

SAN ACE MC

Liquid Cooling System

Instruction Manual

Notice

Thank you for purchasing the SAN ACE MC Liquid Cooling System.

This document gives safety precautions, precautions for using the device correctly and instruction on how to install the device.

Please read the instruction manual before using the device.

This instruction manual is downloadable from the SANYO DENKI WEB site.

(http://www.sanyodenki.co.jp/manual/cooling_e.html)

SANYO DENKI CO., LTD.

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1. Safety Notices

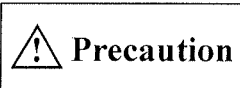
Please read the instruction manual carefully to ensure that you use the device safely.

After understanding the details in the instruction manual, please follow the precautions and use the device correctly.

In this instruction manual, safety precautions are classified as Warnings and Precautions to ensure the device is used correctly, to ensure that personal injury and property damage is prevented.

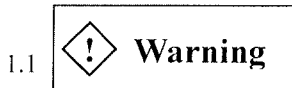


Indicates that incorrect use of the device may create a dangerous situation resulting in death or serious injury



Indicates that incorrect use of the device may create a dangerous situation resulting in minor or moderate injury and/or property damage

Note that use of the device in a manner indicated as a precaution may nevertheless result in a serious situation depending on the circumstances. As both precautions and warnings are important, please be sure to follow them.



1.1

1.1.1 General Warnings

- Please do not use the device in an inflammable atmosphere. Otherwise, fire or injury may result.
- Please do not conduct an operation such as delivery, installation, wiring, maintenance or inspection while the electricity is turned on. Otherwise, electric shock or injury may result.

1.1.2 Warnings when Installing the Device

- Please be sure to install the device correctly. Otherwise, fire or device malfunction may result.

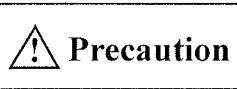
1.1.3 Warning when Doing the Wiring

- Please do the wiring correctly. Otherwise, electric shock or fire may result.

1.1.4 Warning when the Device is in Operation

- Please do not operate the device near objects carrying live electric current. Otherwise, an electric shock may result.
- Please do not allow people or articles approach or come into contact with the blades of the rotating fan. Otherwise, injury may result.
- If an abnormality is found in the fan or pump, such as smoke, fire, odor or noise, turn off the power and stop using it immediately. Otherwise, electric shock, injury, fire or device malfunction may result.
- If liquid is found leaking from the device or PC case, turn off the power and stop using the device immediately. Otherwise, electric shock, injury, fire or device malfunction may result.

1.2



1.2.1 General Precautions

- When delivering the device or conducting, installation, wiring, maintenance or inspection, be sure to assign personnel who have the relevant expertise. Otherwise, electric shock, injury or fire may result.
- Do not disassemble, repair or remodel the device. Otherwise, electric shock, injury or fire may result.
- Do not use the device if it does not comply with the device specifications. Otherwise, electric shock or fire may result.
- This device must not be used for medical devices related to human life.
- This device must not be used for devices that have a critical influence on public or social infrastructure.
- This device must not be used in an environment subject to vibration, such as vibration created by cars and vibration on ships.
- Do not remove the nameplate. Otherwise, the rated voltage may be mistaken, and a fire may result.
- Use the device within the specified thermal range. Otherwise, liquid may leak from the device, or a fire or device malfunction may result.
- Do not use or store the device in the following locations: An atmosphere containing highly inflammable or corrosive gases, locations where water or oil may be splashed, dusty or humid locations, and locations subject to radiation or direct sunlight. Otherwise, liquid may leak from the device, or a fire or device malfunction may result.
- Do not use or store the device in locations subject to strong magnetic fields or strong electromagnetic noise. Otherwise, the fan or pump may be damaged.
- Dispose of the device as industrial waste.
- If you inadvertently imbibe liquid from the system, rinse your mouth and seek immediate medical attention.
- If your eyes or skin are exposed to liquid from the system, rinse the affected area thoroughly with water. If you are injured, seek immediate medical attention.
- Be careful not to touch the edge of the device, such as the heat radiation fin of the radiator, and clip.
- Do not subject the tube or tube connector to excessive pressure. Otherwise, the device may break.

1.2.2 Precautions when Delivering the Device

- Take care when delivering the device to prevent it from toppling or falling. Otherwise, injury may result.
- Do not hold the lead wires. Otherwise, the device may fall, causing injury.
- Do not subject the device to shock. It is a precision device, and it may break.

1.2.3 Precautions when Opening the Package

- Open the package with the top of the box facing upward. Otherwise, the device may fall, causing injury.
- Make sure that the device is exactly the one that you ordered. If the incorrect device is used, injury, fire or device malfunction may result.

1.2.4 Precautions when Installing the Device

- Install the device in the dedicated case.
- Read the instructions for installation in the instruction manual carefully, and install the device correctly. If it is installed incorrectly, fire, malfunction or other problem may result.
- Be sure to fasten the device. Otherwise, injury or device malfunction may result.
- Do not install the device in a location where it may be damaged.
- Do not bend the tube forcibly, or crush it during installation.
- Do not damage the device, subject it to excessive stress, place heavy objects or materials on it or pull it.
- Do not raise the device by holding the cold plate, tube, lead wires or connector during installation. Otherwise, the device may be damaged.
- To install the device, the following items are required:
 - The device: One unit
 - Dedicated Clip: One unit (supplied with the device.)
 - Thermal grease (not supplied with the device. Please purchase it separately.)

