June 1, 2011

DAIKIN SERVICE MANUAL NEWS

★Reliable technology ensures maximum customer satisfaction.★ **M-11006**

Case	Correction of SERVICE MANUAL HDSE08-1
Model	Water cooled chiller

Please refer attached pages for correction of service manual HDSE08-1.
The first half are wrong pages and the second half are correct pages.

2 Specifications

1 Standard Specifications

Water chilling unit (Water cooled type)

Item			Model	C7-UWJ1320B5Y	C7-UWJ1700B5Y	CUW60A5Y
☆Cooling	Capacity ($^{50}/_{60}$Hz)	kW		118/132	150/170	180/200
	Chilled water flow rate ($^{50}/_{60}$Hz)	ℓ/min		338/378	430/487	516/573
	Pressure drop ($^{50}/_{60}$Hz)	ℓ/min		421/478	532/615	641/725
Power source				3 phase 380, 400, 415V/400, 440 VAC 50/60Hz		
Control power source				Single phase 200 VAC 50/60Hz		
Type				Water chilling unit (Water cooled type)		
Exterior				Ivory white (5Y7.5/1)		
External dimensions	H × W × D	mm		1360×2325×650	1390×2430×725	1425×2460×725
Compressor	Model			ZH3LSFYE(50Hz) ZH3LSFYB(60Hz)	ZH5MLFYE/ ZH5MLFYB	ZH5LLFYE/ ZH5LLFYB
	Type			Hermetically sealed scroll type	Semi-hermetically sealed single scroll type	
	Motor output×No.of units	kW		30×1	37×1	45×1
	Starting system			人–△ start		
Heat exchanger on water side	Model			CXC2118	CXC2120	CF3220-C6
	Type			Shell and cross fine tube type		
	No. of units			1		
Evaporator	Model			DHG2414	DHG2418	DHD3220-C6
	Type			Brazed plate type	Shell and HI-X tube type	
	No. of units			1		
Refrigerant control				Thermal expansion valve		
Thermostat				Electronic thermostat for chilled water		
Capacity control		%		100-70-40-0		
Insulation material				Foam polyethylene		
Protection device				See page 13		
Refrig-erant	Name			R22		
	Charge	kg		16	20	24
Refriger-ation oil	Name			SUNISO 4GSD		
	Charge	ℓ		7.5	10	
Pipe con-nections	Condenser water inlet/outlet			PT3 Internal thread		PT4 Internal thread
	Chilled water inlet/outlet			PT3 Internal thread		4B Flange (JIS10K)
	Drain outlet			PT$^{3}/_{4}$ Internal thread for chilled water PT$^{1}/_{4}$ Internal thread for cooling water	PT1 Internal thread for chilled water, PT1$^{1}/_{4}$ Internal thread for cooling water	
Weight (operating weight)		kg		775(830)	960(1020)	1025(1105)
Standard accessories				Instruction manual, Installation manual, strainer for chilled and cooling water, warranty card, fuse	Instruction manual, warranty card, fuse, foundation bolt, vibro-isolating pad, warning sign.	
[In case of modified heat-pump]---Only the specifications different from standard specifications are indicated.						
★Heating	Capacity ($^{50}/_{60}$Hz)	kW		46.8/52.7	175/204	212/240
	Hot water flow rate ($^{50}/_{60}$Hz)	ℓ/min		134/151	502/586	606/690
	Chilled water flow rate ($^{50}/_{60}$Hz)	ℓ/min		60/66	226/256	271/302
Hot water thermostat				Electronic thermostat for chilled water		

(Notes)

☆1: The values shown are based on leaving chilled water outlet temperature of 7°C, inlet/outlet temperature difference of 5°C, and condenser water inlet temperature of 30°C D.B.

★2: The values shown are based on leaving hot water outlet temperature of 45°C, inlet/outlet temperature difference of 5°C, and chilled water inlet temperature of 15.5°C D.B.

