

Air-Cooled Heat Pump Unit

CAHV

Instructions Manual

CAHV-P500YA-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.

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

■ General



WARNING

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.

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

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

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.

CAUTION

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

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

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

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.

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.

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

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.

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. If the unit is left on a damaged base, it may fall and cause injury.

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

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.

To prevent environmental pollution, dispose of brine in the unit or 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 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.

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.

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.

■ Installation

WARNING

Periodically check the installation base for damage.

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.

■ 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.

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.

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.

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.

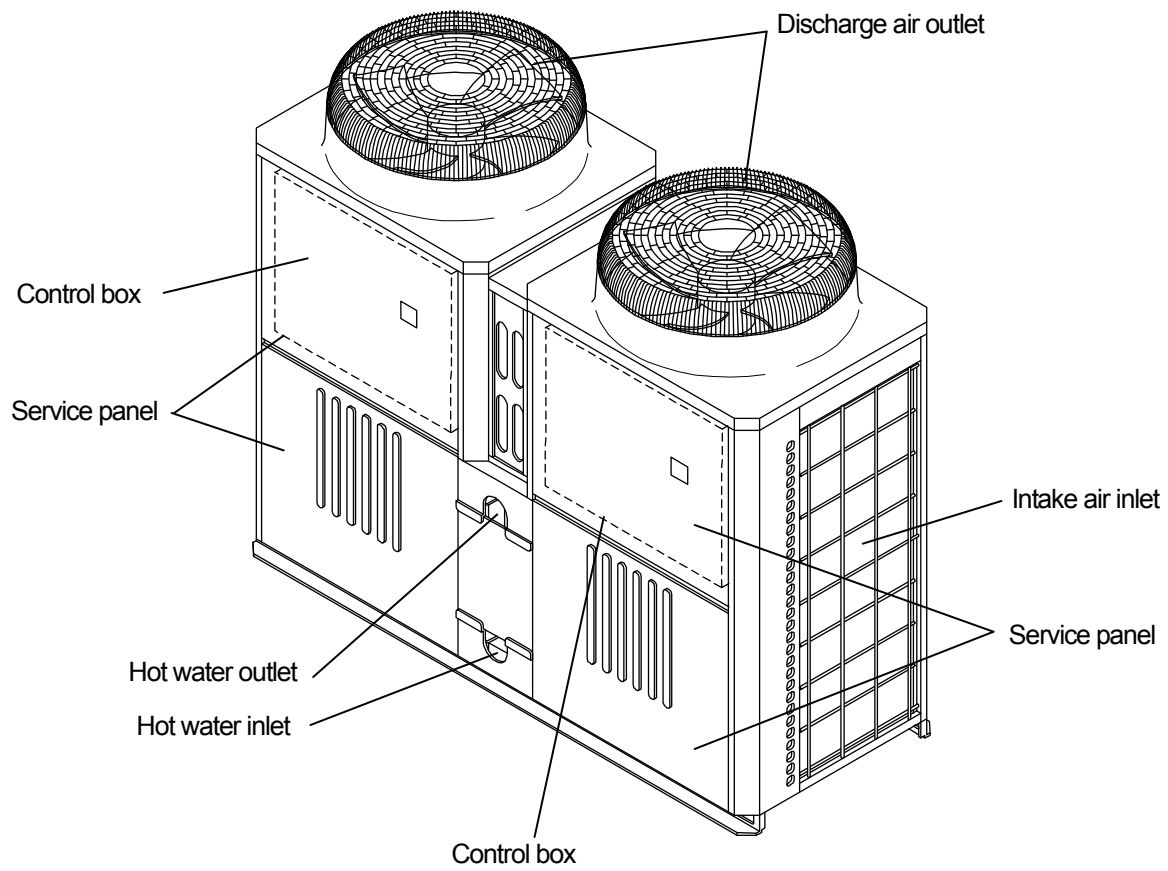
Check the water system, using a relevant manual as a reference.

Using the system that does not meet the standards (including water quality and water flow rate) may cause the water pipes to corrode.

To 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.

1. External Appearance and Components



2. Operating the Unit

[1] Initial Operation

1. Make sure the ON/OFF switch that controls the unit on the on-site 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 ON/OFF switch that controls the unit on the on-site control panel to warm up the compressor.
4. Switch on the ON/OFF switch that controls the unit on the on-site control panel.

[2] Daily Operation

To start an operation

Switch on the ON/OFF switch that controls the unit on the on-site control panel.