1.2.5 Precautions when Doing the Wiring

- Do not damage the wires, subject it to excessive stress, place heavy objects or materials on it, pull it or put in between other objects. Otherwise, electric shock or damage may result.
- Do the wiring so that the wires are not caught in the blades of the fan. Otherwise, injury may result.
- When inserting or removing the connector, hold the housing instead of the wires. Otherwise, electric shock or damage may result.

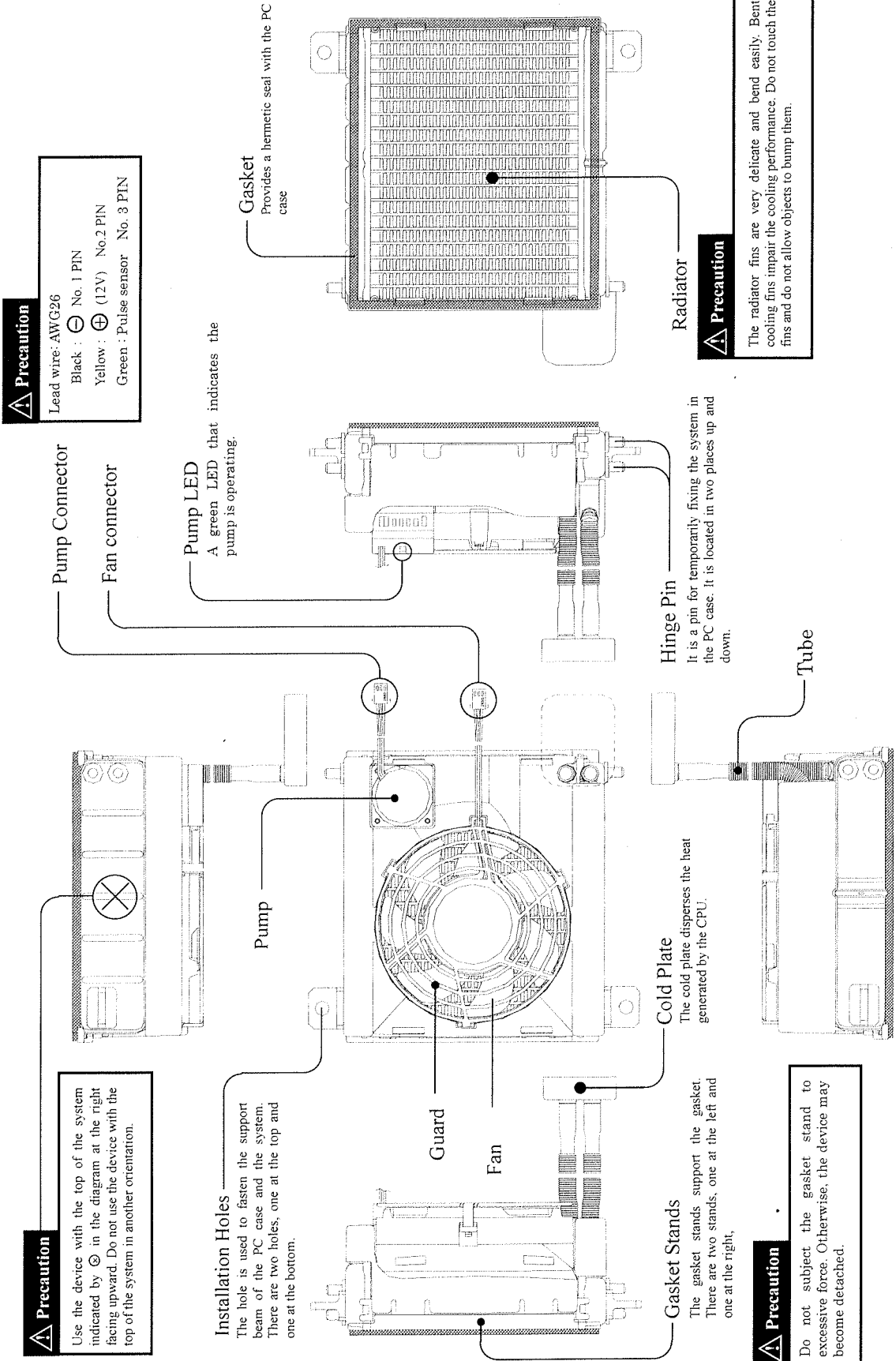
1.2.6 Precautions when Operating the Device

- Secure a ventilation path when installing the device. Do not close the intake or exhaust apertures and do not allow foreign objects to enter the apertures. Otherwise, electric shock, injury, fire or device malfunction may result.
- Please install the device in the correct orientation. Otherwise, device malfunction may result.

