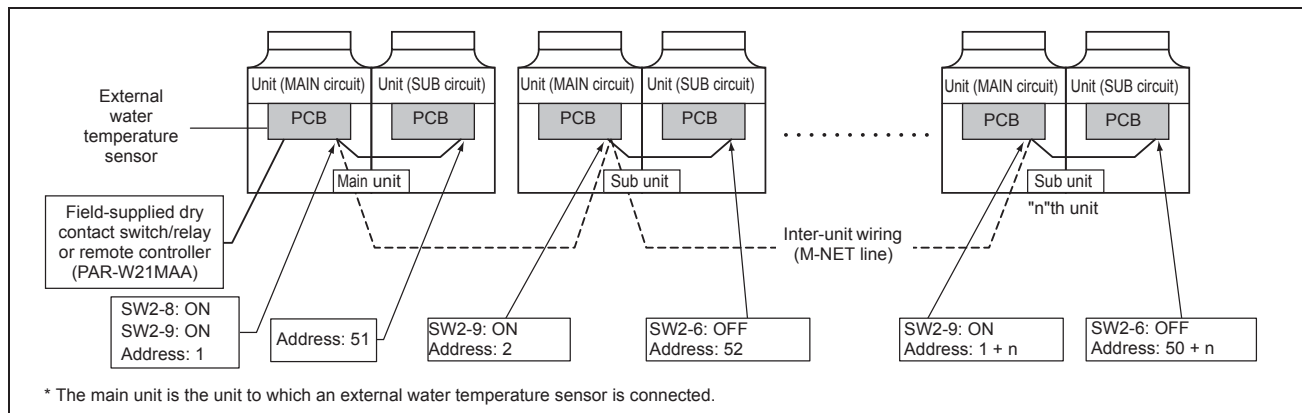
*1 If the start-up process has already been completed, [FFFF] (instead of [EEEE]) will appear when the rotary switch SWU3 is set to "F."

(4) System configuration procedures : Multiple system

1. Set the dip switches and rotary switches.

(Switches on the MAIN circuit on the main unit* AND the MAIN and SUB circuits on all sub units)

System configuration diagram



Setting the switches on the main unit

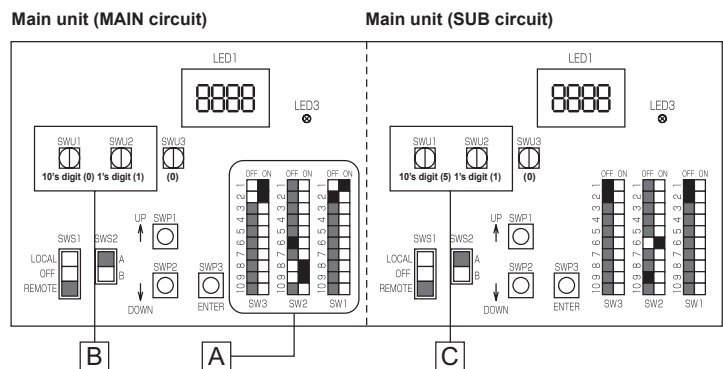
MAIN circuit

- (1) Set the dip switch SW2-8 to ON. (an external water temperature sensor) (labeled A in the figure at right)
- (2) Set the dip switch SW2-9 to ON. (multiple unit control)(labeled A in the figure at right)

SUB circuit

Nothing needs to be changed.

Refer to "Dip switch settings table" (page 17) for further details.



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

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

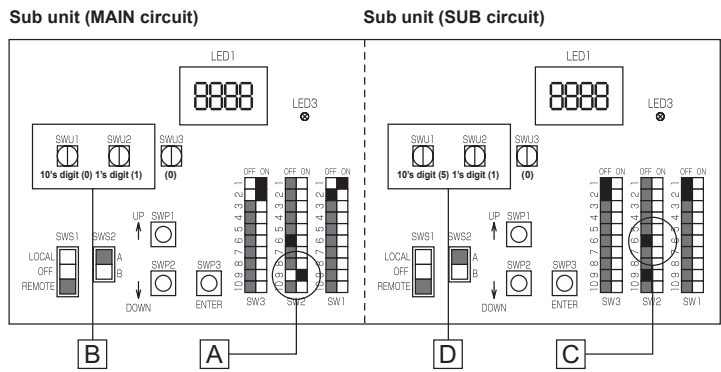
Setting the switches on all sub units

MAIN circuit

- (1) Set the dip switch SW2-9 to ON. (multiple unit control) (labeled A in the figure at right)
- (2) Set the MAIN circuit addresses with the rotary switches. (labeled B in the figure at right). Set the 10's digit with SWU1, and set the 1's digit with SWU2. Assign sequential addresses to the MAIN circuit on all sub units starting with 2.

SUB circuit

- (3) Set the dip switch SW2-6 to OFF. (power supply to communication circuit) (labeled C in the figure at right)
- (4) Set the SUB circuit addresses with the rotary switches (labeled D in the figure above). Set the 10's digit with SWU1, and set the 1's digit with SWU2. Assign sequential addresses to the SUB circuit on all sub units starting with 52.

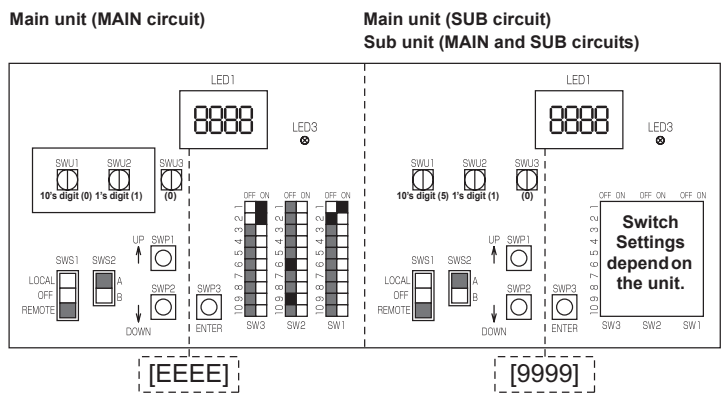


2. Switch on the power to the unit.

Check for loose or incorrect wiring, and then switch on the power to all units.

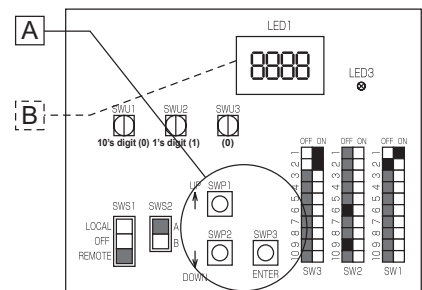
When the power is switched on, the following codes will appear on the LED:

- [EEEE] will appear on LED1 in the MAIN circuit board.
- [9999] will appear on LED1 in the SUB circuit board on the main unit and both MAIN and SUB circuits on the sub units.



3. Set the preset values with the switches on the MAIN circuit board.

- (1) Press either one of the push switches SWP1, 2, or 3 (labeled A in the figure at right) on the MAIN circuit board.
 - * [EEEE] will disappear, and an item code ([101]) will appear on LED1 (labeled B in the figure at right).
- (2) Use SWP3 to toggle through the item codes, and select an item code to change its current value. (The item codes will appear in the following order: [101] → [102] → [104] → [105] → [107] → [101] (back to the beginning).)
- (3) Use SWP1 to increase the value and SWP2 to decrease the value.
- (4) Press SWP3 to save the changed value.



Following the steps above, set the value for the following items with the switches on the MAIN circuit as necessary. Item [107] must be set when multiple units are connected to a system.

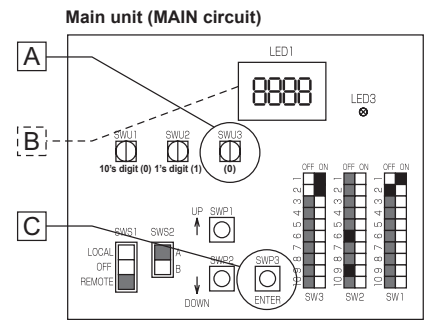
- [101] Not used
- [102] Not used
- [104] Not used
- [105] Not used
- [107] Total number of the main and sub units in the system

4. Perform an initial setup on the MAIN circuit on the main unit

- (1) Set the rotary switch SWU3 on the MAIN circuit on the main unit (labeled A in the figure at right) to "F."
[EEEE] will appear in LED1 (labeled B in the figure at right). *1
- (2) Press and hold the push switch (SWP3) (labeled C in the figure at right) for one second or longer.
 - While the system is starting up [9999] will appear on LED1 (labeled B in the figure at right).
 - When start-up is complete, a control property [0012] will appear.
 - Then, five seconds later, [FFFF] will appear.

- (3) Set the rotary switch SWU3 (labeled A in the figure at right) back to "0."
The start-up process is complete, and the settings for such items as clock, peak-demand control, schedule, and thermistor settings can now be made.

*1 If the start-up process has already been completed, [FFFF] (instead of [EEEE]) will appear when the rotary switch SWU3 is set to "F."



Slide switch (SWS1) settings

Individual system

SWS1 Setting		Unit Operation	
MAIN circuit	SUB circuit	MAIN circuit	SUB circuit
LOCAL	LOCAL	Follows the input signal of the MAIN circuit	Follows the input signal of the sub circuit
	OFF		Ignores the signal input
	REMOTE		Follows the input signal of the sub circuit
OFF	LOCAL	Ignores the signal input	Ignores the signal input
	OFF		
	REMOTE		
REMOTE	LOCAL	Follows the input signal fed through a dry contact interface	Follows the input signal of the MAIN circuit
	OFF		Ignores the signal input
	REMOTE		Follows the input signal of the MAIN circuit

Multiple system (SWS1 in the SUB circuit on both the main and sub units will be ineffective.)

SWS1 Setting		Unit Operation					
Main unit MAIN circuit	Sub unit MAIN circuit	Main unit MAIN circuit	Main unit SUB circuit	Sub unit MAIN circuit	Sub unit SUB circuit		
LOCAL	LOCAL	Follows the input signal of the MAIN circuit on the Main unit	Follows the input signal of the MAIN circuit on the Main unit	Follows the input signal of the MAIN circuit on the Sub unit	Follows the input signal of the MAIN circuit on the Sub unit		
	OFF			Ignores the signal input			
	REMOTE			Follows the input signal of the MAIN circuit on the Sub unit			
OFF	LOCAL	Ignores the signal input		Follows the input signal of the MAIN circuit on the Main unit		Ignores the signal input	Follows the input signal of the MAIN circuit on the Sub unit
	OFF						
	REMOTE						
REMOTE	LOCAL	Follows the input signal fed through a dry contact interface	Follows the input signal of the MAIN circuit on the Main unit		Follows the input signal of the MAIN circuit on the Main unit	Follows the input signal of the MAIN circuit on the Sub unit	
	OFF				Ignores the signal input		
	REMOTE				Follows the input signal of the MAIN circuit on the Main unit		

(5) Re-initializing the system

When the settings for the items below have been changed, the system will require re-initialization.

- Dip switch SW2-8 (use or non-use of an external water temperature sensor) (Re-initialization is required only for the Multiple system.)
- Dip switch SW2-9 (multiple unit control)
- Dip switch SW3-3 (water temperature control method)
- External signal input setting [107] (total number of units in the system)
- Rotary switches (SWU1 and SWU2) (unit address)

Take the following steps to re-initialize the system:

(1) Set the rotary switch SWU3 to "F."
[FFFF] will appear in the LED1.

(2) Press and hold the push switch SWP3 for one second or longer.

- While the system is starting up [9999] will appear on LED1.
- When start-up is complete, a control property [0012] will appear.
- Then, five seconds later, [FFFF] will appear.

(3) Press and hold the push switch SWP3 again for one second or longer.

- While the system is starting up [9999] will appear on LED1.
- When start-up is complete, a control property [0012] will appear.
- Then, five seconds later, [FFFF] will appear.

(4) Set the rotary switch SWU3 back to "0."

(6) Resetting the system (MAIN and SUB circuits)

Take the following steps to reset the system. An error can also be reset by taking the steps below.

Note that the errors on the MAIN unit must be reset through the MAIN circuit, and the errors on the sub unit must be reset through the SUB circuit.

When an error on the MAIN unit is reset, all sub units will stop.

(1) Set the rotary switch SWU3 to "F."
[FFFF] will appear in the LED1.

(2) Press and hold the push switch SWP3 for one second or longer.

- While the system is starting up [9999] will appear on LED1.
- When start-up is complete, a control property [0012] will appear.
- Then, five seconds later, [FFFF] will appear.

(3) Set the rotary switch SWU3 back to "0."

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.

Priority 1	Priority 2	Priority 3		Priority 4			Target water temperature	Sensor that becomes active (when SW2-8 is set to ON)(*1)	
Analog input	Main board on the unit	Dry contact input		Centralized controller AG-150A Remote controller PAR-W21MAA					
	Schedule setting	Mode Change 1	Mode Change 2	No remote controller	Manual setting	Schedule setting			
SW2-7: ON	Ineffective	Ineffective	Ineffective	-	Ineffective	Ineffective	Temperature setting for the analog signal input	TH14	
SW2-7: OFF	When schedule has been set	Ineffective	Ineffective	-	Ineffective	Ineffective	Selectable from temperature settings A through C	Selectable from TH14 or TH15	
	When no schedule has been set	ON (Heating Eco)	ON (Hot water)	-	Ineffective	Ineffective	Temperature setting B (Hot water mode)	Selectable from TH14 or TH15	
		ON (Heating Eco)	OFF (Heating)	-	Ineffective	Ineffective	Temperature setting C (Heating Eco mode)	Selectable from TH14 or TH15	
		OFF (Heating)	ON (Hot water)	-	Ineffective	Ineffective	Temperature setting B (Hot water mode)	Selectable from TH14 or TH15	
		OFF (Heating)	OFF (Heating)	When no RC is used	-	-	-	Temperature setting A (Heating mode)	Selectable from TH14 or TH15
				-	Hot water mode	-	-	Temperature setting B (Hot water mode)	Selectable from TH14 or TH15
				-	Heating ECO mode	-	-	Temperature setting C (Heating Eco mode)	Selectable from TH14 or TH15
				-	Heating	-	-	Temperature setting A (Heating mode)	Selectable from TH14 or TH15
-	-	-	-	When schedule has been set	Target water temp is controlled according to the setting on the remote controller.	TH14			

*1 If SW2-8 is set to OFF, water temperature will be controlled by the built-in thermistors TH11-13 and TH16 on the unit.

Water-temperature setting

Different water temperature settings can be set for different modes. Use item codes 11, 13, 22, 23, 24, 25, 26, or 27 to set the water temperatures.

(1) Setting procedures

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

Step 0

Set the ON/OFF switch (SWS1) to OFF.

Set SWS1 to OFF from the remote controller or with the local switch.

Most settings (other than item codes 11 and 13 (water temperature setting)) cannot be changed unless the ON/OFF setting is set to OFF. *

* Settings can be changed from the optional remote controller, regardless of the ON/OFF status of the operation switch.

Step 1

Outdoor temperature input source selection

SW2	SW3					
-10	5	6	7	8	9	10
OFF	OFF	OFF	OFF	ON	OFF	OFF

Items that can be set	Item code	Initial value	Unit	Setting			Note	Setting change from an optional remote controller
				Increments	Lower limit	Upper limit		
Outdoor temperature input source selection	1080	0		1	0	1		Not possible

0: Outdoor temperature sensor (TH9)

1: IT terminal

Step 2

Set the dip switches SW2 and SW3.

SW2	SW3					
-10	5	6	7	8	9	10
OFF	OFF	OFF	OFF	OFF	ON	OFF

Step 3

Select the desired item with the push switch SWP3.

Item codes 11, 13, 22, 23, 24, 25, 26, and 27 relate to water-temperature setting.

Press the push switch SWP3 to select an item code.

Press the push switches SWP1 and SWP2 to change the value of the selected item.

The value will keep blinking while it is being changed.

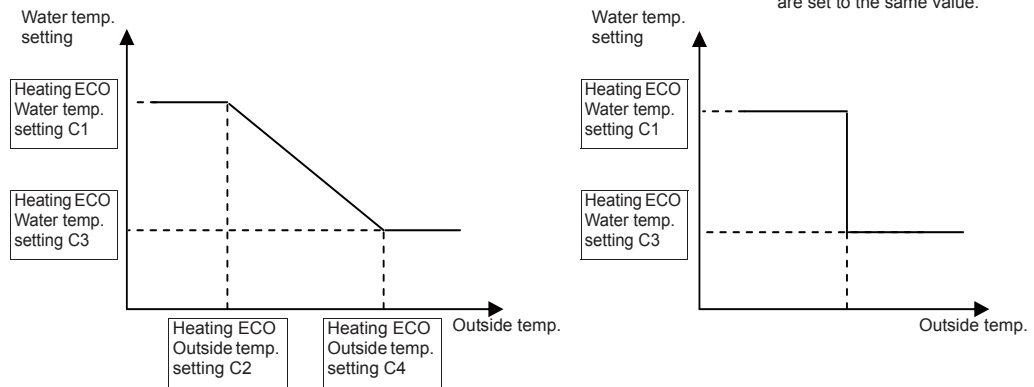
Step 4

Press the push switches SWP1 (↑) or SWP2 (↓) to increase or decrease the value.