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 ON/OFF switch that controls the unit on the on-site control panel.

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 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.)

3. Troubleshooting

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 maintenance provider.

[1] Diagnosing Problems Using Error Codes

Error code *1 (PCB *2)	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.		⊙	⊙
RFSR	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 	○	○
RdSH	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 • 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-refrigerant heat exchanger.	<ul style="list-style-type: none"> • Low-pressure sensor fault • Air-refrigerant 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	Thermistor fault	Outside temperature (TH9)		• Broken or shorted thermistor wiring	○	○
5110		Inlet water temperature (TH10 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		Inlet temperature (TH2 MAIN Circuit)		• Broken or shorted thermistor wiring	○	○
5106		Inlet temperature (TH6 SUB Circuit)			○	○
5104		Air-refrigerant heat exchanger inlet temperature (TH4 MAIN Circuit)		• Broken or shorted thermistor wiring	○	○
5108		Air-refrigerant heat exchanger inlet temperature (TH8 SUB Circuit)			○	○
5114	Representative water temperature (TH14)		• Broken or shorted thermistor wiring	○	○	
5115	Representative 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	×	×
4106 (255)	Power supply fault			• Transmission power supply PCB fault	—	—
4121	Active filter fault			• Active filter fault	⊙	⊙
Rc61 (Preliminary Rc71)	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	<ul style="list-style-type: none"> • High-pressure sensor fault • Linear expansion valve fault (Main circuit LEV, injection LEV) • Injection solenoid valve fault • Refrigerant deficiency (refrigerant gas leak) 	○	○

Error code *1 (PCB *2)	Error type		Cause (Installation/Setting error)	Cause (Parts problems)	Error reset *3	
					Unit side (PCB)	Remote
					SWS1	Operation SW
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	○	○
		ACCT overcurrent		• INV board fault • Ground fault of the compressor • Coil problem	○	○
		DCCT overcurrent		• IPM error (loose terminal screws, cracked due to swelling)	○	○
		Overcurrent relay trip (effective value) (During operation)			○	○
		Overcurrent relay trip (momentary value) (During operation)			○	○
		Short-circuited IPM/ground fault (During operation)		• Ground fault of the compressor • IPM error (loose terminal screws, cracked due to swelling)	○	○
		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	○	○
		ACCT overcurrent (At startup)		• INV board fault • Ground fault of the compressor • Coil problem	○	○
		DCCT overcurrent (At startup)		• IPM error (loose terminal screws, cracked due to swelling)	○	○
		Overcurrent relay trip (effective value) (At startup)			○	○
		Overcurrent relay trip (momentary value) (At startup)			○	○
4220 4225 (108)	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	• INV board CNDC2 wiring fault • INV board fault • 72C fault • Diode stack failure	○	○
		Bus voltage rise protection	Incorrect power supply voltage	• INV board fault	○	○
4220 4225 (111)		Logic error	Malfunction due to external noise interference • Faulty grounding • Improper transmission and external wiring installation (Shielded cable is not used.) • Low-voltage signal wire and high-voltage wire are in contact. (Placing the signal wire and power wire in the same conduit)	• INV board fault	○	○
		Voltage meter error at start up (Bus voltage drop protection at start up (detected by the Main unit side))	Power supply voltage drop	• 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	• Fan motor fault • INV board fan output fault • THHS sensor fault • IPM error (loose terminal screws, cracked due to swelling)	○	○
		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.)	• THHS sensor fault • Current sensor fault • INV board fan output fault • INV circuit fault • Compressor fault	○	○
5301 5305 (115)		ACCT sensor fault		• INV board fault • Ground fault of the compressor and IPM error	○	○

Error code *1 (PCB *2)	Error type		Cause (Installation/Setting error)	Cause (Parts problems)	Error reset *3	
					Unit side (PCB)	Remote
					SWS1	Operation SW
5301 5305 (116)	Inverter error	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 (01) (05)		THHS sensor/circuit fault		<ul style="list-style-type: none"> THHS sensor contact failure THHS sensor fault INV board fault 	○	○
0403 (01) (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 	○	○
7105	Multiple unit 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).		×	×
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)	*7	Communication error due to external noise interference	<ul style="list-style-type: none"> 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	—	—				

*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 cannot 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 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.

[2] Calling for Service

If the problem cannot be solved by following the instructions provided in the table above, please contact your maintenance provider (listed on the back cover) or the nearest Mitsubishi Electric dealer 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.