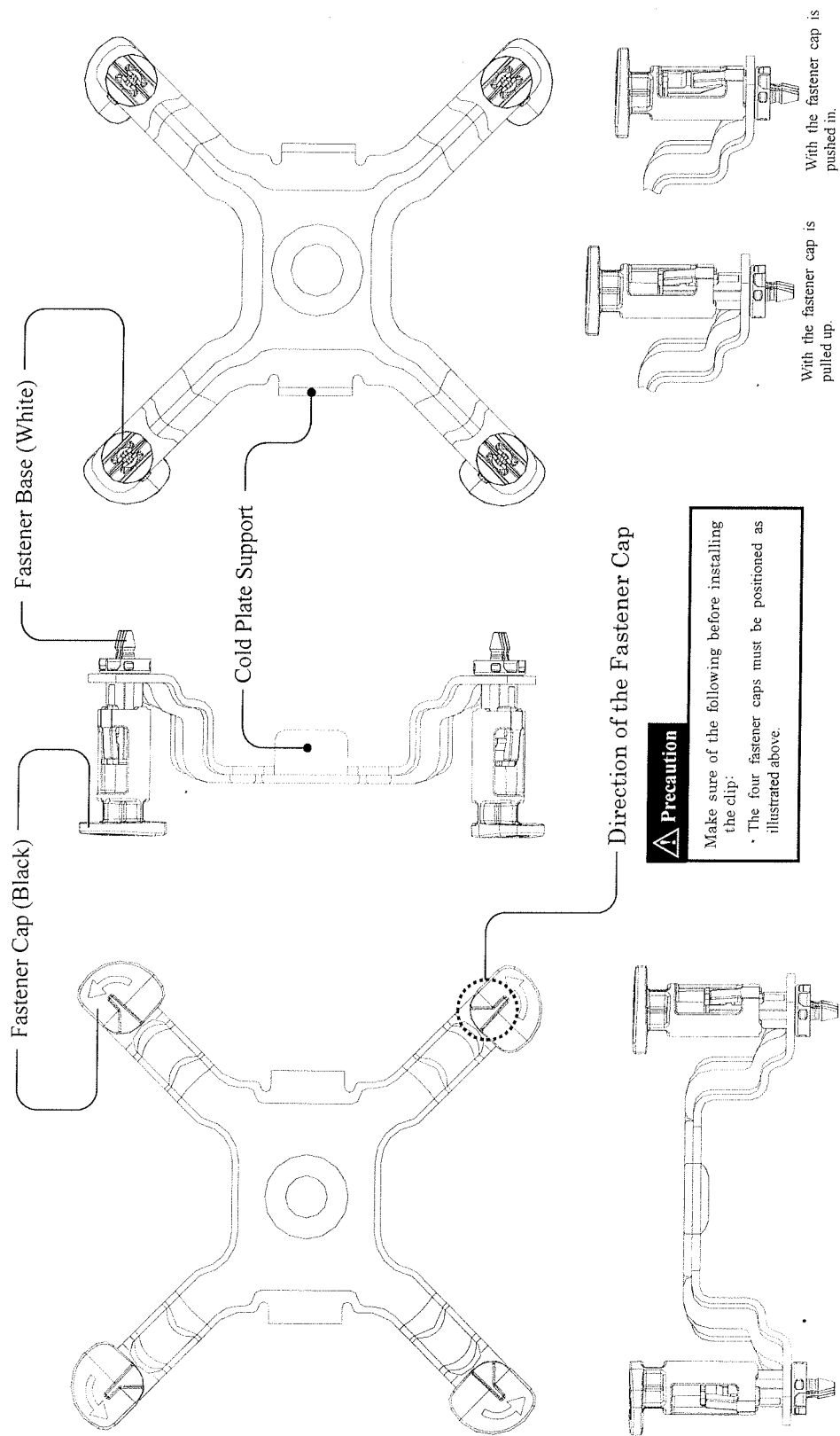
1.2.7 Precautions when Conducting Inspection, Maintenance and Replacement

- The blades of the fan rotate when the device is in operation or shortly after it has stopped. Make sure that the fan has stopped rotating before starting work. Otherwise, injury may result.
- Some parts of the device may be hot when it is operating or shortly after it has stopped. Make sure that the device has cooled down after turning off the power, and before starting work. Otherwise, injury may result.

2.1 Names of Each Part and Functions (System)



2.2 Names of Each Part and Functions (Clip for the Intel LGA 775 Socket)



See "How to Remove the Clip" on page 12 for details of pulling up the fastener cap.