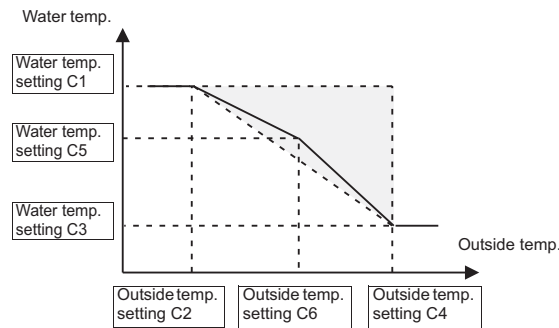
Settings table

Settable item	Item code	Initial value	Setting				Setting change from an optional remote controller (PAR-W21MAA)
			Increments	Lower limit	Upper limit		
Heating ECO mode/ 2-point system or Curve	20	1	2-point system: 0 Curve: 1				
Items that can be set	Item code	Initial value	Unit	Increments	Lower limit	Upper limit	
Water temp. setting A (Heating mode)	11	45	°C	0.1°C	25	70	Possible
Water temp. setting B *1 (Hot water mode)	13	65	°C	0.1°C	25	70	Possible
Heating ECO mode/ Water temp. setting C1 *2	22	60	°C	0.1°C	25	70	Not possible
Heating ECO mode/ Outside temp. setting C2 *2	23	0	°C	0.1°C	-20	50	Not possible
Heating ECO mode/ Water temp. setting C3 *2	24	35	°C	0.1°C	25	70	Not possible
Heating ECO mode/ Outside temp. setting C4 *2	25	25	°C	0.1°C	-20	50	Not possible
Heating ECO mode/ Water temp. setting C5	26	47.5	°C	0.1°C	25	70	Not possible
Heating ECO mode/ Outside temp. setting C6	27	12.5	°C	0.1°C	-20	50	Not possible

* When the values for C2 and C4 are set to the same value.



Heating ECO (Curve)



* Always use a value for setting C6 that is between setting values C2 and C4, and for setting C5 that is between setting values C1 and C3.

*1 These items need not be set when only a single water temperature setting is used. When a signal through a dry contact is used to switch between the three modes, the water temperature setting is selected as follows.

*2 The setting ranges for the water temperature setting A, B, C1, C3, and C5 are shown in the table below.

Water-temperature control	Lower limit	Upper limit
Outlet-water-temperature-based control	25.0°C	70.0°C
Inlet-water-temperature-based control	25.0°C	65.0°C

* When the outside temperature is -5°C or below and the water temperature is set as follows, the unit may operate at a higher preset temperature than the preset temperature: Outlet temperature 35°C/Inlet temperature 30°C.

Step 5
Press the push switch SWP3 to save the change.

Press SWP3 once within one minute of changing the setting with SWP1 or SWP2 to save the setting.
Once the new setting is saved, the display will stop blinking and stay lit. The display will, then, return to the item code display mode.
If SWP3 is not pressed within one minute, the change will not be saved and the display will return to the item code display mode.

(2) Scheduled operation

Up to three sets of start/end times can be assigned for each day.

To operate the units according to the schedule, set the item code 5 to "1", and set the time for item codes 1, 6 through 9, 18, and 19.

Note The operation schedule function will operate only when SWS1 is set to "REMOTE."

Setting procedures

Step 0
Set the ON/OFF switch (SWS1) to OFF.

Set SWS1 to OFF from the remote controller or with the local switch.
Settings cannot be changed unless the ON/OFF setting is set to OFF. *

Step 1
Set the dip switches SW2 and SW3.

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

SW2	SW3					
-10	5	6	7	8	9	10
OFF	OFF	OFF	OFF	OFF	ON	OFF

Step 2
Select the desired item with the push switch SWP3.

Item codes 1, 5 through 9, 18, and 19 relate to scheduled operation setting.
Set the item code to 1, and set the time for each of the relevant items.
Press the push switch SWP3 to select an item code.
Use the push switches SWP1 and SWP2 to change the value of the selected item.
The value will keep blinking while it is being changed.

Step 3
Press the push switches SWP1 (↑) or SWP2 (↓) to increase or decrease the value.

Settings table

Settable item	Item code	Initial value	Unit	Limits and increments		
				Increments	Lower limit	Upper limit
Current time	1	0000	Hour: minute	1 minute	0000	2359
Enable or disable scheduled operation (ON/OFF)	5	0	Enable: 1 Disable: 0	1	0	1
Operation start time 1	6	0000	Hour: minute	1 minute	0000	2359
Operation end time 1	7	0000	Hour: minute	1 minute	0000	2359
Operation start time 2	8	0000	Hour: minute	1 minute	0000	2359
Operation end time 2	9	0000	Hour: minute	1 minute	0000	2359
Operation start time 3	18	0000	Hour: minute	1 minute	0000	2359
Operation end time 3	19	0000	Hour: minute	1 minute	0000	2359

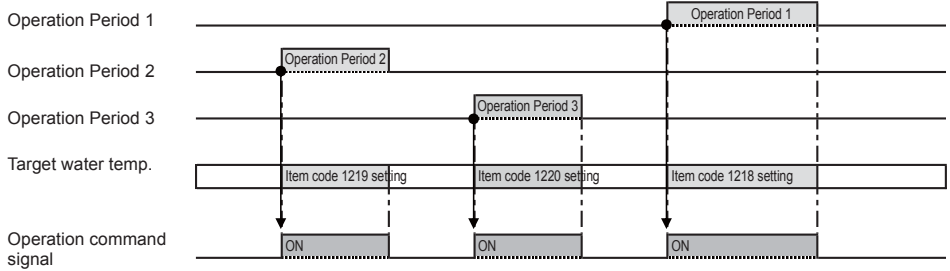
Step 4
Press the push switch SWP3 to save the change.

Press SWP3 once within one minute of changing the setting with SWP1 or SWP2 to save the setting.
Once the new setting is saved, the display will stop blinking and stay lit. The display will, then, return to the item code display mode.
If SWP3 is not pressed within one minute, the change will not be saved and the display will return to the item code display mode.

Note A mode (preset temperatures) can be selected for each operation time period. See the following page for how to make the settings.

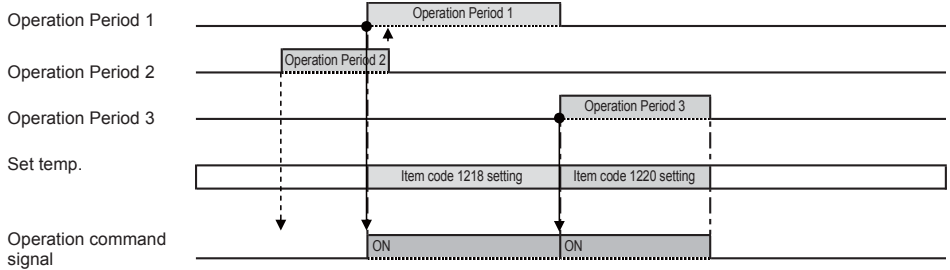
Note If Code 5 is set to "1," lock the remote controller's schedule function.

[When the operation Start/End times do not overlap]



If "Start time 1 - End time 1", "Start time 2 - End time 2", "Start time 3 - End time 3" overlap, the settings for the period with a larger number will be ineffective.

[When operation period 1 and 2 overlap]



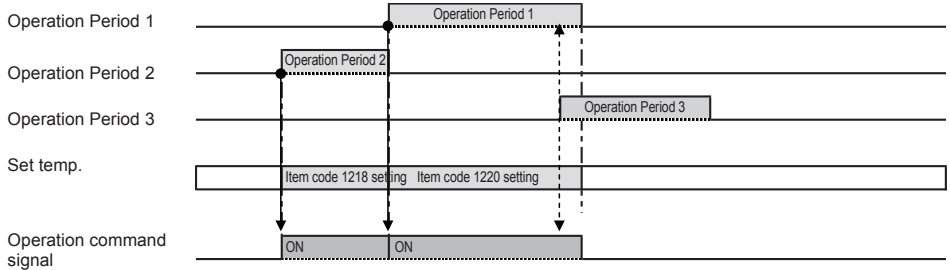
If two or more operation periods overlap, the settings for the period with a larger number will be ineffective.

If Start time 1 and start time 3 are set to the same value, the setting for Start time 3 will be ineffective.

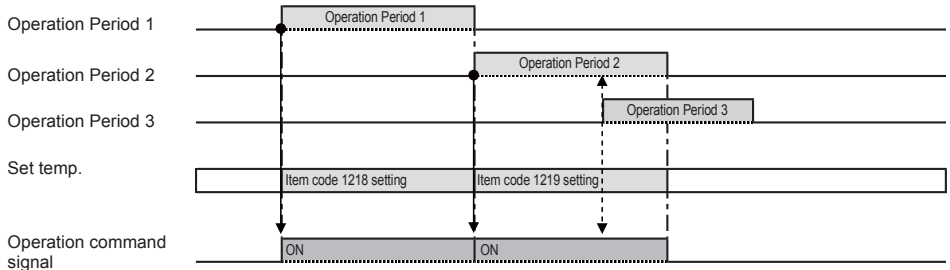
Set the setting for Start time 3 to a time at least one minute after End time 1.

(Once the compressor stops when End time 1 comes, the 3-minute restart delay function will keep the compressor from restarting for three minutes. Because of this, even if Start 3 time is set to a time within three minutes after End time 1, the compressor will not start right away.)

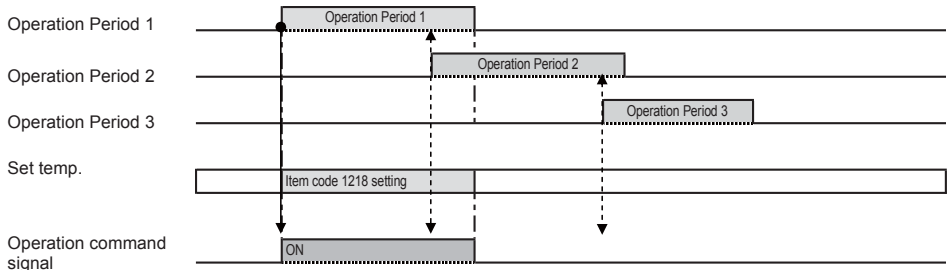
[When operation periods 1 and 3 overlap]



[When operation periods 2 and 3 overlap]



[When operation periods 2 and 3 overlap]



(*) Refer to the section on how to select the preset water temperatures on the next page.

(3) Selecting the preset temperature for different operation periods

Setting procedures

Step 0

Set the ON/OFF switch (SWS1) to OFF.

Set SWS1 to OFF from the remote controller or with the local switch. Settings cannot be changed unless the ON/OFF setting is set to OFF. *

Step 1

Set the dip switches SW2 and SW3.

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

SW2	SW3					
-10	5	6	7	8	9	10
OFF	OFF	OFF	OFF	ON	OFF	OFF

Step 2

Select the desired item with the push switch SWP3.

Item codes 1215 through 1220 relate to scheduled operation setting. Set the item code to 1, and set the time for each of the relevant items. Press the push switch SWP3 to select an item code. Use the push switches SWP1 and SWP2 to change the value of the selected item. The value will keep blinking while it is being changed.

Step 3

Press the push switches SWP1 (↑) or SWP2 (↓) to increase or decrease the value.

Settings table

Items that can be set	Item code	Initial value	Unit	Setting			Note	Setting change from an optional remote controller
				Increments	Lower limit	Upper limit		
Preset temp. 1 (Heating)	1215	14	TH	1	14	15		Possible
Preset temp. 1 (Hot Water)	1216	14	TH	1	14	15		Possible
Preset temp. 1 (Heating ECO)	1217	14	TH	1	14	15		Not possible
Start/End time setting 1 (ON/OFF) water temp. setting	1218	1		1	1	3	*	Not possible
Start/End time setting 2 (ON/OFF) water temp. setting	1219	1		1	1	3	*	Not possible
Start/End time setting 3 (ON/OFF) water temp. setting	1220	1		1	1	3	*	Not possible

*1: Preset temp. A (Heating)
 2: Preset temp. B (Hot Water)
 3: Preset temp. C (Heating ECO)

Step 4

Press the push switch SWP3 to save the change.

Press SWP3 once within one minute of changing the setting with SWP1 or SWP2 to save the setting. Once the new setting is saved, the display will stop blinking and stay lit. The display will, then, return to the item code display mode. If SWP3 is not pressed within one minute, the change will not be saved and the display will return to the item code display mode.

Selecting the preset temperature for different operation periods

When operating the units on schedule, preset temperatures can be selected from A, B, or C for time periods 1 through 3.

Item code 1218: Operation time setting 1

Item code 1219: Operation time setting 2

Item code 1220: Operation time setting 3

Item code 1215: Preset temp. 1 (Item code 11: Heating)

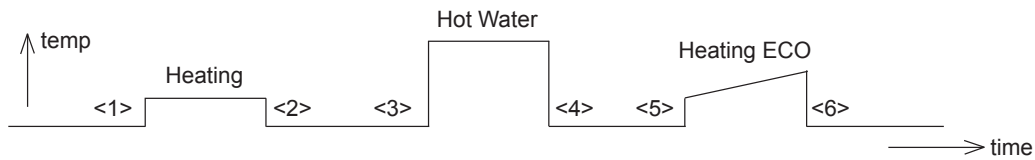
Item code 1216: Preset temp. 2 (Item code 13: Hot Water)

Item code 1217: Preset temp. 3 (Item codes: 22-27: Heating ECO)

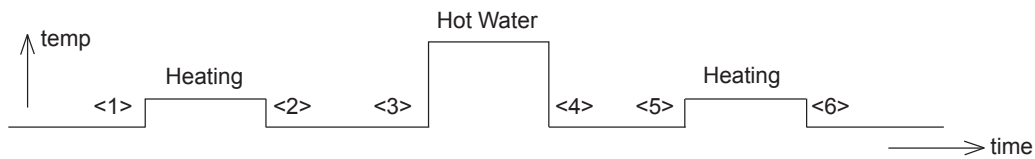
Preset temperature selection for different time periods

			Example 1	Example 2	Example 3
<1> <2>	Start time 1 End time 1	Operation 1 (Preset temperature is selectable from A, B, or C.)	Heating	Heating	Hot Water
<3> <4>	Start time 2 End time 2	Operation 2 (Preset temperature is selectable from A, B, or C.)	Hot Water	Hot Water	Heating ECO
<5> <6>	Start time 3 End time 3	Operation 3 (Preset temperature is selectable from A, B, or C.)	Heating ECO	Heating	Hot Water

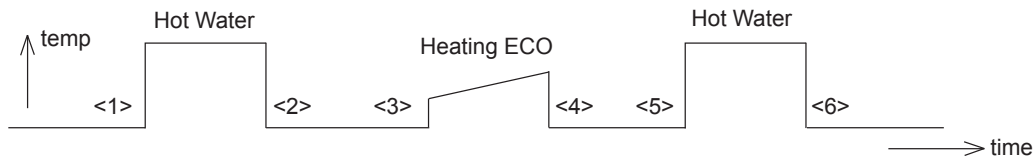
Example 1



Example 2



Example 3



(4) Peak-demand control operation

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

The number of units in operation and the compressor's maximum operating frequency will be controlled according to the peak-demand control signal.

Individual system control	Multiple system control
Individual unit control Maximum frequency = Maximum capacity under peak-demand control	Depending on the peak-demand control setting that is made on the main unit, the number of units in operation and the maximum operating frequency of the units in operation will be adjusted.

Setting procedures

Set the maximum capacity setting on the circuit board.

Step 0
Set the ON/OFF switch (SWS1) to OFF.

Set SWS1 to OFF from the remote controller or with the local switch.
Settings cannot be changed unless the ON/OFF setting is set to OFF. *

Step 1
Set the dip switches SW2 and SW3.

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

SW2	SW3					
-10	5	6	7	8	9	10
OFF	OFF	OFF	OFF	OFF	ON	OFF

Step 2
Select the desired item with the push switch SWP3.

Press the push switch SWP3 to select item code 2.
Press the push switches SWP1 or SWP2 to change the value of the selected item.
The value will keep blinking while it is being changed.

Step 3
Press the push switches SWP1 (↑) or SWP2 (↓) to increase or decrease the value.

Settings table

Items that can be set	Item code	Initial value	Unit	Setting			Setting change from an optional remote controller
				Increments	Lower limit	Upper limit	
Maximum capacity setting	2	100	%	5%	0	100	Not possible
Peak-demand control start time	3	1300	Hour: minute	1	0000	2359	Not possible
Peak-demand control end time	4	1300	Hour: minute	1	0000	2359	Not possible

Step 4
Press the push switch SWP3 to save the change.

Press SWP3 once within one minute of changing the setting with SWP1 or SWP2 to save the setting.
Once the new setting is saved, the display will stop blinking and stay lit. The display will, then, return to the item code display mode.
If SWP3 is not pressed within one minute, the change will not be saved and the display will return to the item code display mode.
(*) If the peak-demand control contact is ON, units will operate at the maximum capacity that was set in the steps above.

(5) Setting the total number of units for a multiple system

Step 0

Set the ON/OFF switch (SWS1) to OFF.

Set SWS1 to OFF from the remote controller or with the local switch. Settings cannot be changed unless the ON/OFF switch is set to OFF.

Step 1

Set the dip switches SW2 and SW3.

Set the dip switches on the circuit board as follows to select how external inputs are received.

SW2	SW3					
-10	5	6	7	8	9	10
OFF	OFF	OFF	OFF	ON	ON	ON

Step 2

Select the desired item with the push switch SWP3.

The item codes shown in the table below will appear in order every time the push switch SWP3 is pressed.

Use the push switches SWP1 and SWP2 to change the value of the selected item. The value will keep blinking while it is being changed.

Step 3

Press the push switches SWP1 (↑) or SWP2 (↓) to increase or decrease the value.

Setting the total number of units

	Item code	Increments	Lower limit	Upper limit	Initial value
Total number of units in the system*1	107	1	1	16	1

*1 Enter the total number of units including the main unit. Applicable only to the main unit.

Step 4

Press the push switch SWP3 to save the change.

Press SWP3 once within one minute of changing the setting with SWP1 or SWP2 to save the setting.

Once the new setting is saved, the display will stop blinking and stay lit. The display will, then, return to the item code display mode.

If SWP3 is not pressed within one minute, the change will not be saved and the display will return to the item code display mode.

Step 5

Turn the power back on. Reset the system.

After changing the settings, re-initialize the system according to the procedures detailed on page 25.

Note

The new setting will not be saved unless a reset is performed.