4. Safety and Maintenance Information

[1] Contact information

Manufacturer

Mitsubishi Electric Corporation AC&R Systems Works

Address:

Phone Number:

Installer

See the back cover.

Maintenance provider

See the back cover.

[2] Refrigerant Information

- See the nameplate for the refrigerant type, factory charged amount, and CO₂ equivalent.
- Charge or recover refrigerant through the service check joint.
- Refrigerant circuit must be serviced by a maintenance provider.
- Do not store spare refrigerant on site.
- It is illegal to release refrigerate containing chlorofluorocarbon into the atmosphere. Recover refrigerant from the unit before disposing of it.

[3] Periodical Inspection

The table below summarizes the scheduled of periodical inspection to be performed by a maintenance provider.

Periodical Inspection Schedule

Inspection Item (Inspection Interval)	Check Point	Check Method and tools	Note
Unit (Biannual)	Check that the unit is not covered with dust or dead leaves.	Visual inspection	
	Check for loose or missing bolts and nuts.	Visual inspection	
	Check for rust.	Visual inspection	Touch up scratches with rust-proof paint as necessary.
	Check that the thermal and acoustic insulations are not coming off.	Visual inspection	
	Check for abnormal noises and vibrations.	Auditory inspection	
Refrigerant system (Biannual)	Check for refrigerant leakage.	Gas leak detector	
	Check for sympathetic vibration between pipes, capillary tubes, and the compressor.	Visual inspection	
	Check that all valves (expansion, solenoid, and 4-way) are operating properly.		Refer to the Parts Inspection and Replacement Intervals table on page 16.
	Check that the condensing temperature is in the normal range.		While heating water, use the temperature reading of the sensor on the water-side heat exchanger outlet pipe in the liquid line (Approx. 300 mm from the water-side heat exchanger) as the condensing temperature. Water outlet temperature: 0 – +5 K

Cont'd	Check that the evaporating temperature is in the normal range.		While heating water, use the temperature reading of the sensor on the air-side heat exchanger inlet pipe as the evaporating temperature. Intake temperature: -3 – +8 K
Compressor	Check that the operating current is normal.		Compare the operating current against the rated current.
	Check for abnormal sounds and vibrations.	Visual inspection	Check that no foreign objects are caught in the unit.
	Check that the compressors are not short-cycling.		Check that the interval between the time when the compressor starts up and the time when it restarts is at least 10 minutes.
Protection devices (Biannual)	Check that the high-pressure switch operates normally.		
	Check that the pump interlock circuit operates normally.		
Electrical system (Biannual)	Check for loose terminal screws.	Screwdriver	
	Check that all electrical contacts are clean.	Visual inspection	
	Check that the conductors and relays are operating normally.		
	Check that the insulation resistance of the operation circuit is normal.	500 V ohmmeter	Min. 5 MΩ
	Check that the insulation resistance of the main circuit is normal.	500 V ohmmeter	Min. 10 MΩ
	Check that the ground wire is properly connected.	Visual inspection	
	Check that all wires are connected properly.	Screwdriver	
Heating-water system	Check that the heating-water is clean.		Check the strainer in the heating-water line.
	Check that the water pressure is normal.		Max. 1.0 MPa
	Check for water leakage.	Visual inspection	
	Check that the water in the pump does not drain back when the pump stops.		
	Check that air is not trapped in the water-side heat exchanger or pipes.		Open the air vent valve to see if any air comes out.
	Check that the voltage and current of the heating-water pump operates normally.		
	Check that the heating-water volume is normal.		
	Check that the heating-water quality meets the quality standards.		See the Quality Standards for Heating and Makeup Water table below.
Air-side heat exchanger (Biannual)	Check the fins and other parts for corrosion.	Visual inspection	
	Check that the fins are not dirty.	Visual inspection	Clean the fins if the high pressure has dropped by 0.1 MPa or more compared to the initial value. (To be measured under the same conditions as at the time of installation)