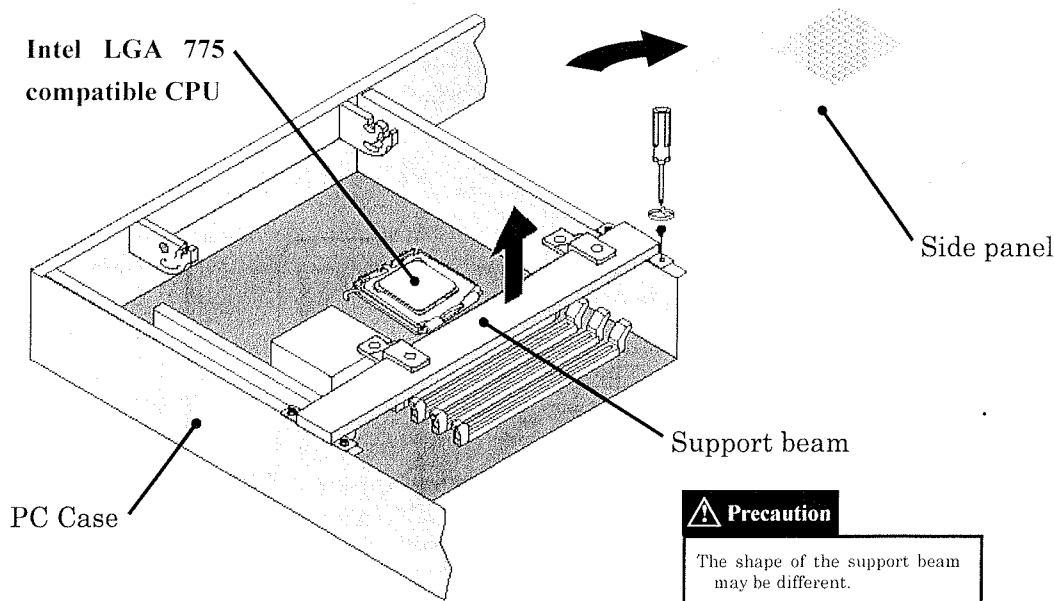
3. Installing the Device

Precautions before Doing the Installation

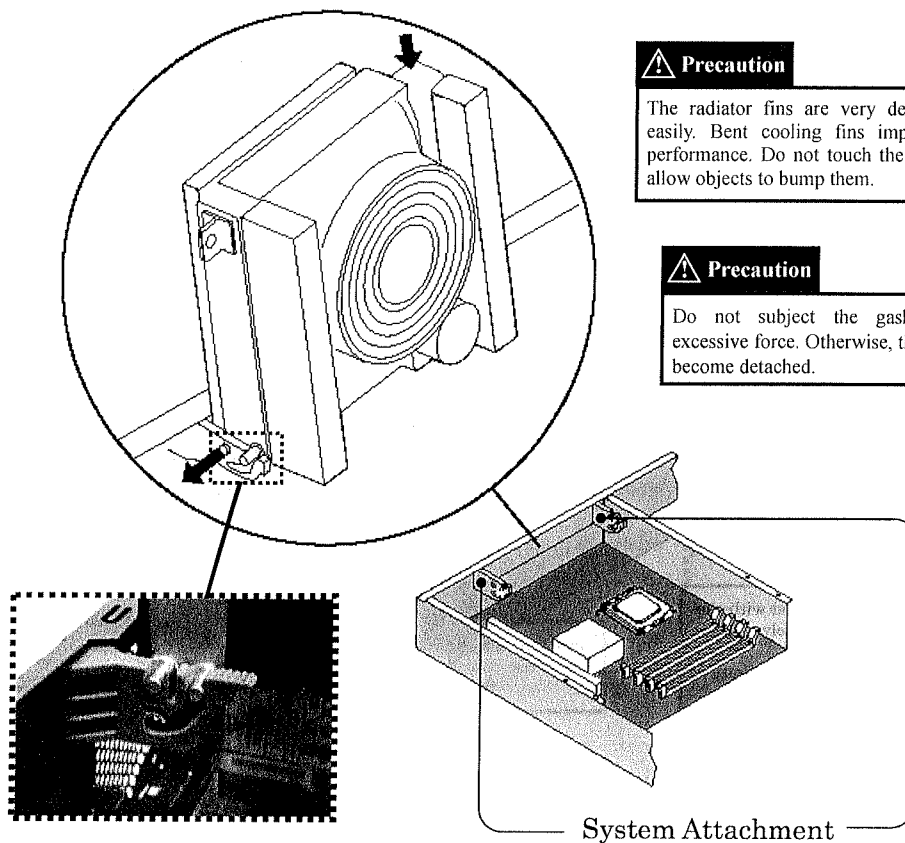
- Install the device in the dedicated PC case.
- The design of your PC case may be slightly different from the PC case illustrated here.
- Use the device by placing it vertically. See "Names of Each Part and Functions (System)" on page 4 for details.
- Do not install the device while the electricity is turned on. When installing the device, turn off all the power, and remove the electric cord of the PC from the outlet.
- The fan and pump is DC12V. Connect them to the connector for a 12V power supply.
- The pump is designed for single-speed operation. The fan has thermal speed control enabling the rotating speed to change according to the circumambient temperature. See the "Device Specifications" on page 12 for details.
- Turn off the BIOS or software fan speed control.
- When bubbles flow into the pump, the air makes a creaking sound, but it does not last long. It stops after the pump has been operating for several minutes.
- The radiator fins are very delicate and bend easily. Bent cooling fins impair the cooling performance. Do not touch the fins and do not allow objects to bump them.
- Do not subject the gasket stand to excessive force. Otherwise, the device may become detached.
- Please use the motherboard with the Intel LGA 775 socket.
- The instructions for installation assume that the motherboard and CPU are installed in the PC case.
- Discharge static electricity before starting work.