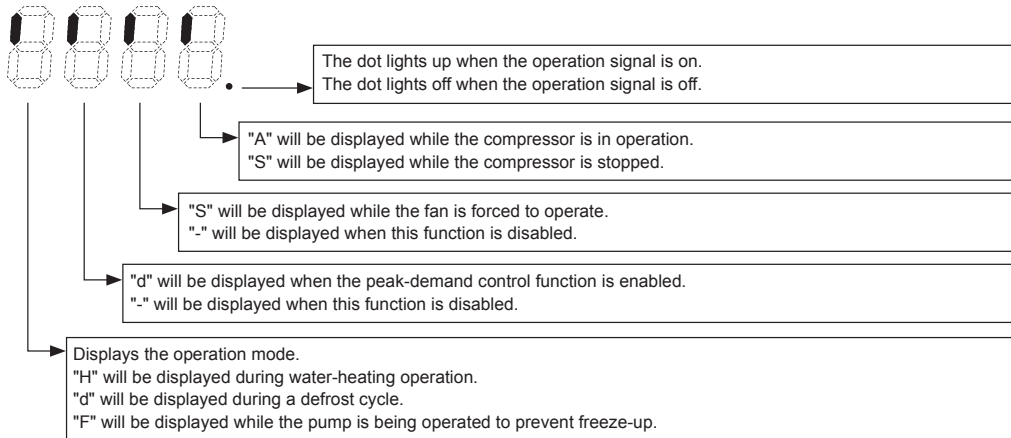
Setting the unit addresses

Refer to "System configuration procedures: Multiple system" (page 21).

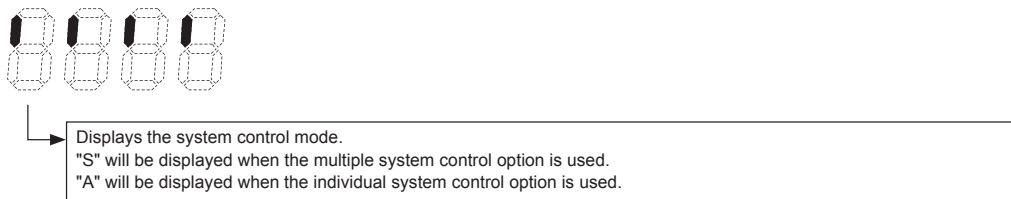
(6) Selecting the item that normally appears on the LED

SW2	SW3						Display content
-10	5	6	7	8	9	10	
OFF	OFF	OFF	ON	OFF	OFF	OFF	Displays the operation mode.(*1)
OFF	OFF	ON	ON	OFF	OFF	OFF	Displays the operation mode.(*2)
OFF	ON	ON	OFF	OFF	OFF	OFF	Displays the current water temperature.
OFF	ON	OFF	OFF	OFF	OFF	OFF	Displays the water-temperature setting.
OFF	OFF	OFF	OFF	OFF	OFF	OFF	Displays the high and low refrigerant pressures.

(*1)



(*2)



(7) Remote water temperature setting input signal type

By setting SW2-7 to ON, external analog signals can be used to set the water temperatures.

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

"0": 4-20 mA

"1": 0-10 V

"2": 1-5 V

"3": 2-10 V

Select item code 21 to set the type of analog input signal to be used to set the water temperature from a remote location.

Setting procedures

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

Step 1

Set dip switches SW2, SW3, SW421-1, and SW421-2.

	SW421-1	SW421-2
4-20 mA	ON	ON
0-10 V	OFF	OFF
1-5 V	OFF	ON
2-10 V	OFF	OFF

	SW2	SW3					
	-10	5	6	7	8	9	10
Switch settings	OFF	OFF	OFF	OFF	OFF	ON	OFF

Step 2

Select the item to be set with push switch SWP3.

Select the type of analog input signal to be used to set the water temperature from a remote location.

Step 3

Change the values with push switches SWP1 (↑) or SWP2 (↓).

Press push switch SWP3 to select the item code.

Change the values with push switches SWP1 and SWP2.

Until the changed values are saved, the values will blink.

Items that can be set	Item code	Initial value	Unit	Setting			Note	Setting change from an optional remote controller
				Increments	Lower limit	Upper limit		
Water temperature setting input signal type	21	0		1	0	3		Not possible

Step 4

Press push switch SWP3 to save the changed value.

Press SWP3 once within one minute of changing the settings to save the change.

When the new setting is saved, the display will stop blinking and stay lit. The display will, then, return to the item code display mode.

If SWP3 is not pressed within one minute, the change will not be saved, and the display will return to the item code display mode.

(8) Setting the water temperature using analog signal input

Select the analog input format

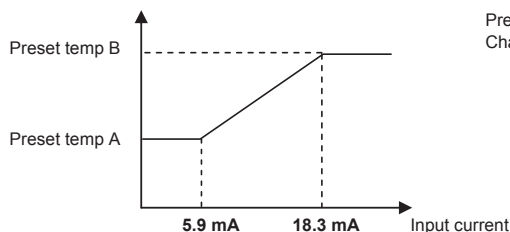
	SW2	SW3					
	-10	5	6	7	8	9	10
Switch settings	OFF	OFF	OFF	OFF	OFF	ON	OFF

Items that can be set	Item code	Initial value	Unit	Setting			Note	Setting change from an optional remote controller
				Increments	Lower limit	Upper limit		
Select the analog input format	1051	0		1	0	3		Not possible

Select "0"

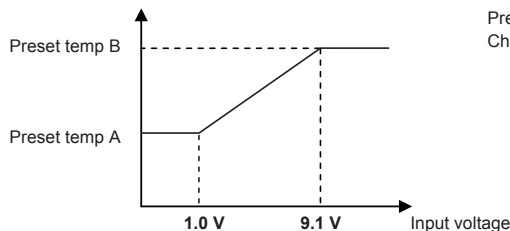
0: Water temperature input 4-20 mA
 1: Capacity control input 4-20 mA
 2: Water temperature input IT terminal
 3: Capacity control input IT terminal

- When dip switch SW2-7 is set to ON (Enable external input), the target water temperature varies with the preset temperatures A and B and the type of analog input signal.
- When the water temperature setting input signal type is set to 0 (4-20 mA)
 - External analog input signal of 5.9 mA: Preset temp. A (Item code 11)
 - External analog input signal of 18.3 mA: Preset temp. B (Item code 13)
 - External analog input signal of between 5.9 and 18.3 mA: the preset temperature will be linearly interpolated.



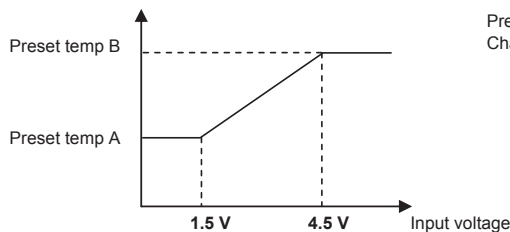
Preset temperature = $(B - A) * (\text{Input current} - 5.9 \text{ mA}) / 12.4 \text{ mA} + A$
 Change of 0.12 mA or less is not recognized.

- When the water temperature setting input signal type is set to 1 (0-10 V)
 - External analog input signal of 1.0 V: Preset temp. A (Item code 11)
 - External analog input signal of 9.1 V: Preset temp. B (Item code 13)
 - External analog input signal of between 1.0 and 9.1 V: the preset temperature will be linearly interpolated.



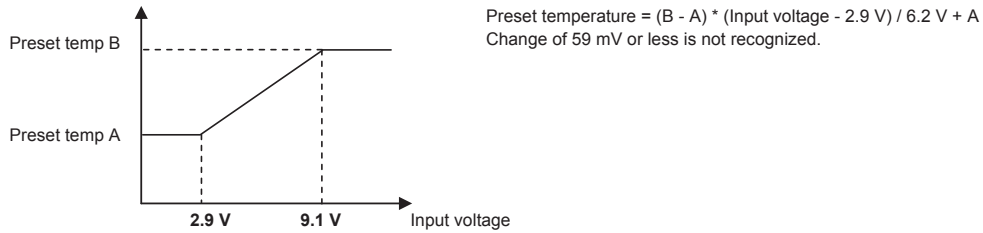
Preset temperature = $(B - A) * (\text{Input voltage} - 1.0 \text{ V}) / 8.1 \text{ V} + A$
 Change of 59 mV or less is not recognized.

- When the water temperature setting input signal type is set to 2 (1-5 V)
 - External analog input signal of 1.5 V: Preset temp. A (Item code 11)
 - External analog input signal of 4.5 V: Preset temp. B (Item code 13)
 - External analog input signal of between 1.5 and 4.5 V: the preset temperature will be linearly interpolated.



Preset temperature = $(B - A) * (\text{Input voltage} - 1.5 \text{ V}) / 3.0 \text{ V} + A$
 Change of 29 mV or less is not recognized.

- When the water temperature setting input signal type is set to 3 (2-10 V)
 - External analog input signal of 2.9 V: Preset temp. A (Item code 11)
 - External analog input signal of 9.1 V: Preset temp. B (Item code 13)
 - External analog input signal of between 2.9 and 9.1 V: the preset temperature will be linearly interpolated.



(9) Setting the capacity control ratio using analog signal input

Select the analog input format

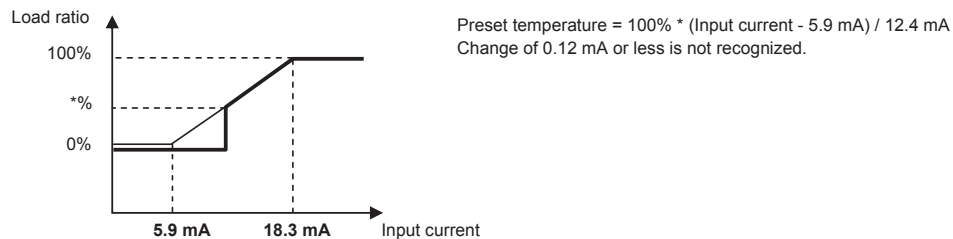
	SW2	SW3					
	-10	5	6	7	8	9	10
Switch settings	OFF	OFF	OFF	OFF	OFF	ON	OFF

Items that can be set	Item code	Initial value	Unit	Setting			Note	Setting change from an optional remote controller
				Increments	Lower limit	Upper limit		
Select the analog input format	1051	0		1	0	3		Not possible

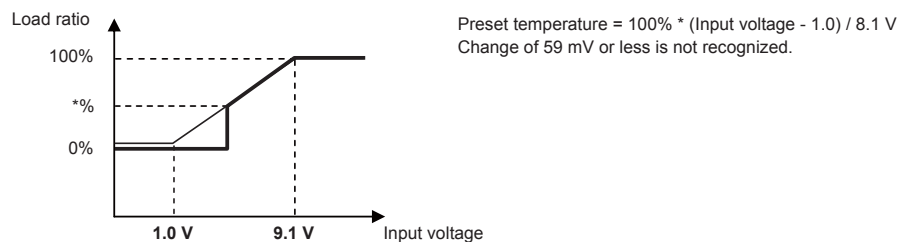
Select "1"

- 0: Water temperature input 4-20 mA
- 1: Capacity control input 4-20 mA
- 2: Water temperature input IT terminal
- 3: Capacity control input IT terminal

- When dip switch SW2-7 is set to ON (Enable external input), the capacity control ratio varies with the type of analog input signal.
 - When the water temperature setting input signal type is set to 0 (4-20 mA)
 - External analog input signal of 5.9 mA: 0%
 - External analog input signal of 18.3 mA: 100%
 - External analog input signal of between 5.9 and 18.3 mA: the percent will be linearly interpolated.

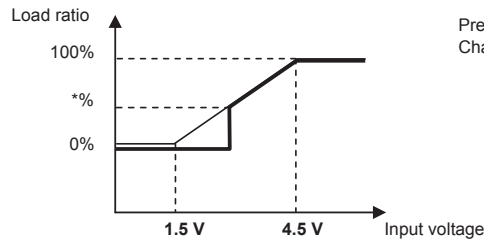


- When the water temperature setting input signal type is set to 1 (0-10 V)
 - External analog input signal of 1.0 V: 0%
 - External analog input signal of 9.1 V: 100%
 - External analog input signal of between 1.0 and 9.1 V: the percent will be linearly interpolated.



- When the water temperature setting input signal type is set to 2 (1-5 V)

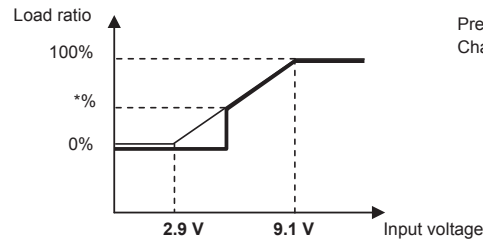
- External analog input signal of 1.5 V: 0%
- External analog input signal of 4.5 V: 100%
- External analog input signal of between 1.5 and 4.5 V: the percent will be linearly interpolated.



Preset temperature = $100\% * (\text{Input voltage} - 1.5) / 3.0 \text{ V}$
 Change of 29 mV or less is not recognized.

- When the water temperature setting input signal type is set to 3 (2-10 V)

- External analog input signal of 2.9 V: 0%
- External analog input signal of 9.1 V: 100%
- External analog input signal of between 2.9 and 9.1 V: the percent will be linearly interpolated.



Preset temperature = $100\% * (\text{Input voltage} - 2.9 \text{ V}) / 6.2 \text{ V}$
 Change of 59 mV or less is not recognized.

*%: When the compressor frequency drops below 30 Hz, the compressor stops.

The frequency value that causes the compressor to stop varies depending on the outside temperature and water temperature.

(10) Setting the booster heater 1 operation conditions

A temperature at which the booster heater 1 will go into operation (TWL) can be selected.

Select item code 1057 and 1058 to set the threshold temperature (TWL1 and TAL1) for booster heater operation.

Booster heater 1 operation conditions

• Individual system

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

- 1 Water-temperature control option is set to OFF, the water temperature drops below TWL1, and the outside temperature drops below TAL1.
- 2 Water-temperature control option is set to ON, the external water temperature sensor reading drops below TWL1, and the outside temperature drops below TAL1.

The booster heater 1 signal of the MAIN circuit comes on.

• Multiple system

The operation command signal is ON and the following condition is met.

External water temperature sensor readings (TH14 and TH15) drop below TWL1, and the reading of the outside temperature sensor connected to the MAIN circuit of the main unit drops below TWL1.

The booster heater 1 signal of the MAIN circuit comes on.

Booster heater 1 operation-stop conditions

The operation command signal is OFF or all of the following two conditions are met.

- 1 The water temperature is at or above TWL1+2°C or the outside temperature is at or above TAL1+2°C.
- 2 External water temperature sensor readings (TH14 and TH15) are at or above TWL1+2°C, or the reading of the outside temperature sensor (TH9) connected to the MAIN circuit of the main unit exceeds TAL1+2°C.

(*)Unit's inlet water temperature: Average value between the water temperature settings of the MAIN and SUB circuits

Setting procedures

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

Step 1
Outdoor temperature
input source selection

	SW2	SW3					
	-10	5	6	7	8	9	10
Switch settings	OFF	OFF	OFF	OFF	ON	OFF	OFF

Items that can be set	Item code	Initial value	Unit	Setting			Note	Setting change from an optional remote controller
				Increments	Lower limit	Upper limit		
Outdoor temperature input source selection	1080	0		1	0	1		Not possible

0: Outdoor temperature sensor (TH9)

1: IT terminal

Step 2
Set dip switches
SW2 and SW3.

	SW2	SW3					
	-10	5	6	7	8	9	10
Switch settings	OFF	OFF	OFF	OFF	OFF	ON	OFF

Step 3
Select the item to be set with
push switch SWP3.

Step 4
Change the values with push
switches SWP1 (↑) or SWP2 (↓).

Select item code 1057 and 1058 to set the operation temperature (TWL1 and TAL1) for the booster heater 1.
Press push switch SWP3 to select the item code.
Change the values with push switches SWP1 and SWP2.
Until the changed values are saved, the values will blink.

Items that can be set	Item code	Initial value	Unit	Setting			Note	Setting change from an optional remote controller
				Increments	Lower limit	Upper limit		
Booster heater 1 operation water temperature (TWL1)	1057	40	°C	0.1	0	70		Not possible
Booster heater 1 operation outside temperature (TAL1)	1058	-10		0.1	-30	50		

Press and hold push switches SWP1 and SWP2 to fast forward the numbers.

Step 5
Press push switch SWP3 to save
the changed value.

Press SWP3 once within one minute of changing the settings to save the change.
When the new setting is saved, the display will stop blinking and stay lit. The display will, then, return to the item code display mode.
If SWP3 is not pressed within one minute, the change will not be saved, and the display will return to the item code display mode.

(11) Setting the booster heater 2 operation conditions

A temperature at which the booster heater 2 will go into operation (TWL) can be selected.

Select item code 1059 and 1060 to set the threshold temperature (TWL2 and TAL2) for booster heater operation.

Booster heater 2 operation conditions

• Individual system

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

- 1 Water-temperature control option is set to OFF, the water temperature drops below TWL2, and the outside temperature drops below TAL2.
- 2 Water-temperature control option is set to ON, the external water temperature sensor reading drops below TWL2, and the outside temperature drops below TAL2.

The booster heater 2 signal of the MAIN circuit comes on.

• Multiple system

The operation command signal is ON and the following condition is met.

External water temperature sensor readings (TH14 and TH15) drop below TWL2, and the reading of the outside temperature sensor connected to the MAIN circuit of the main unit drops below TWL2.

The booster heater 2 signal of the MAIN circuit comes on.

Booster heater 2 operation-stop conditions

The operation command signal is OFF or all of the following two conditions are met.

- 1 The water temperature is at or above TWL2+2°C or the outside temperature is at or above TAL2+2°C.
- 2 External water temperature sensor readings (TH14 and TH15) are at or above TWL2+2°C, or the reading of the outside temperature sensor (TH9) connected to the MAIN circuit of the main unit exceeds TAL2+2°C.