Quality Standards for Heating and Makeup Water

Properties	Quality standards			Corrosion and scaling tendencies	
	Makeup water	Circulating water [Between 20°C (exclusive) and 60°C (inclusive)]	Circulating water [Between 60°C (exclusive) and 90°C (inclusive)]	Corrosion	Scaling
Ph (25°C)	7.0–8.0	7.0–8.0	7.0–8.0	6.8 or below	8.0 or above
Electrical conductivity (mS/m)(25°C)	30 or below	30 or below	30 or below	√	√
Chloride ion (mgCl/l)	30 or below	50 or below	30 or below	√	
Sulphate ion (mgSO ₄ ²⁻ /l)	30 or below	50 or below	30 or below	√	
Acid consumption (pH 4.8) (mCaCO ₃ /l)	50 or below	50 or below	50 or below		√
Total hardness (mgCaCO ₃ /l)	70 or below	70 or below	70 or below		√
Calcium hardness (mgCaCO ₃ /l)	50 or below	50 or below	50 or below		√
Ionized silica (mgSiO ₂ /l)	30 or below	30 or below	30 or below		√
Iron (mgFe/l)	0.3 or below	1.0 or below	1.0 or below	√	√
Copper (mgCu/l)	0.1 or below	1.0 or below	1.0 or below	√	
Sulphide ion (mgS ²⁻ /l)	Not to be detected	Not to be detected	Not to be detected	√	
Ammonium ion (mgNH ₄ ⁺ /l)	0.1 or below	0.3 or below	0.1 or below	√	
Residual chlorine (mgCl/l)	0.3 or below	0.25 or below	0.1 or below	√	
Free carbon dioxide (mgCO ₂ /l)	4.0 or below	0.4 or below	0.4 or below	√	

[4] Parts Inspection and Replacement Intervals

The table below shows the recommended inspection and replacement intervals. Replacement interval is a recommended replacement period and not the warranty period. Note that the replacement interval depends on usage environment. Check the unit components periodically and replace them as necessary before problems arise to prevent adverse effects on other parts.

Parts Inspection and Replacement Intervals

Parts		Check item	Inspection interval (times per year)	Replacement interval
Refrigerant circuit	Compressor	High and low pressures, vibrations, abnormal noises, insulation resistance, loose terminals	2	40,000 hours
	Air-side HEX	High and low pressures, dirty fins	2	10 years
	Water-side HEX	High and low pressures, water pressure loss	2	10 years
	Solenoid valves	Operation, leakage, clogging	2	7 years
	4-way valves	Operation, leakage, clogging	2	7 years
	Check valves	Operation, leakage, clogging	1	10 years
	Electric expansion valves	Operation	2	7 years
	Strainers	Difference between the outlet and inlet temperatures	1	When major maintenance is performed
	Refrigerant tank	Difference between the outlet and inlet temperatures	1	10 years
	Capillary tubes	Contact abrasion, vibrations	1	10 years
Electrical circuit	Pipes	Contact abrasion, vibrations	1	10 years
	Solenoid valves, 4-way valve coils	Insulation resistance	2	7 years
	Electric heater (compressor case)	Insulation resistance	2	20,000 hours
	Fuses	External appearance	2	8 years
	Electronic substrates	External appearance	2	8 years
	Pressure switches and sensors	Contact resistance at the contact, friction wear on the capillaries	2	7–10 years
	Terminal blocks	Loose terminals	2	8 years
	Wires and connectors	Breakage, looseness, deterioration, friction	2	10 years
	Smoothing capacitor	Water leakage, deformation	2	10 years
Ventilation system	Heatsink cooling fan	Insulation resistance, abnormal sounds	2	10 years
	Fans	Balance	2	10 years
	Motors	Insulation resistance, abnormal sounds, vibrations	2	6–10 years

[5] Safety, Ventilation, and Fire-Extinguishing Devices

Read their respective manuals and understand how to use them correctly. Perform regular inspection and maintenance to keep them in good conditions.

5. Warranty

[1] Terms and Conditions

The unit is covered by the warranty for a period of 1 year from the date of installation. Only the affected parts or the parts authorized by Mitsubishi Electric on the compressor and the heating unit will be replaced free of charge. Malfunctions resulting from the use of unit as listed below shall not be covered even during the warranty period.

[2] Exclusions

(1) Damages resulting from incorrect selection of units or system design problem

Damages resulting from improper installation that deviates from the instructions and precautions detailed in this manual.

Damages resulting from a selection of unit with a capacity that is obviously too large or too small relative to the heating load of a given application.

(2) Damages resulting from making an unauthorized alteration, defeating the safety feature of the protection device to stop the unit, or failing to interlock the operation of the pump with the unit.

(e.g., Damages inflicted to the heat exchanger caused by an operation of the unit without operating the pump or continued operation of unit after a problem has occurred)

(3) Damages resulting from the use of unit outside of the specified outlet temperature, outside temperature, or cold water flow rate ranges. Damages resulting from using the type of power source other than the specified type (capacity shortage, voltage shortage, voltage imbalance).