■ Installation

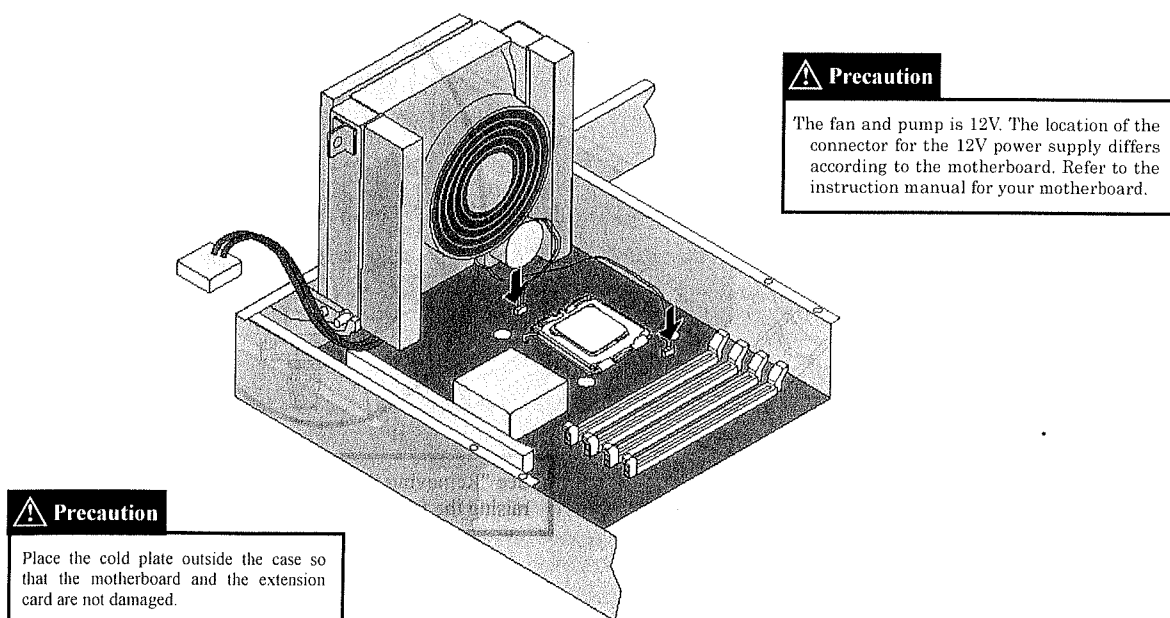
1. Remove the side panel of the PC case, and lay it down in the direction illustrated below.
2. Remove the support beam in the center of the PC case.



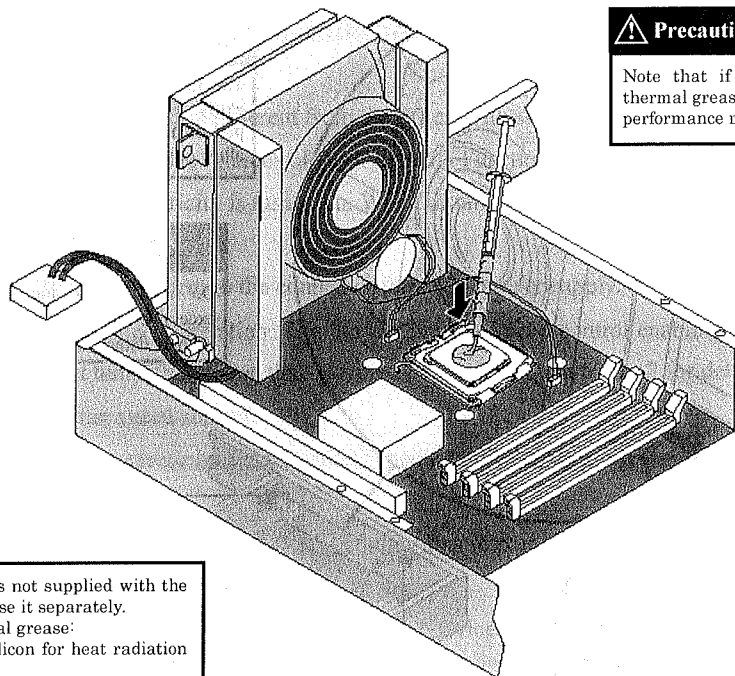
3. Insert the hinge pin in the system attachment, and fasten the device temporarily.



4. Install the connector of the fan and pump to the 3-pin connector for 12 V power supply on the motherboard.
- Make sure that the direction of the connector is correct when installing it.



5. Apply the thermal grease to the CPU. Apply an appropriate amount of grease uniformly all over the CPU.



⚠ Precaution

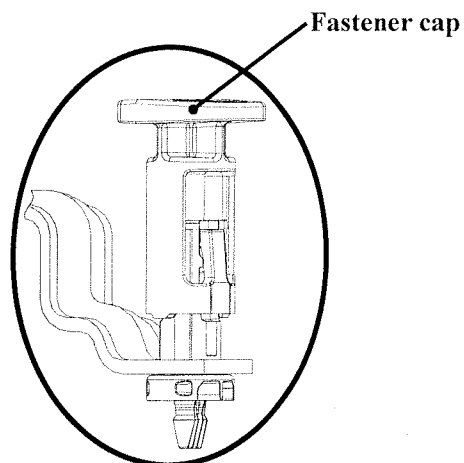
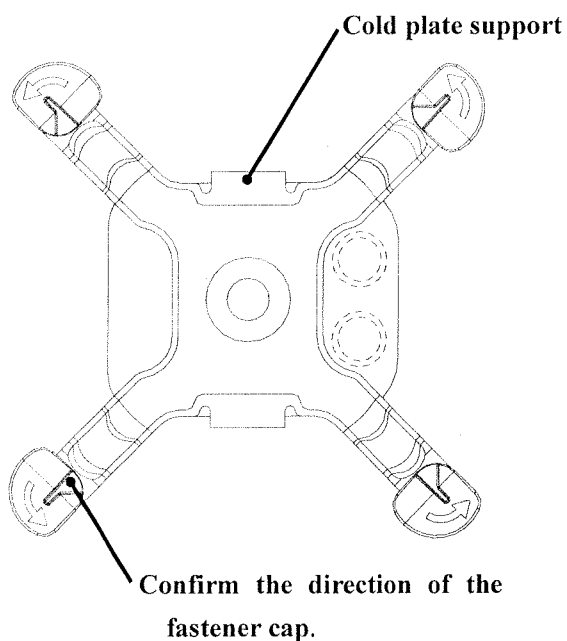
Note that if a substantial amount of thermal grease is not applied, the cooling performance may be impaired.