(*)Unit's inlet water temperature: Average value between the water temperature settings of the MAIN and SUB circuits

Setting procedures

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

Step 1
Outdoor temperature
input source selection

	SW2	SW3					
	-10	5	6	7	8	9	10
Switch settings	OFF	OFF	OFF	OFF	ON	OFF	OFF

Items that can be set	Item code	Initial value	Unit	Setting			Note	Setting change from an optional remote controller
				Increments	Lower limit	Upper limit		
Outdoor temperature input source selection	1080	0		1	0	1		Not possible

0: Outdoor temperature sensor (TH9)
1: IT terminal

Step 2
Set dip switches
SW2 and SW3.

	SW2	SW3					
	-10	5	6	7	8	9	10
Switch settings	OFF	OFF	OFF	OFF	OFF	ON	OFF

Step 3
Select the item to be set with
push switch SWP3.

Step 4
Change the values with push
switches SWP1 (↑) or SWP2 (↓).

Select item code 1059 and 1060 to set the operation temperature (TWL2 and TAL2) for the booster heater 2.
Press push switch SWP3 to select the item code.
Change the values with push switches SWP1 and SWP2.
Until the changed values are saved, the values will blink.

Items that can be set	Item code	Initial value	Unit	Setting			Note	Setting change from an optional remote controller
				Increments	Lower limit	Upper limit		
Booster heater 2 operation water temperature (TWL2)	1059	30	°C	0.1	0	70		Not possible
Booster heater 2 operation outside temperature (TAL2)	1060	-15		0.1	-30	50		

Press and hold push switches SWP1 and SWP2 to fast forward the numbers.

Step 5
Press push switch SWP3 to save
the changed value.

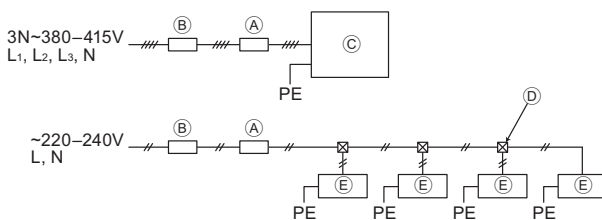
Press SWP3 once within one minute of changing the settings to save the change.
When the new setting is saved, the display will stop blinking and stay lit. The display will, then, return to the item code display mode.
If SWP3 is not pressed within one minute, the change will not be saved, and the display will return to the item code display mode.

5. Electrical Wiring Installation

[1] Main Power Supply Wiring and Switch Capacity

Schematic Drawing of Wiring (Example)

- (A): Switch (with current breaking capability)
- (B): Current leakage breaker
- (C): Outdoor unit
- (D): Pull box
- (E): Indoor unit



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

Model	Minimum wire thickness (mm ²)			Current leakage breaker	Local switch (A)		No-fuse breaker (A)	Max. Permissible System Impedance
	Main cable	Branch	Ground		Capacity	Fuse		
CAHV-P500YB-HPB	25	-	25	75 A 100 mA 0.1 sec. or less	75	75	75	0.28 Ω

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, sunlight, rain).
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 10%.
4. Specific wiring requirements should adhere to the wiring regulations of the region.
5. Power supply cords of appliances for outdoor use 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 Air Conditioner 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 $S_{SC} (*2)$ 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 $S_{SC} (*2)$.

$S_{SC} (*2)$

S_{SC} (MVA)
4.11

Control cable specifications

Remote controller cable	Size	0.3 - 1.25 mm ² (Max. 200 m total)*2
	Recommended cable types	CVV
M-NET cable between units *1	Size	Min. 1.25 mm ² (Max. 120 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

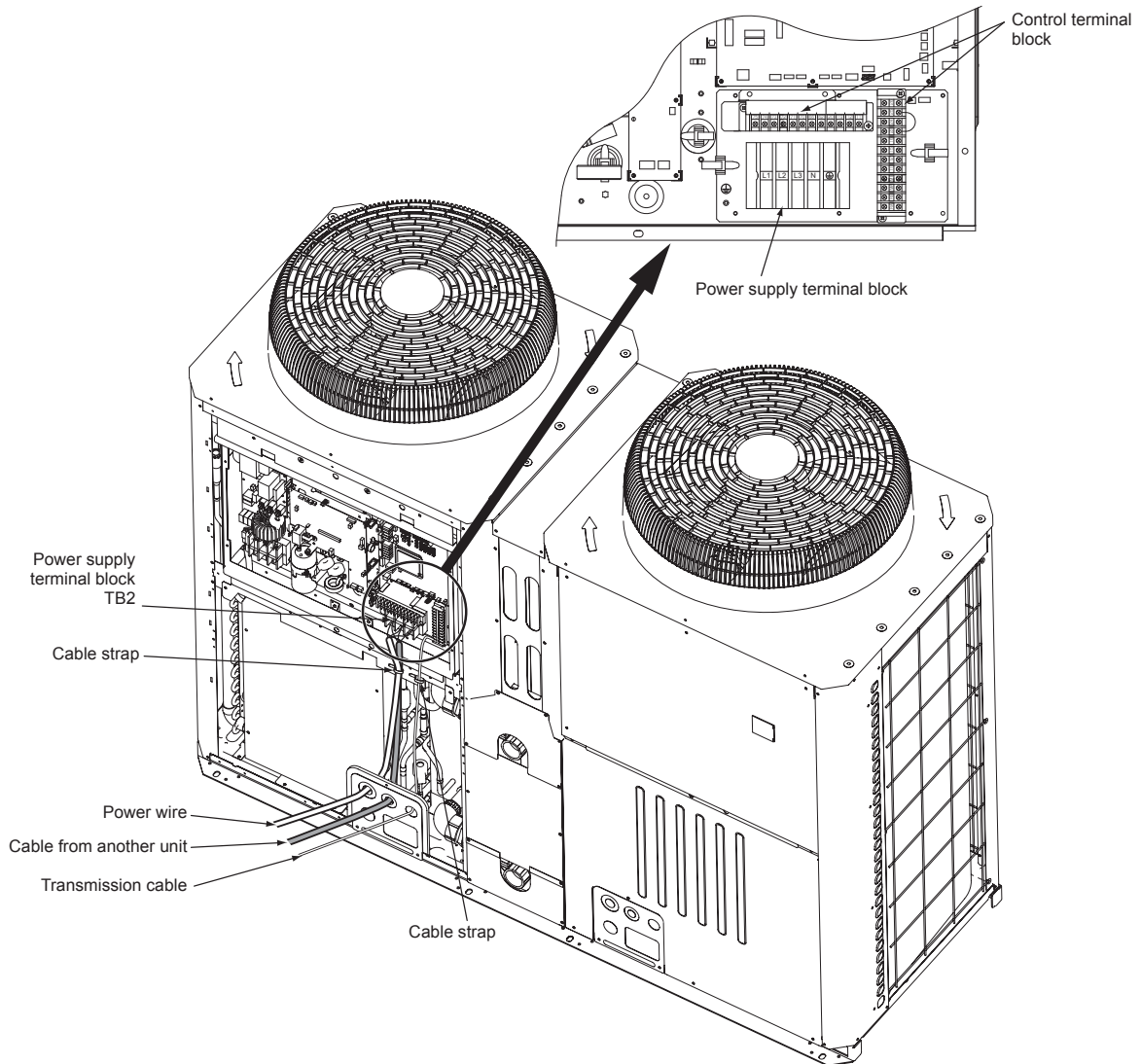
*1 Use a CVVS or CPEVS cable (Max. total length of 200 m) if there is a source of electrical interference near by (e.g., factory) or the total length of control wiring exceeds 120 m.

*2 When the wiring length exceeds 10 m, use wire of 1.25 mm².

[2] Cable Connections

<1> Schematic Diagram of a Unit and Terminal Block Arrangement

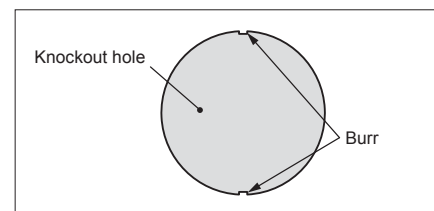
To remove the front panel of the control box, unscrew the four screws and pull the panel forward and then down.



Important: Power supply cables larger than 25 mm² in diameter are not connectable to the power supply terminal block (TB2). Use a pull box to connect them.

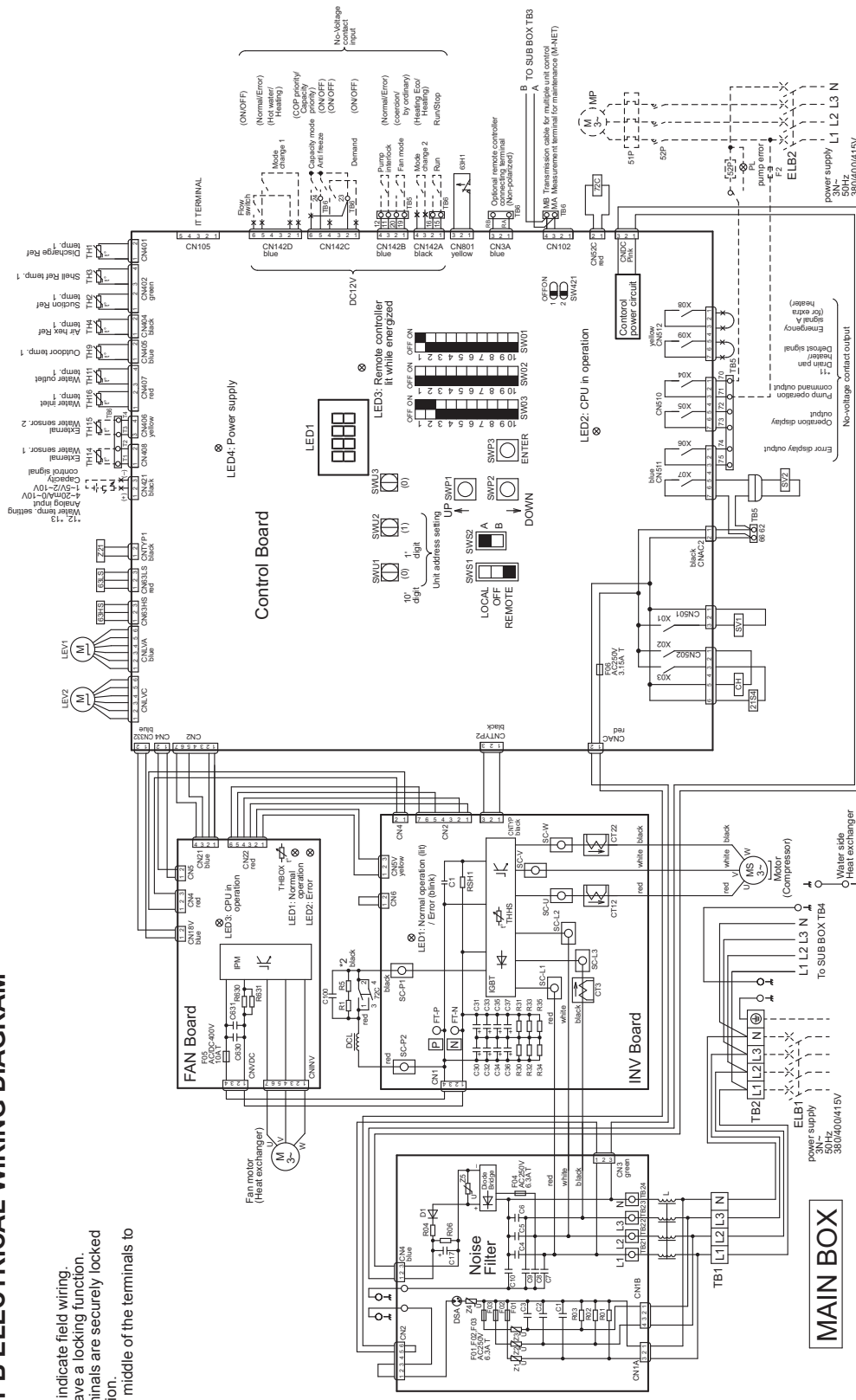
<2> Installing the conduit tube

- Punch out the knockout hole for wire routing at the bottom of the front panel with a hammer.
- When putting wires through knockout holes without protecting them with a conduit tube, deburr the holes and protect the wires with protective tape.
- If damage from animals is a concern, use a conduit tube to narrow the opening.



CAHV-P500YB-HPB ELECTRICAL WIRING DIAGRAM

Note 1. Single-dotted lines indicate field wiring.
 Note 2. Faston terminals have a locking function. Check that the terminals are securely locked in place after insertion. Press the tab in the middle of the terminals to remove them.

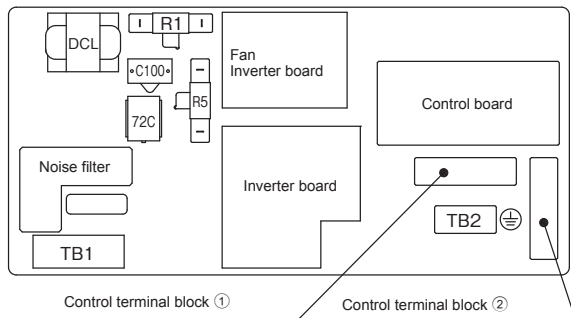


- Note 3. The symbols used for different types of terminals are as follows:
 ○ : Terminal block
 X : Cut the short-circuit wire, and connect field wiring
 □ : Bullet terminal (field supply: male ø3.96)
- Note 4. To switch between "Capacity priority" and "COP priority," remove the short-circuit wire on terminal 23 and CN142-6.
- Note 5. The broken lines indicate the optional parts, field-supplied parts, and field work.
- Note 6. Be sure to connect the wires from terminals 11 and 12 to the interlock contact on the pump.
 A short-circuit may cause abnormal stop or malfunctions.
- Note 7. Operation signals can be received from the remote controller or through the dry contact. The temperature setting can be changed by a signal received through the dry contact or by using the schedule setting.
 Leave a space of at least 5 cm between the low voltage external wiring (no-voltage contact input and remote controller wiring) and wiring of 100 V or greater. Do not place them in the same conduit tube or cable tray as this will damage the circuit board.
 The voltage/current applied to the dry contact should not exceed 12 VDC/5 mA.
- Note 8.
- Note 9.
- Note 10. When cable tray is used for the control cable wiring, use a separate cable tray for the following wiring.
 Using the same cable tray may cause malfunctions and damage to the unit.
 (a) Optional remote controller wiring
 (b) No-voltage contact input wiring
 (c) No-voltage contact output wiring
 (d) Remote water temp. setting
- Note 11. Selects either Drain pan signal or Defrost signal by SW2 and SW3 settings. (Item code 1056)
- Note 12. Selects either Water Temperature setting input signal or Capacity control input signal by SW2 and SW3 settings. (Item code 1051)
- Note 13. Use a 4-20 mA signal output device with insulation.
 Feeding 30 mA or more current may damage the circuit board.

Symbol explanation

	Symbol	Explanation
MAIN BOX and SUB BOX	CH	Crankcase heater (for heating the compressor)
	CT12	AC current sensor
	CT22	
	CT3	
	C100	Capacitor (Electrolysis)
	DCL	DC reactor
	F01	Fuse
	F02	
	F03	
	F04	
	F05	
	F06	
	LEV1	Electronic expansion valve (Main circuit)
	LEV2	Electronic expansion valve (Injection)
	M	Fan motor
	MS	Compressor motor
	R1	Electrical resistance
	R5	
	SV1	Solenoid valve (Injection circuit)
	SV2	Solenoid valve (Hot-gas circuit)
	THHS	IGBT temperature
	Z21	Function setting connector
	21S4	4-way valve
	63HS	High-pressure sensor
	63H1	High-pressure switch
	63LS	Low-pressure sensor
72C	Electromagnetic relay (Inverter main circuit)	
MAIN BOX	TH1~4	Thermistor
	TH9,11	
	TH14~16	
Field-supplied	<ELB1,2>	Earth leakage breaker
	<F2>	Fuse
	<H20>	Emergency signal (for extra heater)
	<H21>	Drain pan heater
	<MP>	Pump motor
	<51P>	Overcurrent relay (Pump)
	<52P>	Electromagnetic contactor (Pump)

Inside the control box (front view)