(4) Damages resulting from inadequate operation, adjustment, and maintenance

a. Damages resulting from short-cycling of the compressor (cycle length shorter than 5 minutes)

b. Damages resulting from inadequate maintenance (e.g., shortage of water flow due to clogged pipes, degradation of water quality, and salt damage)

c. Damages resulting from low-quality water (corrosion of heat exchanger)

(5) Act of God or fire

(6) Improper installation or improper selection of installation site

a. Damages resulting from chemicals and other corrosive substances on site

b. Damages resulting from careless handling during installation

c. Damages resulting from neglecting to address the installation problem that had been pointed out by Mitsubishi personnel

d. Damages resulting from a poorly built foundation or frame

(7) Damages resulting from improper installation, misuse, improper adjustment, and lack of proper maintenance shall not be covered by the warranty. Mitsubishi Electric shall not be held liable under any circumstances for any secondary damage that may result from malfunctions of the heat pump, such as loss of sales. Consult a Mitsubishi agent regarding purchasing coverage.

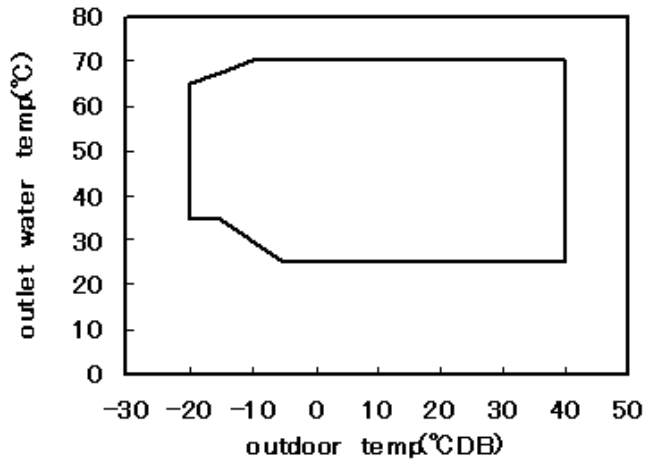
(8) The unit described in this manual is designed for use in Japan, and the contents of this manual are applicable only in Japan.

Mitsubishi Electric does not provide maintenance/repair services for the units used outside of Japan.

6. Main Specifications

SPECIFICATIONS			
Model		CAHV-P500YA-HPB	
Power source		3-phase 4-wire 380-400-415 V 50/60 Hz	
Capacity ^{*1}		kW	45
		kcal/h	38700
		Btu/h	153540
	Power input	kW	12.9
	Current input	A	21.78-20.69-19.94
COP (kW/kW)		3.49	
Capacity ^{*2}		kW	45
		kcal/h	38700
		Btu/h	145690
	Power input	kW	25.57
	Current input	A	43.17-41.01-39.53
COP (kW/kW)		1.76	
Maximum current input ^{*3}		A	57.77-54.88-52.90
Water pressure drop ^{*1}		12.9 kPa (1.87 psi)	
Temperature range ^{*4}	Outlet water temperature		35–65°C (95–149°F), 25–70°C (77–158°F)
	Outdoor temperature	D.B.	-20–+40°C (-4–+104°F), -10–+40°C (14–104°F)
Circulating water volume range		7.5 m ³ /h-15.0 m ³ /h	
Sound pressure level (measured in an anechoic room) ^{*1}		dB (A)	59
Sound pressure level (measured 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 1977 x 758 67.3 (65.0 not including legs) x 77.8 x 29.8
Net weight		kg (lb)	526 (1160)
Accessories		Y-strainer Rc 1 1/2	
Design pressure	R407C	MPa	3.85
	Water	MPa	1.0
Drawing number	Wiring		kC94G268X01
	External appearance		KC94G195X01
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		0 Pa (0 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) and the outlet water temperature of 45 °C (113 °F)
- *2 Under normal heating conditions at the outdoor temperature of 7 °CDB/6 °CWB (44.6 °FDB/42.8 °FWB) and 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) and the unit is set to the “Capacity Priority” mode through the no-voltage A-contact.
- *4



- 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.

Unit converter

- Kcal = kW x 860
- BTU/h = kW x 3.412
- cfm = m³/min x 35.31
- Lb = kg/0.4536

Installer's Name, Address, and Phone Number

Empty rounded rectangular box for installer information.

Maintenance Provider's Name, Address, and Phone Number

Empty rounded rectangular box for maintenance provider information.