⚠ Precaution

The thermal grease is not supplied with the device. Please purchase it separately.
Recommended thermal grease:
Shin-Etsu Silicone silicon for heat radiation G751

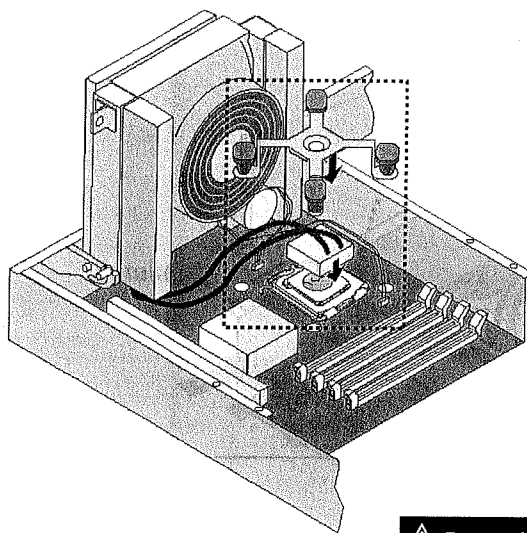
6. Confirm the following before installing the cold plate in the CPU:

- Four fastener caps are positioned as illustrated below.

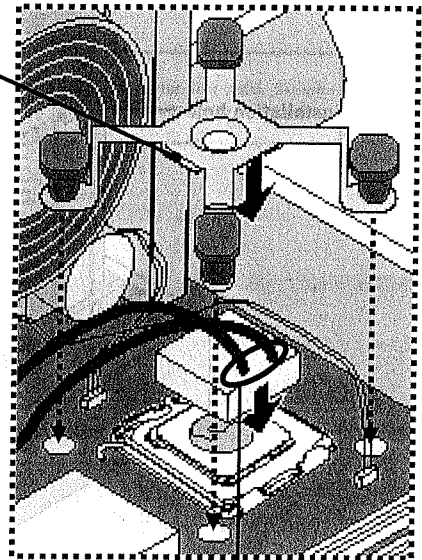


See "Removing the Clip" on page 12 for details about raising the fastener cap.

7. Adjust the cold plate so that it is in the center of the CPU. Adjust the clip so that it sits on the four open holes on the motherboard, and fasten the cold plate temporarily.



Cold plate support

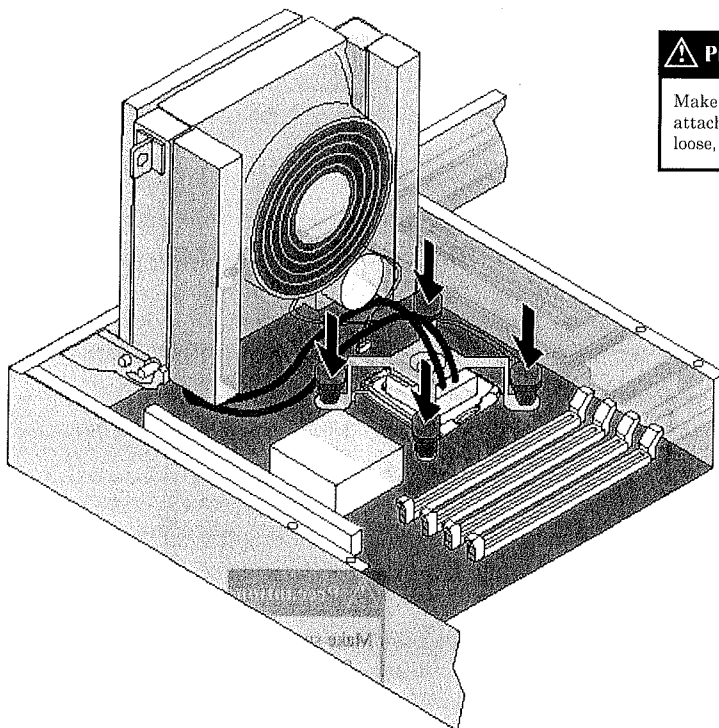


Tube connection side

⚠ Precaution

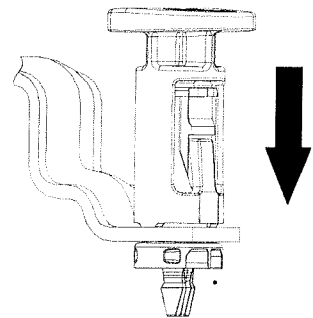
Install the cold plate by setting the tube connection side in the direction illustrated.