Display setting

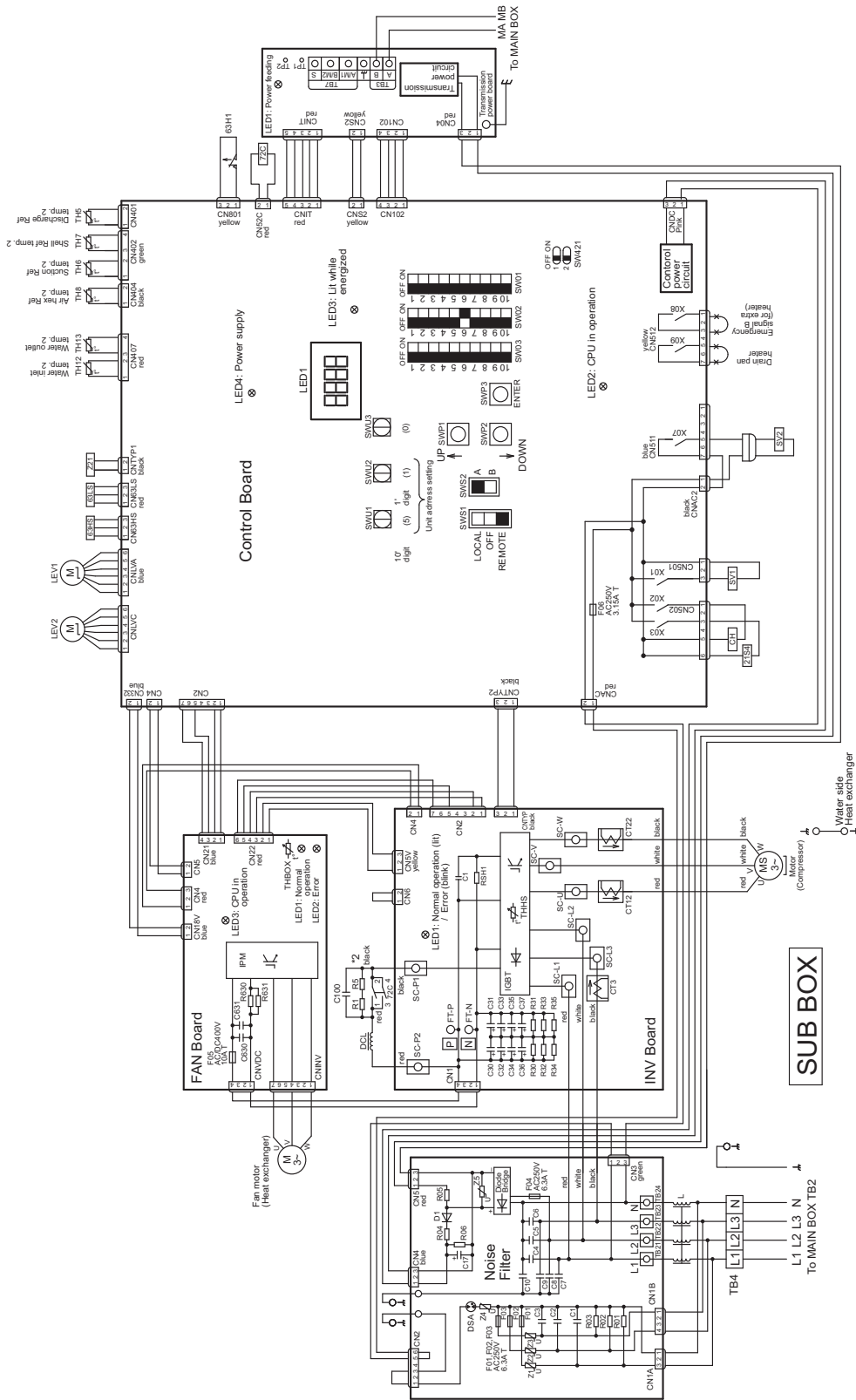
Control board display	Control board SW setting *1	
Preset water temperature	SW3-5: ON	SW3-6: OFF
Current water temperature *2	SW3-5: ON	SW3-6: ON
High pressure/Low pressure	SW2-10: OFF	SW3-8: OFF
	SW3-5: OFF	SW3-9: OFF
	SW3-6: OFF	SW3-10: OFF
	SW3-7: OFF	

- *1 Select an item to be displayed by setting the switches.
- *2 The current water temperature will be displayed according to the selection on the preset water temperature display option.
- *3 If an error occurs, a 4-digit error code, from a list of error codes in the table at right will blink on the board and remote controller display. ([Error code] and [Error source address] appear alternately on the remote controller display.)
- *4 Definition of symbols in the "Error reset" column
 - ⊙ ...Errors that can be reset regardless of the switch settings
 - ...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"
 - × ...Errors that cannot be reset
 - ...Errors that will be automatically reset after the cause of the error is removed
- *5 Power failure can be detected only when the switch setting "Automatic recovery after power failure" on the unit is set to "Disable." (The default setting is "Enable.")
- *6 Depending on the system configuration, the unit may come to an abnormal stop when the communication error lasts for 10 minutes or longer. In this case, the error needs to be reset by setting either SWS1 on the unit (PCB) or remote operation switch.
- *7 This error code will appear when multiple errors occur that are reset in different ways and when one or more of these errors have not been reset. This error can be reset by turning off and then back on the unit's power.
- *8 Remove the cause of the error before resetting the error. Resuming operation without removing the cause may burst the heat exchanger.
- *9 [Error code] and [Detail code] appear alternately. Refer to the Installation Manual for detail codes.

Error Codes

No.	Error code (PCB *3)	Error type	Error reset *4	
			Unit side (PCB) SWS1	Remote controller Operation SW
1	R000	Unreset errors	*7	×
2	R-P0	Power failure	*5	⊙
3	RC61	Discharge temperature fault	○	○
4	Rd5H	Compressor flooding	○	○
5	Rf5R	Water supply cutoff (Flow switch)	○	○
6	RHP1	High pressure fault	○	○
7	R471	Open phase	×	×
8	D403	Serial communication error	○	○
9	1103	Shell temperature fault	○	○
10	1104	Heat exchanger freeze up	*8	○
11	1303	Vacuum protection fault	○	○
12	4102	Open phase (T phase)	○	○
13	4106	Power supply fault	*9	—
14	4115	Power supply frequency fault	×	×
15	4121	Active filter fault	⊙	⊙
16	4220,4225	Inverter bus voltage fault	*9	○
17	4230,4235	Inverter overheat protection fault	○	○
18	4240,4245	Inverter overload protection fault	○	○
19	4250,4255	iPM error (inclusive)/overcurrent relay trip	*9	○
20	4260,4265	Cooling fan fault	○	○
21	5101	Discharge temperature thermistor error (TH1 MAIN Circuit)	○	○
22	5102	Compressor inlet temperature thermistor error (TH2 MAIN Circuit)	○	○
23	5103	Shell temperature thermistor error (TH3 MAIN Circuit)	○	○
24	5104	Air-side heat exchanger refrigerant temperature thermistor error (TH4 MAIN Circuit)	○	○
25	5105	Discharge temperature thermistor error (TH5 SUB Circuit)	○	○
26	5106	Compressor inlet temperature thermistor error (TH6 SUB Circuit)	○	○
27	5107	Shell temperature thermistor error (TH7 SUB Circuit)	○	○
28	5108	Air-side heat exchanger refrigerant temperature thermistor error (TH8 SUB Circuit)	○	○
29	5109	Outside temperature thermistor error (TH9)	○	○
30	5110	THHS sensor/Circuit fault	*9	○
31	5111	Outlet water temperature thermistor error (TH11 MAIN Circuit)	○	○
32	5112	Inlet water temperature thermistor error (TH12 SUB Circuit)	○	○
33	5113	Outlet water temperature thermistor error (TH13 SUB Circuit)	○	○
34	5114,5115	External water temperature thermistor error (TH14, TH15)	○	○
35	5116	Inlet water temperature thermistor error (TH16 MAIN Circuit)	○	○
36	5117	High-pressure sensor fault	○	○
37	5118	Low-pressure sensor fault	○	○
38	5301,5305	ACCT·DCCT sensor fault/Circuit fault	*9	○
39	6500	Communication error between the MAIN and SUB units	—	—
40	6600	Communication error between the MAIN and SUB units (Simple multiple unit control)	×	×
41	6603		—	—
42	6606		—	—
43	6607 *6		—	—
44	6608 *6		—	—
45	6830	Address overlap	×	×
46	6831	Remote controller signal reception error 1	—(○)	—(○)
47	6832	Remote controller signal transmission error	—(○)	—(○)
48	6833	Remote controller over current	×	×
49	6834	Remote controller signal reception error 2	—(○)	—(○)
50	7102	Incorrect setting of No.-of-connected-unit	*9	×
51	7105	Address setting error	×	×
52	7113,7117	Model setting error	×	×
53	7130	Incompatible combination of units	×	×

CAHV-P500YB-HPB ELECTRICAL WIRING DIAGRAM

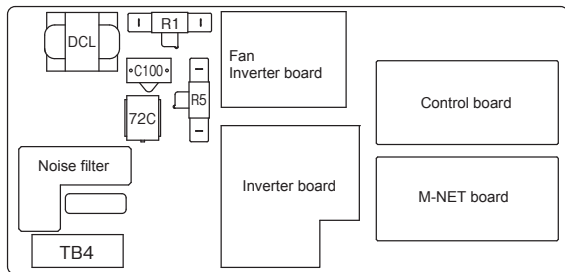


- Note 1. Single-dotted lines indicate field wiring.
- Note 2. Faston terminals have a locking function. Check that the terminals are securely locked in place after insertion. Press the tab in the middle of the terminals to remove them.

Symbol explanation

	Symbol	Explanation
MAIN BOX and SUB BOX	CH	Crankcase heater (for heating the compressor)
	CT12	AC current sensor
	CT22	
	CT3	
	C100	Capacitor (Electrolysis)
	DCL	DC reactor
	F01	Fuse
	F02	
	F03	
	F04	
	F05	
	F06	
	LEV1	Electronic expansion valve (Main circuit)
	LEV2	Electronic expansion valve (Injection)
	M	Fan motor
	MS	Compressor motor
	R1	Electrical Resistance
	R5	
	SV1	Solenoid valve (Injection circuit)
	SV2	Solenoid valve (Hot-gas circuit)
	THHS	IGBT temperature
	Z21	Function setting connector
	21S4	4-way valve
	63HS	High-pressure sensor
	63H1	High-pressure switch
	63LS	Low-pressure sensor
	72C	Electromagnetic relay (Inverter main circuit)
SUB BOX	TH5-8	Thermistor
	TH12,13	

Inside the control box (front view)



Display setting

Control board display	Control board SW setting *1	
Preset water temperature	SW3-5: ON	SW3-6: OFF
Current water temperature *2	SW3-5: ON	SW3-6: ON
High pressure/Low pressure	SW2-10: OFF	SW3-8: OFF
	SW3-5: OFF	SW3-9: OFF
	SW3-6: OFF	SW3-10: OFF
	SW3-7: OFF	

- *1 Select an item to be displayed by setting the switches.
 *2 The current water temperature will be displayed according to the selection on the preset water temperature display option.
 *3 If an error occurs, a 4-digit error code, from a list of error codes in the table at right will blink on the board and remote controller display. ([Error code] and [Error source address] appear alternately on the remote controller display.)
 *4 Definition of symbols in the "Error reset" column
 ⊗ ... Errors that can be reset regardless of the switch settings
 ○ ... 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"
 × ... Errors that cannot be reset
 — ... Errors that will be automatically reset after the cause of the error is removed
 *5 Power failure can be detected only when the switch setting "Automatic recovery after power failure" on the unit is set to "Disable." (The default setting is "Enable.")
 *6 Depending on the system configuration, the unit may come to an abnormal stop when the communication error lasts for 10 minutes or longer. In this case, the error needs to be reset by setting either SWS1 on the unit (PCB) or remote operation switch.
 *7 This error code will appear when multiple errors occur that are reset in different ways and when one or more of these errors have not been reset.
 This error can be reset by turning off and then back on the unit's power.
 *8 Remove the cause of the error before resetting the error.
Resuming operation without removing the cause may burst the heat exchanger.
 *9 [Error code] and [Detail code] appear alternately.
 Refer to the Installation Manual for detail codes.

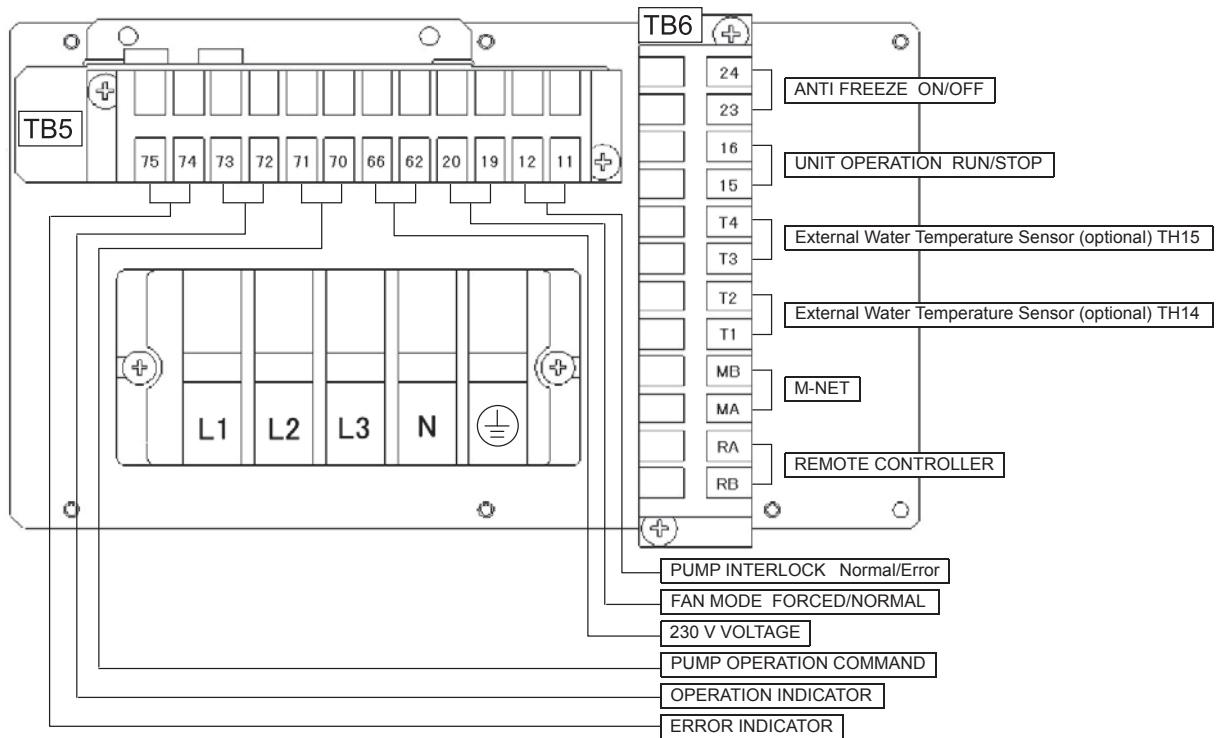
Error Codes

No.	Error code (PCB *3)	Error type	Error reset *4	
			Unit side (PCB) SWS1	Remote controller Operation SW
1	R000	Unreset errors	*7	×
2	R-PO	Power failure	*5	⊗
3	RE 6 1	Discharge temperature fault	○	○
4	Rd5H	Compressor flooding	○	○
5	RF 5R	Water supply cutoff (Flow switch)	○	○
6	RHP 1	High pressure fault	○	○
7	R4 7 1	Open phase	×	×
8	D403	Serial communication error	○	○
9	1 103	Shell temperature fault	○	○
10	1 104	Heat exchanger freeze up	*8	○
11	1303	Vacuum protection fault	○	○
12	4 102	Open phase (T phase)	○	○
13	4 106	Power supply fault	*9	—
14	4 1 15	Power supply frequency fault	×	×
15	4 1 2 1	Active filter fault	⊗	⊗
16	4220,4225	Inverter bus voltage fault	*9	○
17	4230,4235	Inverter overheat protection fault	○	○
18	4240,4245	Inverter overload protection fault	○	○
19	4250,4255	iPM error (inclusive)/overcurrent relay trip	*9	○
20	4260,4265	Cooling fan fault	○	○
21	5 10 1	Discharge temperature thermistor error (TH1 MAIN Circuit)	○	○
22	5 102	Compressor inlet temperature thermistor error (TH2 MAIN Circuit)	○	○
23	5 103	Shell temperature thermistor error (TH3 MAIN Circuit)	○	○
24	5 104	Air-side heat exchanger refrigerant temperature thermistor error (TH4 MAIN Circuit)	○	○
25	5 105	Discharge temperature thermistor error (TH5 SUB Circuit)	○	○
26	5 106	Compressor inlet temperature thermistor error (TH6 SUB Circuit)	○	○
27	5 107	Shell temperature thermistor error (TH7 SUB Circuit)	○	○
28	5 108	Air-side heat exchanger refrigerant temperature thermistor error (TH8 SUB Circuit)	○	○
29	5 109	Outside temperature thermistor error (TH9)	○	○
30	5 1 10	THHS sensor/Circuit fault	*9	○
31	5 1 1 1	Outlet water temperature thermistor error (TH11 MAIN Circuit)	○	○
32	5 1 1 2	Inlet water temperature thermistor error (TH12 SUB Circuit)	○	○
33	5 1 1 3	Outlet water temperature thermistor error (TH13 SUB Circuit)	○	○
34	5 1 1 4,5 1 1 5	External water temperature thermistor error (TH14, TH15)	○	○
35	5 1 1 6	Inlet water temperature thermistor error (TH16 MAIN Circuit)	○	○
36	5 1 1 7	High-pressure sensor fault	○	○
37	5 1 1 8	Low-pressure sensor fault	○	○
38	530 1,5305	ACCT-DCCT sensor fault/Circuit fault	*9	○
39	6500	Communication error between the MAIN and SUB units	—	—
40	6600		×	×
41	6603	Communication error between the MAIN and SUB units (Simple multiple unit control)	—	—
42	6606		—	—
43	6607 *6		—	—
44	6608 *6		—	—
45	6830	Address overlap	×	×
46	683 1	Remote controller signal reception error 1	—(○)	—(○)
47	6832	Remote controller signal transmission error	—(○)	—(○)
48	6833	Remote controller over current	×	×
49	6834	Remote controller signal reception error 2	—(○)	—(○)
50	7 102	Incorrect setting of No.-of-connected-unit	*9	×
51	7 105	Address setting error	×	×
52	7 1 1 3,7 1 1 7	Model setting error	×	×
53	7 1 30	Incompatible combination of units	×	×

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.

External Input/Output

Input type	Dry contact		ON (Close)	OFF (Open)	Terminal block/connector
	(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.	
(b) MODE CHANGE 2	Heating Eco/Heating	The unit will go into operation when the water temperature drops below the temperature setting for "Water Temp Setting C." (Heating ECO mode)	The unit will go into operation when the water temperature drops below the temperature setting for "Water Temp Setting A." (Heating mode)	CN142A 3-4	
(c) PRIORITY MODE	COP/Capacity	The unit will operate in the energy-efficient mode (COP priority mode).	The unit will operate at the maximum capacity setting (Capacity priority mode).	CN142C 2-6	
(d) MODE CHANGE 1	Hot water/Heating	The unit will go into operation when the water temperature drops below the temperature setting for "Water Temp Setting B."	The unit will go into operation when the water temperature drops below the temperature setting for "Water Temp Setting A." (Heating mode)	CN142D 1-5	
(e) ANTI FREEZE	On/Off	The unit will operate in the Anti-Freeze mode (with the target temperature between 25-35°C) when the contact status of (a) "Unit Operation" is "Stop" OR the ON/OFF button on the remote controller is turned off.	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.	TB6 23-24	
(f) FAN MODE	Forced/Normal	The fan will remain in operation after the compressor has stopped (including when the OPERATION status is "STOP").	The fan will stop when the compressor stops.	TB5 19-20	
(g) FLOW SWITCH	Normal/Error	The unit is allowed to operate.	The unit will not operate.	CN142D 2-6	
(h) PUMP INTERLOCK	Normal/Error	The unit is allowed to operate.	The unit will not operate.	TB5 11-12	
(i) 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. (If the maximum capacity setting for item (c) above "Priority mode" is below the setting for the Peak-demand control setting, the unit will operate at whichever capacity is the smaller.)	The unit will operate at or below the maximum capacity setting for either "Capacity Priority Mode" or "COP Priority Mode" that was selected for item (c) "Priority Mode" above.	CN142C 1-4	
Analog					Terminal block/connector
Input type		Action			
(j) WATER TEMP SETTING/CAPACITY CONTROL		Water temperature or capacity control 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. Selection between drain pan output and defrost output can be made using the item code 1051. Note: Use a 4-20 mA signal output device with insulation.			CN421 2(+)-3(-)
(k) EXTERNAL WATER SENSOR (optional)			-	TB6 T1-T2	
(l) EXTERNAL WATER SENSOR (optional)			-	TB6 T3-T4	
Output type	Contact type		Conditions in which the contact closes (turns on)	Conditions in which the contact opens (turns off)	Terminal block/connector
	(m) ERROR INDICATOR	Close/Open	The unit has made an abnormal stop.	During normal operation	
(n) OPERATION INDICATOR	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.	TB5 72-73	
(o) PUMP OPERATION COMMAND	Close/Open	(1) When SW2-8 is set to ON The pump will operate according to the Thermo-ON/OFF status of the unit. (2) When SW2-8 is set to OFF 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	TB5 70-71	
(p) EMERGENCY SIGNAL	Close/Open	Water temperature has dropped below the Booster Heater Operation Water Temperature (TWL1 value)(Item code 1057) and the outside temperature (TAL1 value)(Item code 1058).	Water temperature is at or above "TWL1+2°C" or the outside temperature is at or above "TAL1+2°C".	MAIN circuit CN512 1-3	
(q) DRAIN PAN HEATER SIGNAL/ DEFROST SIGNAL Selects either the drain pan signal or defrost signal by Item code 1056	Close/Open	In case of the defrost signal when item code 1056 is "1", at least one of the circuits is in defrost mode.	In case of the drain pan signal when item code 1056 is "0", the outside temperature is above 1°C or the outside temperature has risen above 3°C after the conditions has been met under which the contact turns on. In case of the defrost signal when item code 1056 is "1", both circuits are not in defrost mode.	MAIN circuit CN512 5-7	
(r) DRAIN PAN HEATER SIGNAL	Close/Open		-	SUB circuit CN512 5-7	
(s) EMERGENCY SIGNAL 2	Close/Open	Water temperature has dropped below the Booster Heater Operation Water Temperature (TWL2 value)(Item code 1059) or the outside temperature (TAL2 value)(Item code 1060)	Water temperature is at or above "TWL2+2°C" or the outside temperature is at or above "TAL2+2°C".	SUB circuit CN512 1-3	
RC/M-NET	REMOTE CONTROLLER	PAR-W21MAA			TB6 RA-RB
	M-NET			-	TB6 MA-MB



6. Troubleshooting

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

[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.		Normal
Water temperature is low.		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.	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.
	Water temperature is high.		High pressure is too high, or low pressure is too low.	Operate the units within the specified pressure range.
			Water flow shortage	Increase the water flow rate.
			Problem with the external devices	Repair the devices.

[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.

Diagnosing Problems Using Error Codes

Error code *1 (PCB *2 RC M-NET)	Error type		Cause (Installation/Setting error)	Cause (Parts problems)	Error reset *3	
					Unit side (PCB)	Remote
					SWS1	Operation SW
R000	Unreset errors		*4 Some of the errors have not been reset.		—	—
R-P0	Power failure		*5 Power failure occurred when the operation switch is switched on.		⊙	⊙
RF5R	Water supply cutoff (Flow switch has been triggered.)		The water flow rate dropped below the flow switch threshold. Water supply cutoff	<ul style="list-style-type: none"> • Open-circuited flow switch • Broken flow switch wiring 	○	○
RHP1	High pressure fault		No water Water supply cutoff	<ul style="list-style-type: none"> • Linear expansion valve fault • High-pressure sensor fault 	○	○
Rd5H	Compressor flooding			<ul style="list-style-type: none"> • Fan motor fault/broken fan motor wiring • Low-pressure sensor fault • Shell temperature thermistor fault • High-pressure sensor fault • Discharge refrigerant temperature thermistor fault • Linear expansion valve fault • Broken electronic expansion valve wiring • Hot gas solenoid valve fault 	○	○
1303	Suction pressure fault		The outside temperature was below the operating range. Sudden frosting or heavy snow clogged up the air-side heat exchanger.	<ul style="list-style-type: none"> • Low-pressure sensor fault • Air-side heat exchanger inlet thermistor fault • Suction refrigerant temperature thermistor fault • LEV' bypass check valve fault • Linear expansion valve fault • Fan motor fault/broken fan motor wiring • Refrigerant deficiency (refrigerant gas leak) 	○	○
1103	Shell temperature fault		The outside temperature was above the upper limit of the operating range. Excessive oil flow	<ul style="list-style-type: none"> • Shell temperature thermistor fault • Linear expansion valve fault 	○	○
5109	Ther- mistor fault	Outside temperature (TH9)		• Broken or shorted thermistor wiring	○	○
5116		Inlet water temperature (TH16 MAIN Circuit)		• Broken or shorted thermistor wiring	○	○
5112		Inlet water temperature (TH12 SUB Circuit)			○	○
5111		Outlet water temperature (TH11 MAIN Circuit)		• Broken or shorted thermistor wiring	○	○
5113		Outlet water temperature (TH13 SUB Circuit)			○	○
5103		Shell temperature (TH3 MAIN Circuit)		• Broken or shorted thermistor wiring	○	○
5107		Shell temperature (TH7 SUB Circuit)			○	○
5101		Discharge temperature (TH1 MAIN Circuit)		• Broken or shorted thermistor wiring	○	○
5105		Discharge temperature (TH5 SUB Circuit)			○	○
5102		Suction temperature (TH2 MAIN Circuit)		• Broken or shorted thermistor wiring	○	○
5106	Suction temperature (TH6 SUB Circuit)			○	○	
5104	Air-side heat exchanger inlet temperature (TH4 MAIN Circuit)		• Broken or shorted thermistor wiring	○	○	
5108	Air-side heat exchanger inlet temperature (TH8 SUB Circuit)			○	○	
5114	External water temperature (TH14)		• Broken or shorted thermistor wiring	○	○	
5115	External water temperature (TH15)		• Broken or shorted thermistor wiring	○	○	
5117	High-pressure sensor fault/high-pressure fault			• Broken or shorted pressure sensor wiring	○	○
5118	Low-pressure sensor fault/low-pressure fault			• Broken or shorted pressure sensor wiring	○	○
7113	Model setting error 1		Dip switches on the PCB were set incorrectly during maintenance.		×	×
7117	Model setting error 2			• Resistor R21 fault (connected to the Main control board)	×	×
4115	Power supply frequency fault		Power supply frequency is a frequency other than 50 Hz or 60 Hz.		×	×
R471	Open phase		There is an open phase.	• Circuit board fault	×	×

Error code *1 (PCB *2 RC M-NET)	Error type		Cause (Installation/Setting error)	Cause (Parts problems)	Error reset *3		
					Unit side (PCB)	Remote	
					SWS1	Operation SW	
4 106 (255)	Power supply fault			• Transmission power supply PCB fault	—	—	
4 121	Active filter fault			• Active filter fault	⊙	⊙	
RC 61 (Preliminary RC 71)	Discharge temperature fault (A discharge refrigerant temperature of 120°C or above is detected for 30 seconds while the compressor is in operation.) (A discharge refrigerant temperature of 125°C or above is detected momentarily while the compressor is in operation.)		No water Abrupt change in water temperature (5K/min. or greater) Pump failure	• High-pressure sensor fault • Linear expansion valve fault (Main circuit LEV, injection LEV) • Injection solenoid valve fault • Refrigerant deficiency (refrigerant gas leak)	○	○	
1104	Heat exchanger freeze up *6		Drop in water flow or water supply cutoff during the defrost cycle Water temperature drop during defrost cycle	• 4-way valve switching failure	○	○	
4250 4255 (101)	Inverter error	Electric current related errors during operation	IPM error	• 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	○	○	
4250 4255 (102)			ACCT overcurrent	• INV board fault • Ground fault of the compressor • Coil problem • IPM error (loose terminal screws, cracked due to swelling)	○	○	
4250 4255 (103)			DCCT overcurrent			○	○
4250 4255 (107)			Overcurrent relay trip (effective value) (During operation)			○	○
4250 4255 (106)			Overcurrent relay trip (momentary value) (During operation)			○	○
4250 4255 (104)			Short-circuited IPM/ground fault (During operation)		• Ground fault of the compressor • IPM error (loose terminal screws, cracked due to swelling)	○	○
4250 4255 (105)			Overcurrent error due to a short-circuited (During operation)	Inter-phase voltage drop (Inter-phase voltage at or below 180 V)	• Ground fault of the compressor • Shorted output wiring	○	○
4250 4255 (101)	Current related problems at start up		IPM error (At startup)	• 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	○	○	
4250 4255 (102)			ACCT overcurrent (At startup)	• INV board fault • Ground fault of the compressor • Coil problem • IPM error (loose terminal screws, cracked due to swelling)	○	○	
4250 4255 (103)			DCCT overcurrent (At startup)			○	○
4250 4255 (107)			Overcurrent relay trip (effective value) (At startup)			○	○
4250 4255 (106)			Overcurrent relay trip (momentary value) (At startup)			○	○

Error code *1 (PCB *2 RC M-NET)	Error type			Cause (Installation/Setting error)	Cause (Parts problems)	Error reset *3	
						Unit side (PCB)	Remote
						SWS1	Operation SW
4220 4225 (100)	Inverter error	Voltage related problems during operation	Bus voltage drop protection	Momentary power failure/power failure Power supply voltage drop (Inter-phase voltage is 180 V or below.) Voltage drop	<ul style="list-style-type: none"> INV board CNDC2 wiring fault INV board fault 72C fault Diode stack failure 	○	○
4220 4225 (109)			Bus voltage rise protection	Incorrect power supply voltage	<ul style="list-style-type: none"> INV board fault 	○	○
4220 4225 (111)			Logic error	Malfunction due to external noise interference <ul style="list-style-type: none"> Faulty grounding Improper transmission and external wiring installation (Shielded cable is not used.) Low-voltage signal wire and high-voltage wire are in contact. (Placing the signal wire and power wire in the same conduit) 	<ul style="list-style-type: none"> INV board fault 	○	○
4220 4225 (131)			Voltage meter error at start up (Bus voltage drop protection at start up (detected by the Main unit side))	Power supply voltage drop	<ul style="list-style-type: none"> PCB fault 	○	○
4230 4235			Heatsink fault (Heatsink overheat protection)	Power supply voltage drop (Inter-phase voltage is 180 V or below.) Clogged heatsink cooling air passage	<ul style="list-style-type: none"> Fan motor fault INV board fan output fault THHS sensor fault IPM error (loose terminal screws, cracked due to swelling) 	○	○
4240 4245			Overload protection	Short-cycling of air (reduced air flow) Clogged heatsink cooling air passage Power supply voltage drop (Inter-phase voltage is 180 V or below.)	<ul style="list-style-type: none"> THHS sensor fault Current sensor fault INV board fan output fault INV circuit fault Compressor fault 	○	○
5301 5305 (115)			ACCT sensor fault		<ul style="list-style-type: none"> INV board fault Ground fault of the compressor and IPM error 	○	○
5301 5305 (116)			DCCT sensor		<ul style="list-style-type: none"> Poor contact at the INV board connector CNCT Poor contact at the INV board connector DCCT Ground fault of the compressor and IPM error 	○	○
5301 5305 (117)			ACCT sensor/circuit fault		<ul style="list-style-type: none"> Poor contact at the INV board connector CNCT2 (ACCT) ACCT sensor fault 	○	○
5301 5305 (118)			DCCT sensor/circuit fault		<ul style="list-style-type: none"> Poor contact at the INV board connector CNCT Poor contact at the INV board connector DCCT DCCT sensor fault INV board fault 	○	○
5301 5305 (119)			Open-circuited IPM/loose ACCT sensor		<ul style="list-style-type: none"> Disconnected ACCT sensor (CNCT2) ACCT sensor fault Broken compressor wiring INV circuit fault (IPM error etc.) 	○	○
5301 5305 (120)			Faulty wiring		<ul style="list-style-type: none"> ACCT sensor is connected in the wrong phase. ACCT sensor is connected in the wrong orientation. 	○	○
5110 (B1) (05)			THHS sensor/circuit fault		<ul style="list-style-type: none"> THHS sensor contact failure THHS sensor fault INV board fault 	○	○
0403 (B1) (05)			Serial communication error		<ul style="list-style-type: none"> Communication error between control board and INV board (noise interference, broken wiring) 	○	○
—			IPM system error	INV board switch setting error	<ul style="list-style-type: none"> Wiring or connector connection between connectors on IPM-driven power supply circuit INV board fault 	○	○

Error code *1 (PCB *2 RC M-NET)	Error type		Cause (Installation/Setting error)	Cause (Parts problems)	Error reset *3	
					Unit side (PCB)	Remote
					SWS1	Operation SW
6830	Remote controller error (incl. remote controller wiring fault)	Address overlap	There are two or more of the same address.		×	×
7105		Non-consecutive address, system error	Address setting error (Non-consecutive address)		×	×
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	—	—
6833		Remote controller over current	Remote controller cable is short		×	×
6834		Remote controller signal reception error 2	Communication error due to external noise interference	• Main control board communication circuit fault	—	—
7105	Multiple system error	Address setting error	Address setting error (Non-consecutive address)		×	×
7130		Incompatible combination of units	Different types of units are connected to the same system.		×	×
7102		No.-of-connected-unit setting is incorrect.	No.-of-connected-unit setting is incorrect (Main unit).		×	×
4126 1001	Analog input error (Control board (MAIN) CN421)	Analog input type fault Set Item code 21	• Broken or Open 4-20mA signal output device wiring (CN421)	○	○	
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		*7		—	—	

*1: The codes in the parentheses in the "Error code" column indicate error detail codes.

*2: If an error occurs, error codes shown above will appear in the 4-digit digital display on the PCB.

*3: Definition of symbols in the "Error reset" column.

⊙: Errors that can be reset regardless of the switch settings

○: 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"

×: Errors that cannot be reset

—: Errors that will be automatically cancelled once its cause is removed

*4: 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.")

*5: Depending on the system configuration, if communication error lasts for 10 minutes or longer, units will make an abnormal stop.
This error can be reset by turning off and then back on the unit's power.

*6: This error code will appear when multiple errors occur that are reset in different ways and when one or more of these errors have not been reset. This error can be reset by turning off and then back on the unit's power.

*7: Before resetting this error, remove its causes. Resuming operation without removing the causes of heat exchanger freeze up will cause heat exchanger damage.

[3] Calling for Service

If the problem cannot be solved by following the instructions provided in the table on the previous pages, 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 "CAHV" and is found on the lower part of the left side 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.

7. Operating the Unit

[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. (The compressor will not be warmed up if initial settings have not been made. Make sure to make initial settings.)
4. Switch on the Run/Stop switch that controls the unit on the on-site control panel.

[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 10 minutes. If the unit does not start when the ON/OFF switch is turned on, leave the switch turned on for 10 minutes. The unit will automatically start up within 10 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)

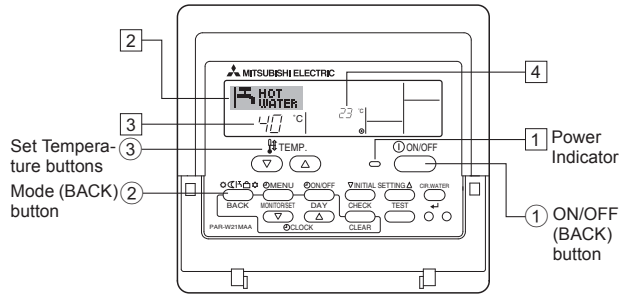
Refer to the following pages for how to use the remote controller.

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 outside 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” above.
- If the main power was turned off for six days or longer, make sure that the clock on the unit is correct.

[3] Using the Remote Controller

<1> Starting and Stopping Operation and Changing the Operation Mode



To Start Operation

1. Press the ON/OFF (BACK) button ①.
The power indicator ④ and the display will light up.

To Stop Operation

1. Press the ON/OFF (BACK) button ① while the unit is in operation.
The power indicator ④ and the display will light off.
The remote controller will remember the last mode and temperature settings when turned off.

To select the Mode

1. With the power turned on, press the Mode (BACK) button ② until the desired mode appears.
 - Each press changes the operation mode in the following sequence (see notes *1 and *2 below):
Heating→Heating ECO→Hot water→Anti-freeze→Back to Heating.
The currently selected mode will appear in the area labeled ②.

*1 The available modes vary depending on the model.

*2 Refer to section [4] "Function Settings" [4]-2. (2) for how to change the settings for a specific function.

<2> Setting the Water Temperature

The current water temperature will appear in the area labeled [3].