8. Insert the fastener cap until it clicks, and securely fasten the cold plate to the CPU.



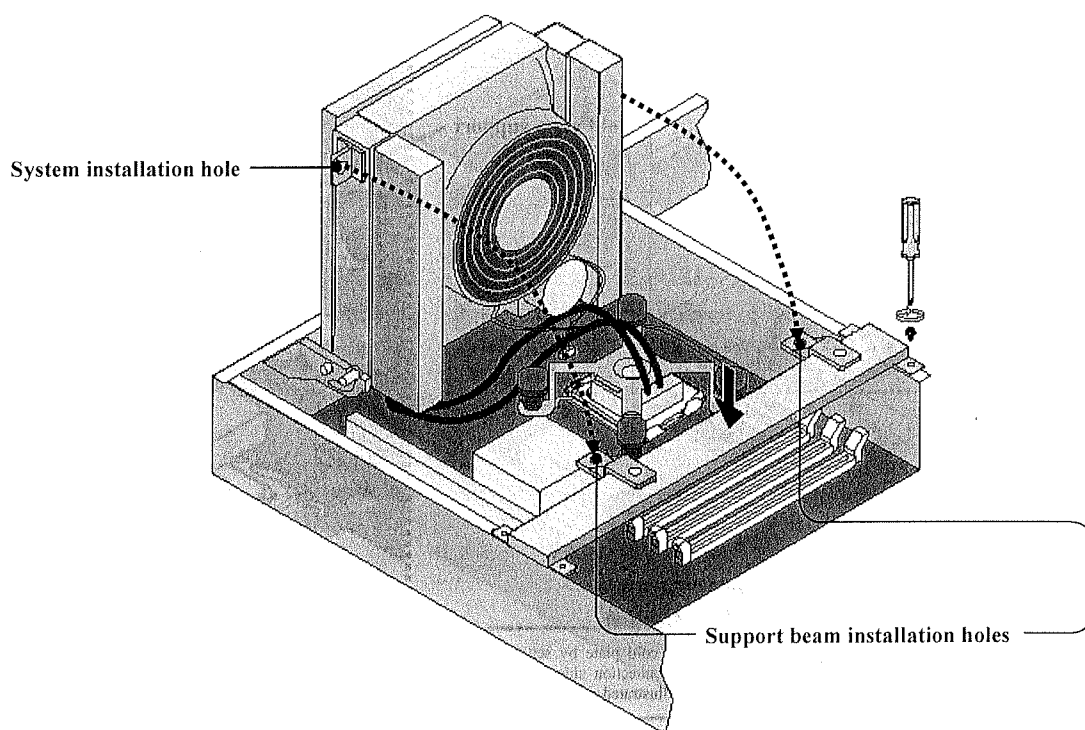
⚠ Precaution

Make sure that the cold plate is completely attached to the CPU. If the cold plate is loose, fasten it again.

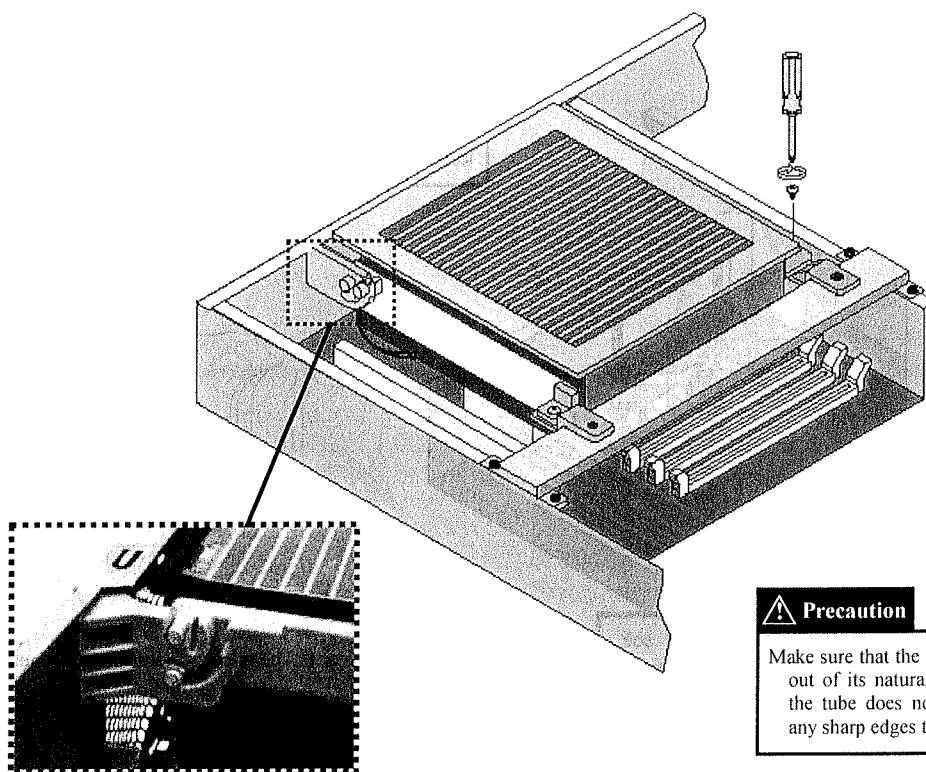


The state where the fastener cap is completely inserted

9. Install the support beam again.



10. Put the device in the case. Adjust the installation holes of the device and the support beam, and fasten at two locations.