How to Change the Temperature Setting

- To lower the water temperature setting
Press the ∇ Set Temperature button [3].
- To raise the water temperature setting
Press the Δ Set Temperature button [3].
 - Each press increases or decreases the temperature by 1 °C (1 °F).
The current setting will appear in the area labeled [3] in the figure on the previous page.
 - The settable ranges for the "Hot Water" and "Heating" modes are as follows. *1, *2

Hot Water	Heating
25 °C - 70 °C 77 °F - 158 °F *3	25 °C - 55 °C 77 °F - 131 °F *3

Note:

- *1 Available ranges vary depending on the type of unit connected.
- *2 If the temperature ranges are restricted from the remote controller, the settable ranges may be narrower than shown above. If an attempt is made to set a value outside of the restricted range, the display will show a message indicating that the range is currently restricted. For information about how to set and clear the restrictions, refer to section [4], item [4]-2. (3).
- *3 Temperatures can be displayed in Celsius or Fahrenheit (factory setting: Fahrenheit). For information about how to select °C or °F, refer to section [4], item [4]-4. (1).
- *4 If the target water temperature setting for the Heating mode has been set to a temperature outside of the remote controller's setting range (above 55°C) from the circuit board, any signal from the remote controller to change the temperature setting will be ignored. If this happens, disconnect the remote controller, set the target temperature to 55°C or below from the circuit board, reconnect the remote controller, and then change the temperature setting from the remote controller.

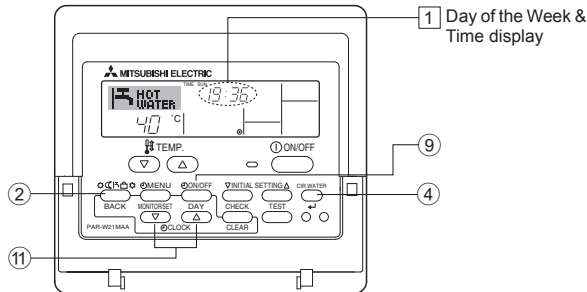
- Water temperature can be controlled based on the inlet or outlet temperature.
- The water temperature range that can be displayed is between 0 °C to 100 °C. Outside this range, the display flashes either 0 °C or 100 °C.

<3> Setting the Day of the Week and Time

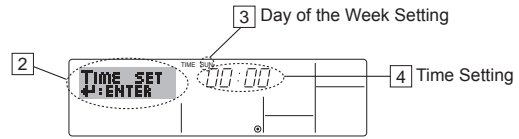
Use this screen to set and change the current day of the week and time settings.

Note:

The day and time will not appear if the clock display is disabled from the remote controller on the Function Selection menu.



How to Set the Day of the Week and Time



- Press the ∇ or Δ Set Time button [11] to bring up **TIME SET** in the area labeled [2].
- Press the TIMER ON/OFF (SET DAY) button [9] to set the day (labeled [3] in the figure).
 - Each press advances the day.
- Press the Set Time button [11] as necessary to set the time.
 - When the button is held down, the time (at [4]) will increment first in one-minute intervals, then in ten-minute intervals, and then in one-hour intervals.
- After making the appropriate settings in Steps 2 and 3, press the CIR.WATER \leftarrow button [4] to save the values.

Note:

The changes will be lost unless the Mode (BACK) button [2] is pressed before the CIR.WATER \leftarrow button [4] is pressed.

- Press the Mode (BACK) button [2] to complete the setting procedure and return the display to the normal operation screen. The new day and time will appear in the area labeled [3].

<4> Using the Timer

Three types of timers are available as follows: ① Weekly timer, ② Simple timer, or ③ Auto-Off timer. The timer type can be selected from the remote controller on the Function Selection menu.

For information about how to use the Function Selection menu on the remote controller, refer to section [4], item [4]-3. (3).

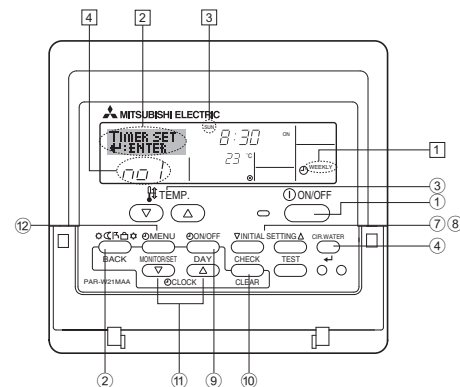
Using the Weekly Timer

- The weekly timer can be used to schedule up to six events for each day of the week.
 - Each operation event can consist of any of the following: ON/OFF time together with a temperature setting, ON/OFF time only, or temperature setting only.
 - When the timer reaches the preset time, the schedule event will take place.
- The time can be set to the nearest minute.

Note:

- *1 The Weekly, Simple, and Auto-Off timers cannot be used concurrently.
- *2 The weekly timer will not operate when any of the following conditions is met.
The timer is off; the system is in error; a test run is in progress; the remote controller is performing self-check or remote controller check; the timer, function, day, or time is being set. If the ON/OFF status and/or the temperature setting is centrally controlled, their settings cannot be changed according to a schedule that was set from the remote controller.

Operation No.



How to Set the Weekly Timer

- On the Normal Operation screen, make sure that the weekly timer icon **[1]** is displayed.
- Press the TIMER MENU button **[2]**, so that the "Set Up" appears on the screen **[2]**. (Each press toggles between "Set Up" and "Monitor".)
- Press the TIMER ON/OFF (SET DAY) button **[9]** to set the day. Each press advances the day, which appears in the area labeled **[3]**.
- Press the **[▽]** or **[△]** INITIAL SETTING button **(7)** or **(8)** to select a desired operation pattern number (1 through 6) **[4]**.
 - * (The remote-controller display on the previous page shows how the display would appear if operation No. 1 for Sunday were set to the values shown below.)

Setup Matrix

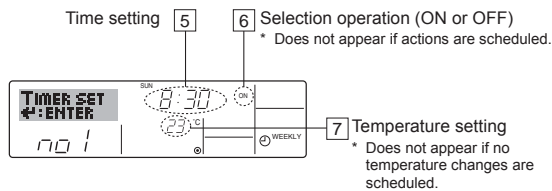
Op No.	Sunday	Monday	...	Saturday
No. 1	<ul style="list-style-type: none"> 8:30 ON 23 °C (73 °F) 			
No. 2	<ul style="list-style-type: none"> 10:00 OFF 	<ul style="list-style-type: none"> 10:00 OFF 	<ul style="list-style-type: none"> 10:00 OFF 	<ul style="list-style-type: none"> 10:00 OFF
...				
No. 6				

<Operation 1 settings for Sunday>
Start the unit at 8:30, with the temperature set to 23 °C (73 °F).

<Operation 2 settings for every day>
Turn off the unit at 10:00.

Note:

By selecting the day to "Sun Mon Tues Wed Thurs Fri Sat", the same action can be carried out at the same time every day.
(Example: In Operation No. 2 above, the unit is scheduled to be turned off at 10:00 every day.)



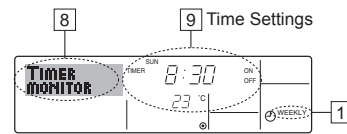
- Press the Set Time button **[11]** to set the time **[5]**.
 - * Time will first increment in one-minute intervals, then in ten-minute intervals, and then in one-hour intervals.
- Press the ON/OFF button **[1]** to select the desired operation (ON or OFF), at **[6]**.
 - * Each press toggles through the following options:
No display (no setting) → "ON" → "OFF"
- Press the Set Temperature button **[3]** to set the temperature **[7]**.
 - * Each press:
No display (no setting) ↔ 5 (41) ↔ 6 (43) ↔ ... ↔ 89 (192) ↔ 90 (194) ↔ No display. (Available temperature range: The temperature display range is between 5 °C (41 °F) and 90 °C (194 °F). The actual range which the temperature can be controlled will vary according to the type of the connected unit.)
- To clear the current values for the selected operation, press and quickly release the CHECK (CLEAR) button **[10]** once.
 - * The displayed time setting will change to "—:—", and the ON/OFF and temperature settings will disappear.
(To clear all weekly timer settings at once, hold down the CHECK (CLEAR) button **[10]** for two seconds or more. The display will begin flashing, indicating that all settings have been cleared.)
- After making the appropriate settings in Steps 5, 6, and 7, press the CIR.WATER **[4]** button to save the values.

Note:

The changes will not be saved unless the Mode (BACK) button **[2]** is pressed before the CIR.WATER **[4]** button is pressed.
If two or more different operation patterns have been scheduled for exactly the same time, only the operation with the highest Operation No. will be carried out.

- Repeat Steps 3 through 9 as necessary to add more settings.
- Press the Mode (BACK) button **[2]** to return to complete the setting procedure and return to the Normal Operation screen.
- To activate the timer, press the TIMER ON/OFF button **[9]**, so that the "Timer Off" icon **[10]** disappears.
 - * If no timer settings have been made, the "Timer Off" icon will flash on the screen.

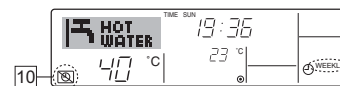
How to View the Weekly Timer Settings



- Make sure that "WEEKLY" is displayed **[1]**.
- Press the TIMER MENU button **[2]** so that "Monitor" appears on the screen **[8]**.
- Press the TIMER ON/OFF (SET DAY) button **[9]** to select the desired day.
- Press the **[▽]** or **[△]** INITIAL SETTING **(7)** or **(8)** to toggle through the settings **[9]**.
 - * Each press will advance the display to the next timer operation in order of time.
- To close the monitor display and return to the Normal Operation screen, press the Mode (BACK) button **[2]**.

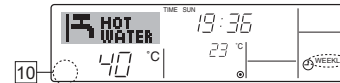
To Turn Off the Weekly Timer

Press the TIMER ON/OFF button **[9]** so that "Timer Off" appears at **[10]**.



To Turn On the Weekly Timer

Press the TIMER ON/OFF button **[9]** so that the "Timer Off" icon **[10]** disappears.

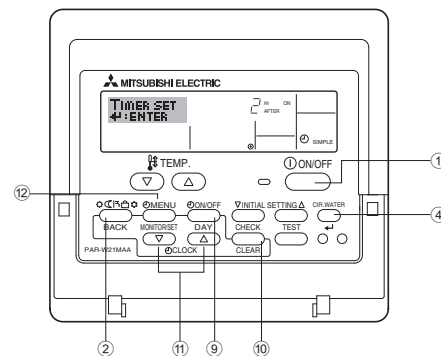


Using the Simple Timer

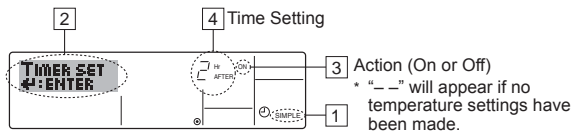
- The simple timer can be set in any of the following three ways.
 - Start time only: The unit starts when the set time has elapsed.
 - Stop time only: The unit stops when the set time has elapsed.
 - Start & stop times: The unit starts and stops at the respective elapsed times.
- The simple timer can be set to start and stop the unit only once each within a 72-hour period.
The time setting can be made in one-hour increments.

Note:

- *1 Weekly, Simple, and AUTO-off timers cannot be used concurrently.
- *2 The simple timer will not operate when any of the following conditions is met. The timer is disabled; the system is in error; a test run is in progress; the remote controller is performing self-check or remote controller check; or a function or the timer is being set. If the ON/OFF status and/or the temperature setting is centrally controlled, their settings cannot be changed according to the schedule that was set from the remote controller.



How to Set the Simple Timer



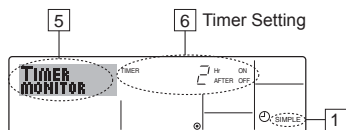
- On the normal operation screen, make sure that the simple timer icon is displayed (1). If anything other than "SIMPLE" is displayed, select the simple timer by referring to section 4.4]-3(3).
- Press the TIMER MENU button (2), so that "Set Up" appears (2). (Each press toggles between "Set Up" and "Monitor".)
- Press the ON/OFF button (1) to display the current ON or OFF setting. Each press toggles between the time remaining until the unit turns on or off. ("ON" or "OFF" will appear in the area labeled 3.)
 - ON timer The unit will start operation when the specified hours have elapsed.
 - OFF timer The unit will stop operation when the specified hours have elapsed.
- With "ON" or "OFF" displayed on the screen (3), press the Set Time button (1) to set the hours until the unit turns on or off (4).
 - Available Range: 1 to 72 hours
- To set both the ON and OFF times, repeat Steps 3 and 4.
 - * Note that ON and OFF times cannot be set to the same value.
- To clear the current ON or OFF setting: Display the ON or OFF setting (see step 3) and then press the CHECK (CLEAR) button (10) so that "-" appears where the remaining time was. To use only the ON-timer or the OFF-timer, make sure that the time setting for the timer that will not be used is set to "-".
- After completing steps 3 through 6 above, press the CIR.WATER ← button (4) to save the value.

Note:

The changes will not be saved unless the Mode (BACK) button (2) is pressed before the CIR.WATER ← button (4) is pressed.

- Press the Mode (BACK) button (2) to return to the Normal Operation screen.
- Press the TIMER ON/OFF button (9) to start the timer countdown. When the timer is running, the remaining time should appear on the screen. **Make sure that the remaining time is displayed on the screen and that it is correct.**

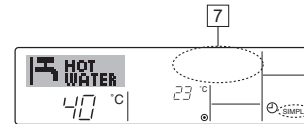
Viewing the Current Simple Timer Settings



- Make sure that "SIMPLE" is displayed (1).
- Press the TIMER MENU button (2), so that "Monitor" appears on the screen (5).
 - If the ON or OFF simple timer is running, the current timer value will appear in the area labeled 6.
 - If ON and OFF values have both been set, the two values will appear alternately.
- Press the Mode (BACK) button (2) to close the monitor display and return to the Normal Operation screen.

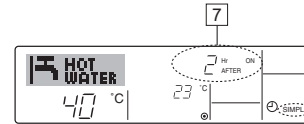
To Turn Off the Simple Timer

Press the TIMER ON/OFF button (9) so that the timer setting no longer appears on the screen (at 7).



To Turn On the Simple Timer

Press the TIMER ON/OFF button (9) so that the timer setting appears in the area labeled 7.

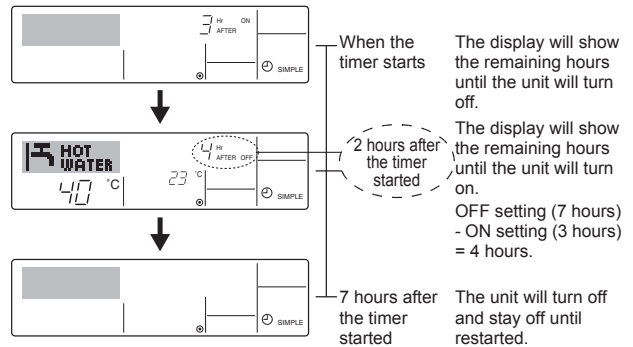


Examples

The two examples below show how the screen will appear when both the ON- and Off- timers have been set.

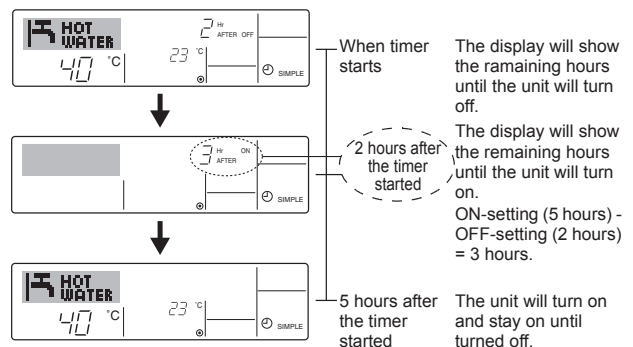
Example 1:

The ON-timer is set to 3 hours, and the OFF-timer is set to 7 hours.



Example 2:

The ON-timer is set to 5 hours, and the OFF-timer is set to 2 hours.

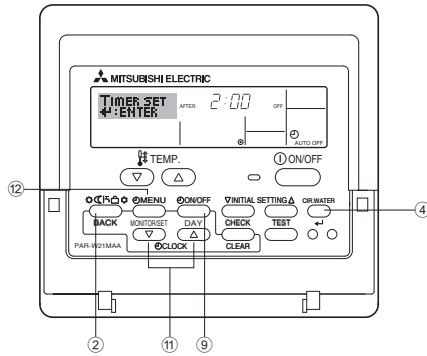


Using the Auto-Off Timer

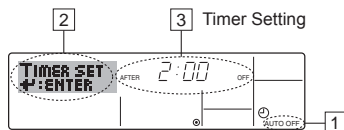
1. This timer begins countdown when the unit starts, and shuts the unit off when the set time has elapsed.
2. Available settings range from 30 minutes to 4 hours in 30-minute intervals.

Note:

- *1 Weekly Timer/Simple Timer/Auto Off Timer cannot be used at the same time.
- *2 The Auto Off timer will not operate when any of the following conditions is in effect.
The timer is off; the system is in error; a test run is in progress; the remote controller is performing self-check or remote controller check; or a function or the timer is being set. If the ON/OFF status and/or the temperature setting is centrally controlled, their settings cannot be changed according to the schedule that was set from the remote controller.



How to Set the Auto-Off TIMER



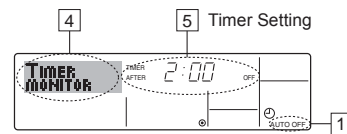
1. On the Normal Operation screen, make sure that "AUTO OFF" is displayed (1).
If anything other than "AUTO OFF" is displayed, select the Auto-Off timer by referring to section 4.[4]-3(3).
2. Press and hold the TIMER MENU button (2) for 3 seconds, so that "Set Up" appears on the screen (2).
(Each press toggles between "Set Up" and "Monitor".)
3. Press the Set Time button (3) to set the OFF time (3).
4. Press the CIR.WATER ← button (4) to save the setting.

Note:

The changes will not be saved unless the Mode (BACK) button (2) is pressed before the CIR.WATER ← button (4) is pressed.

5. Press the Mode (BACK) button (2) to complete the setting procedure and return to the Normal Operation screen.
6. If the unit is already running, the timer will start counting down immediately. **Make sure that the remaining time is displayed on the screen and that it is correct.**

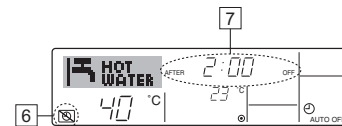
Checking the Current Auto-Off Timer Setting



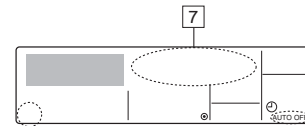
1. Make sure that "AUTO OFF" is displayed (1).
2. Press and hold the TIMER MENU button (2) for 3 seconds so that "Monitor" appears (4).
 - The time remaining until the unit will turn off will appear in the area labeled (5).
3. To close the monitor display and return to the Normal Operation screen, press the Mode (BACK) button (2).

To Turn Off the Auto-Off Timer

- Press and hold the TIMER ON/OFF button (9) for 3 seconds so that "Timer Off" appears (6) and the timer value (7) disappears.

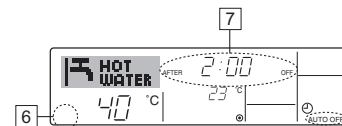


- Alternatively, turn off the unit itself. The timer value (7) will disappear from the screen.



To Turn On the Auto-Off Timer

- Press and hold the TIMER ON/OFF button (9) for 3 seconds. The "Timer Off" will disappear (6), and the timer setting will appear on the display (7).
- Alternatively, turn on the unit. The timer value will appear in the area labeled (7).



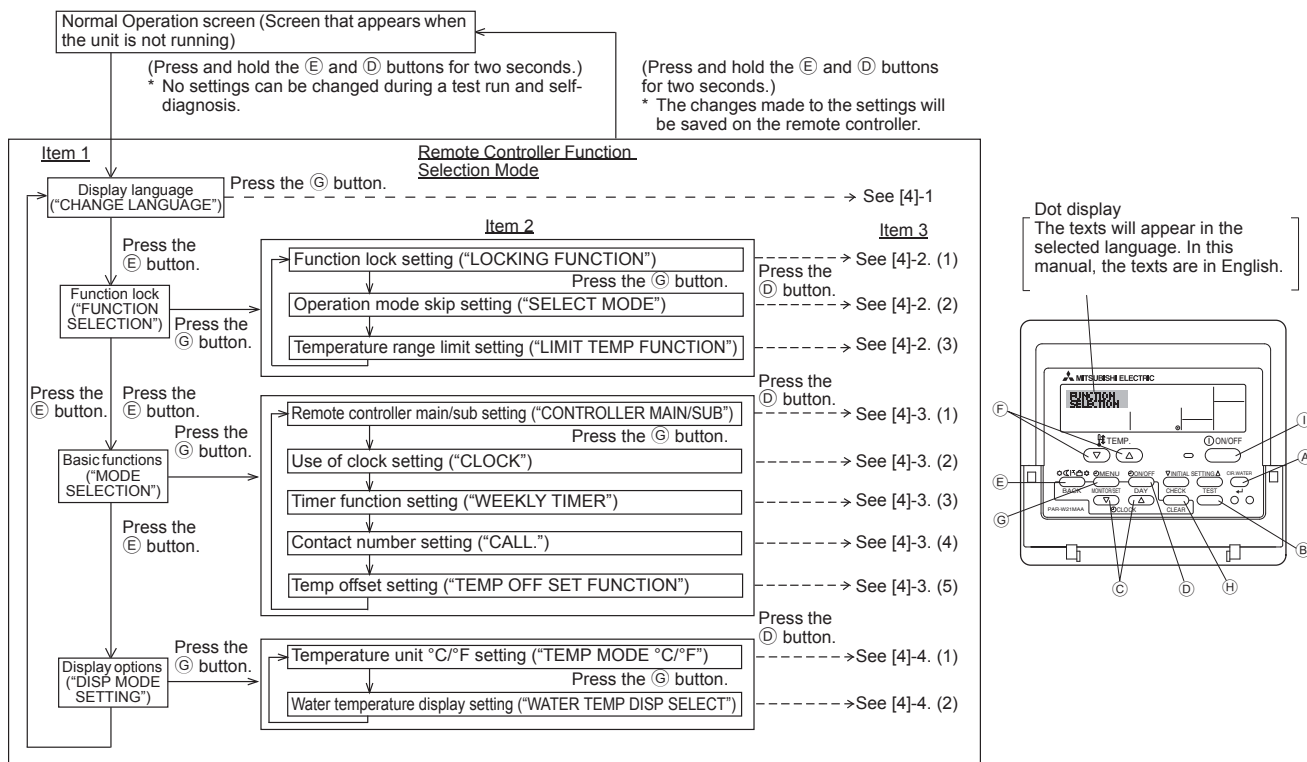
[4] Function Settings

The settings for the following remote controller functions can be changed using the remote controller function selection mode. Change the settings as necessary.

Item 1	Item 2	Item 3 (Setting content)
1. Display language setting ("CHANGE LANGUAGE")	Display language selection	• Use to select the display language from available languages.
2. Function lock settings ("FUNCTION SELECTION")	(1) Function lock ("LOCKING FUNCTION")	• Use to lock functions.
	(2) Operation mode skip setting ("SELECT MODE")	• Use to show or hide specific modes.
	(3) Temperature range limit setting ("LIMIT TEMP FUNCTION")	• Use to restrict the temperature range.
3. Basic function settings ("MODE SELECTION")	(1) Remote controller main/sub setting ("CONTROLLER MAIN/SUB")	• Use to designate the remote controller as Main or Sub. *When two remote controllers are connected to one group, one controller must be set to sub.
	(2) Use of clock setting ("CLOCK")	• Use to enable or disable the clock.
	(3) Timer function setting ("WEEKLY TIMER")	• Use to select a timer type.
	(4) Contact number setting ("CALL.")	• Use to show or hide, or enter the emergency contact number.
	(5) Temp offset setting ("TEMP OFF SET FUNCTION")	• Use to show or hide the offset value.
4. Display options ("DISP MODE SETTING")	(1) Temperature unit °C/°F setting ("TEMP MODE °C/°F")	• Use to show or hide the temperature unit (°C or °F).
	(2) Water temperature display setting ("WATER TEMP DISP SELECT")	• Use to show or hide the water temperature.

Function setting flowchart

[1] Stop the unit and go into the remote controller function selection mode. → [2] Select from item 1. → [3] Select from item 2. → [4] Make the setting. → [5] Return to the Normal Operation screen.



Settings details

[4]-1. Display language setting

The display language can be selected from the languages listed below.

- Press the [⏏ MENU] button to change the language.
 - English (GB), ② German (D), ③ Spanish (E), ④ Russian (RU), ⑤ Italian (I), ⑥ French (F), ⑦ Swedish (SW)

[4]-2. Function lock settings

(1) Function lock

- Press the [⏏ ON/OFF] button to toggle through the following options.
 - no1: All buttons except the [⏏ ON/OFF] button will be locked.
 - no2: All buttons will be locked.
 - OFF (Default): No buttons will be locked.
- * Press and hold the [CIR.WATER] and [⏏ ON/OFF] buttons simultaneously for two seconds on the Normal Operation screen to enable the button-lock function.

(2) Operation mode skip setting

The following modes can be made available for selection or can be hidden.

- Press the [⏏ ON/OFF] button to toggle through the following options.
 - Heating mode
 - Heating ECO mode
 - Hot Water mode
 - Anti-freeze mode
 - Cooling mode
 - OFF (Default): All modes will be available for selection.
- * The mode that is not supported on the connected unit will not be available, even if the mode is available for selection on the display.

(3) Temperature range limit setting

The temperature range for the following modes can be restricted. Once the range has been restricted, the preset temperature can only be set to a value within the restricted range.

- Press the [⏏ ON/OFF] button to toggle through the following options.
 - LIMIT TEMP HEATING MODE
 - LIMIT TEMP HOT WATER MODE
 - LIMIT TEMP ANTI-FREEZE MODE
 - LIMIT TEMP COOLING MODE
 - OFF (Default): The temperature ranges are not active.
- To increase or decrease the temperature, press the [TEMP. ⏏] or [TEMP. ⏏] button.
- Settable range

Hot Water mode	:	Lower limit:	25 ~70 °C (77 ~158 °F)
		Upper limit:	70 ~25 °C (158 ~ 77 °F)
Heating mode	:	Lower limit:	25 ~55 °C (77 ~131 °F)
		Upper limit:	55 ~25 °C (131 ~ 77 °F)

- * The settable range varies depending on the type of unit to be connected.

[4]-3. Basic functions

(1) Remote controller main/sub setting

- Press the [⏏ ON/OFF] button ① to toggle between the following options.
 - Main The controller will be designated as the main controller.
 - Sub The controller will be designated as the sub controller.

(2) Use of clock setting

- Press the [⏏ ON/OFF] button ① to toggle between the following options.
 - ON The clock function.
 - OFF The clock function.

(3) Timer function setting

- Press the [⏏ ON/OFF] button ① to toggle through the following options.
 - WEEKLY TIMER (Default)
 - AUTO OFF TIMER
 - SIMPLE TIMER
 - TIMER MODE OFF
- * When the use of clock setting is set to OFF, the "WEEKLY TIMER" cannot be used.

(4) Contact number setting

- Press the [⏏ ON/OFF] button ① to toggle through the following options.
 - CALL OFF The contact number will not be displayed when a problem occurs.
 - CALL ***** The contact number will be displayed when a problem occurs.
CALL_ Use this option to enter the contact number.
- Setting the contact number
To set the contact number, follow the following procedures.
Press the [TEMP. ⏏] or [TEMP. ⏏] button ① to move the cursor to the right (left). Press the [CLOCK ⏏] or [CLOCK ⏏] button ② to set the contact number.

(5) Temp offset setting

- Press the [⏏ ON/OFF] button ① to toggle between the following options.
 - ON The offset value will be displayed under the water temperature initial setting mode.
 - OFF The offset value will not be displayed.

[4]-4. Display options

(1) Temperature unit °C/°F setting

- Press the [⏏ ON/OFF] button ① to toggle between the following options.
 - °C Celcius
 - °F Fahrenheit

(2) Water temperature display setting

- Press the [⏏ ON/OFF] button ① to toggle between the following options.
 - ON The water temperature will be displayed.
 - OFF The water temperature will not be displayed.

[5] Using the Unit in Sub-freezing or Snowy Conditions

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 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.

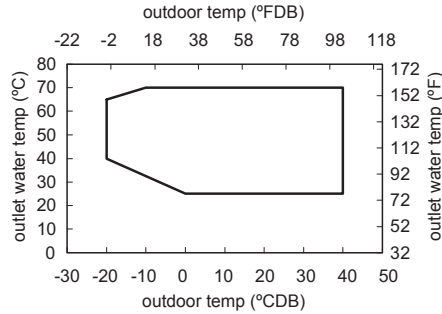
In areas where temperature drops to freezing, use an anti-freeze circuit and leave the main power turned on to prevent the water in the water circuit from freezing and damaging the unit or causing water leakage and resultant damage to the furnishings.

- Remove the snow off the unit before switching on the ON/OFF switch.
- In areas where the outside air 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 outside temperature 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*.
(* A function that automatically operates the water circulation pump to prevent the water in the circuit from freezing when the water temperature drops.)

8. Main Specifications

SPECIFICATIONS			
Model		CAHV-P500YB-HPB (-BS)	
Power source		3-phase 4-wire 380-400-415 V 50 Hz	
Capacity *1		kW	45.0
		kcal/h	38700
		Btu/h	153540
	Power input	kW	12.9
	Current input	A	21.8-20.7-19.9
	COP (kW/kW)		3.49
Capacity *2		kW	45.0
		kcal/h	38700
		Btu/h	153540
	Power input	kW	25.6
	Current input	A	43.2-41.0-39.5
	COP (kW/kW)		1.76
Maximum current input *3		A	57.8-54.9-52.9
Water pressure drop *1		12.9 kPa (1.87 psi)	
Temperature range *4	Outlet water temperature		25-70°C 77-158°F
	Outdoor temperature	D.B.	-20-40°C -4-104°F
Circulating water volume range		7.5 m ³ /h-15.0 m ³ /h	
Sound pressure level (measured 1 m below the unit in an anechoic room) *1		dB (A)	59
Sound pressure level (measured 1 m below the unit in an anechoic room) *3		dB (A)	63
Water pipe diameter and type	Inlet	mm (in)	38.1 (Rc 1 1/2"), screw pipe
	Outlet	mm (in)	38.1 (Rc 1 1/2"), screw pipe
External finish		Acrylic painted steel sheet <Munsell 5Y 8/1 or similar>	
External dimensions H x W x D		mm in	1710 (1650 not including legs) x 1978 x 759 67.3 (65.0 not including legs) x 77.9 x 29.9
Net weight		kg (lb)	511 (1127)
Accessories		Y-strainer Rc 1 1/2	
Design pressure	R407C	MPa	3.85
	Water	MPa	1.0
Drawing number	Wiring	KC94R746	
	External appearance	KC94R745	
Heat exchanger	Water-side	Copper brazed stainless steel sheet	
	Air-side	Plate fins and copper tubes	
Compressor	Type	Inverter scroll hermetic compressor	
	Manufacturer	MITSUBISHI ELECTRIC CORPORATION	
	Starting method	Inverter	
	Motor output	kW	7.5 x 2
	Case heater	kW	0.045 X 2
	Lubricant	MEL 32	
Fan	Air flow rate	m ³ /min	185 x 2
		L/s	3083 x 2
		cfm	6532 x 2
	External static pressure *5	60 Pa (6.1 mm H ₂ O)	
	Type and quantity	Propeller fan x 2	
	Control and driving mechanism	Inverter control, direct driven by motor	
Motor output	kW	0.46 x 2	
HIC (Heat inter-changer) circuit		Copper pipe	
Protection devices	High pressure	High-pressure sensor and switch set at 3.85 MPa (643 psi)	
	Inverter circuit	Overheat and overcurrent protection	
	Compressor	Overheat protection	
	Fan motor	Thermal switch	
Defrosting method		Auto-defrost mode (Reversed refrigerant cycle)	
Refrigerant	Type and factory charge	kg	R407C, 5.5 kg x 2
	Flow and temperature control	LEV and HIC circuit	

- *1 Under normal heating conditions at the outdoor temperature of 7°CDB/6°CWB (44.6°FDB/42.8°FWB), the outlet water temperature of 45°C (113°F), and the inlet water temperature of 40°C (104°F)
- *2 Under normal heating conditions at the outdoor temperature of 7°CDB/6°CWB (44.6°FDB/42.8°FWB) and the outlet water temperature of 70°C (158°F)
- *3 Under normal heating conditions at the outdoor temperature of 7°CDB/6°CWB (44.6°FDB/42.8°FWB) when the unit is set to the "Capacity Priority" mode through the dry NC-contact
- *4



Outdoor temp -20°CDB/ Outlet water temp 40~65°C
 (Outdoor temp -4°FDB/ Outlet water temp 104°F~149°F)
 Outdoor temp -10°CDB/ Outlet water temp 33°C~70°C
 (Outdoor temp 14°FDB/ Outlet water temp 91°F~158°F)
 Outdoor temp 0°CDB/ Outlet water temp 25°C~70°C
 (Outdoor temp 32°FDB/ Outlet water temp 77°F~158°F)

*5 Dip SW on the unit control board needs to be changed to the value more than 10 Pa.

- Due to continuing improvements, specifications may be subject to change without notice.
- Do not use steel pipes as water pipes.
- Keep the water circulated at all times. Blow the water out of the pipes if the unit will not be used for an extended period of time.
- Do not use ground water or well water.
- Do not install the unit in an environment where the wet bulb temperature exceeds 32°C.
- The water circuit must be a closed circuit.
- There is a possibility that the unit may abnormally stop when it operates outside its operating range. Provide backup (ex. boiler start with error display output signal (blue CN511 1-3)) for abnormal stop.



Unit converter

Kcal = kW x 860

BTU/h = kW x 3,412

cfm = m³/min x 35.31

Lb = kg/0.4536

HOT WATER HEAT PUMP
MODEL CAHV-P500YB-HPB <G>

REFRIGERANT R407C 5.5 kg X 2

LEGAL REFRIGERATION TON 6.18RT (3.09RT X 2)

ALLOWABLE HP 3.85MPa (38.5bar)
PRESSURE(Ps) LP 1.80MPa (18.0bar)

WEIGHT 511 kg

IP CODE IP24

YEAR OF MANUFACTURE _____



SERIAL No. _____

RATED VOLTAGE 3N-	V	380	400	415	415
FREQUENCY	Hz	50			
CAPACITY	kW	45.0			
	kcal/h	38700			
	Btu/h	153540			
RATED INPUT	kW	12.9	10.9		
COP		3.49	4.13		
RATED CURRENT	A	21.8	20.7	19.9	17.6 (P186%)
RATED CONDITION					
OUTLET WATER TEMP.	°C	45	35		
INLET WATER TEMP.	°C	40	30		
OUTDOOR DB / WB	°C	7 / 6	7 / 6		

Contains fluorinated greenhouse gases covered by the Kyoto Protocol.

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

DWG.No.KC79P040H01

HOT WATER HEAT PUMP
MODEL CAHV-P500YB-HPB-BS <G>

REFRIGERANT R407C 5.5 kg X 2

LEGAL REFRIGERATION TON 6.18RT (3.09RT X 2)

ALLOWABLE HP 3.85MPa (38.5bar)
PRESSURE(Ps) LP 1.80MPa (18.0bar)

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INLET WATER TEMP.	°C	40	30		
OUTDOOR DB / WB	°C	7 / 6	7 / 6		

Contains fluorinated greenhouse gases covered by the Kyoto Protocol.

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 AIR-CONDITIONING & REFRIGERATION SYSTEMS WORKS
 5-66, TEBIRA, 6-CHOME, WAKAYAMA CITY, JAPAN
 MADE IN JAPAN

DWG.No.KC79P040H02

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 2006/95/EC
- Electromagnetic Compatibility Directive 2004/108/EC
- Pressure Equipment Directive 97/23/EC
- Machinery Directive 2006/42/EC

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

mitsubishi electric corporation

HEAD OFFICE: TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN

Authorized representative in EU: MITSUBISHI ELECTRIC EUROPE B.V.

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