⚠ Precaution

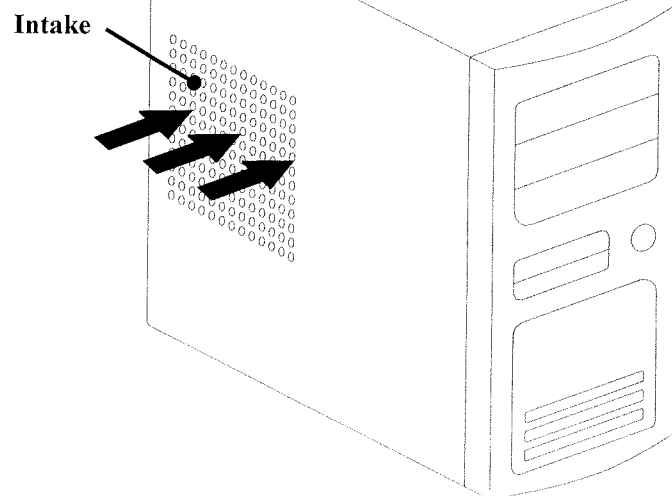
Make sure that the tube is not bent or crushed out of its natural position. Make sure that the tube does not come into contact with any sharp edges that may damage it.

11. Install the side panel and attach the case.

To start the system, turn on the power while the case is standing.

 Precaution

Do not close the intake on the side panel. Do not close other intakes or exhaust openings on the case.



4. Removing the Device

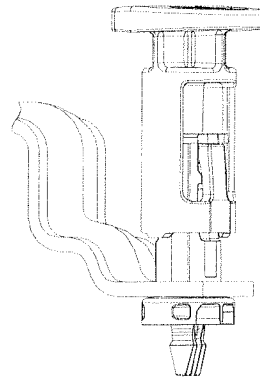
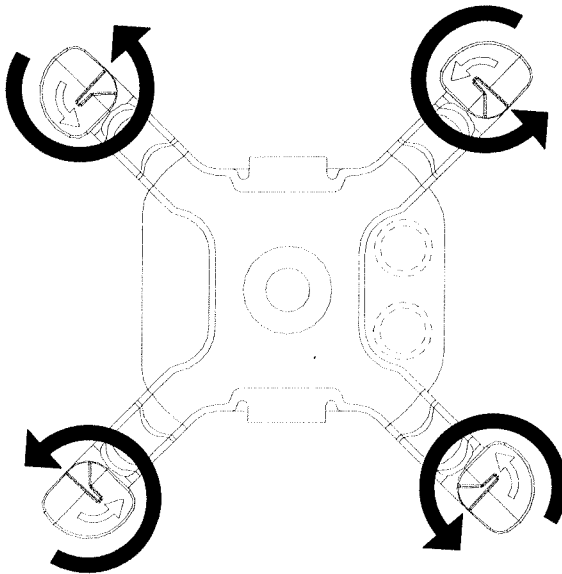
To uninstall the device, reverse the procedures in “Installing the Device” in Section 3.

To remove the clip, perform the following operations.

—Removing the Clip—

To remove the clip, rotate all fastener caps 90° counterclockwise.

Then pull the fastener caps upward.



Pull the fastener caps
upward.

5. Device Specifications

Operating temperature range	0°C ~ +60°C	
Storage temperature range	-40°C ~ +70°C	
Mass	Approx. 1150 g	
Rated voltage of the Fan / Pump	DC 12 V	
Operating voltage range for the Fan / Pump	DC 11.4 V ~ 12.6 V	
Rated current for the Fan	0.25 A (at 12V DC)	
Rated current for the Pump	0.12 A (at 12V DC)	
Motor protection system for the Fan / Pump	Current shutoff system (with reverse polarity protection)	
Insulation resistance for the Fan / Pump	DC 500 V 10 MΩ or higher (between the lead conductor and frame)	
Dielectric strength for the Fan / Pump	AC 50/60 Hz 500 V, 1 minute (between the lead conductor and frame)	
Rated rotating speed for the Fan	Thermal speed control enabling the fan speed to be changed automatically according to the temperature of air passing through the radiator	
	2,400 min ⁻¹ (at 12V DC) When the temperature of air passing through the radiator is 35°C or higher.	1,300 min ⁻¹ (at 12V DC) When the temperature of air passing through the radiator is 25°C or lower.
Rated rotating speed for the pump	2,000 min ⁻¹ (at 12V DC)	
Thermal resistance	0.22 K/W (at 2,400 min ⁻¹ for the Fan)	0.255 K/W (at 1,300 min ⁻¹ for the Fan)
Sound Pressure Level* 1	42 dB(A) (at 2,400 min ⁻¹ for the Fan)	28 dB(A) (at 1,300 min ⁻¹ for the Fan)
Lead connector for the Fan / Pump	Lead wires:AWG26 / Connector :MOLEX 22-01-3037(P/N 2695-03RP) / Contact :MOLEX P/N 5159PBT equivalent products No.1 PIN:⊖ (Black) No.2 PIN: ⊕ (Yellow) No.3 PIN: Pulse sensor (Green)	
Sensor for the Fan / Pump	Open collector output 2 Plus/Rotation 10 mA or less	
Pump LED	When Operating light up green.	

Note 1: Measured one meter from the surface of the radiator.

■ Part Materials

- Fan, guard, gasket stand, pump casing: Plastic
- Tube: Fluorine plastic (Fluorinated polymer)
- Pump motor, radiator: Aluminum
- Gasket: Rubber sponge or polyethylene
- Cold plate: Copper (nickel plating on the surface)
- Liquid: Propylene glycol solution

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