<<WRONG>>

Water chilling unit (Water cooled type)

Item \ Model				C7-UWJ2650B5Y	C7-UWJ3350B5Y	CUW120A5Y	CUW240A5Y
☆Cooling	Capacity	($^{50}/_{60}$Hz)	kW	236/265	300/335	355/400	760/800
	Chilled water flow rate	($^{50}/_{60}$Hz)	ℓ/min	677/760	860/960	1018/1147	2178/2294
	Pressure drop	($^{50}/_{60}$Hz)	ℓ/min	841/960	1064/1214	1266/1449	2550/2910
Power source				3 phase 380, 400, 415V/400, 440 VAC 50/60Hz			3 phase 380V, 50Hz
Control power source				Single phase 200 VAC 50/60Hz			220VAC 50/60Hz
Type				Water chilling unit (Water cooled type)			
Exterior				Ivory white (5Y7.5/1)			
External dimensions	H×W×D		mm	1310×2835×900	1525×2785×995	1525×2840×980	2180×2855×1455
Compressor	Model			ZH3LSFYE/ ZH3LSFYB	ZH5MLFYE/ ZH5MLFYB	ZH5LLFYE/ ZH5LLFYB	ZH9SLFCYE
	Type			Semi-hermetically sealed single scroll type			Semi-hermetic single screw type
	Motor output×No.of units		kW	30×2	37×2	40×2	90×2
	Starting system			人−△ start			
Heat exchanger on water side	Model			CXC1920	CXC2120-1	CXC2420-14	CF4520-C12
	Type			Shell and cross fine tube type			
	No. of units			2			
Evaporator	Model			DHG2724	DHG3222	DHG3224	DHD4020-C24
	Type			Shell and HI-X tube type			Dry Expansion shell and Hi-x Tube Type
	No. of units			1			2
Refrigerant control				Thermal expansion valve			
Thermostat				Electronic thermostat for chilled water			
Capacity control			%	100-70-40-20-0			
Insulation material				Foam polyethylene			
Protection device				See page 13			
Refrig-erant	Name			R22			
	Charge		kg	16×2	20×2	24×2	60×2
Refriger-ation oil	Name			SUNISO 4GSD			
	Charge		ℓ	7.5×2	10×2	10×2	14×2
Pipe con-nections	Condenser water inlet/outlet			PT3 Internal thread		PT4 Internal thread	6B flange (connect to ϕ159 tube)
	Chilled water inlet/outlet			4B Flange (JIS10K)		5B Flange (JIS10K)	Inlet 6B flange (connect to ϕ 159 tube) Outlet 5B flange (connect to ϕ 140 tube)
	Drain outlet			PT1 Internal thread for chilled water, PT1¼ Internal thread for cooling water			-
Weight (operating weight)			kg	1395(1500)	1790(1925)	1930(2085)	4880(5380)
Standard accessories				Instruction manual, warranty card, fuse, foundation bolt, vibro-isolating pad, warning sign.			Operation manual, fuse, warranty, mating flange
[In case of modified heat-pump]---Only the specifications different from standard specifications are indicated.							
★Heating	Capacity	($^{50}/_{60}$Hz)	kW	277/319	350/403	422/485	838/985
	Hot water flow rate	($^{50}/_{60}$Hz)	ℓ/min	795/914	1004/1156	1197/1380	2405/2755
	Chilled water flow rate	($^{50}/_{60}$Hz)	ℓ/min	356/401	452/509	535/605	1055/1210
Hot water thermostat				Electronic thermostat for chilled water			

(Notes)

☆1: The values shown are based on leaving chilled water outlet temperature of 7°C, inlet/outlet temperature difference of 5°C, and condenser water inlet temperature of 30°C D.B.

★2: The values shown are based on leaving hot water outlet temperature of 45°C, inlet/outlet temperature difference of 5°C, and chilled water inlet temperature of 15.5°C D.B.

<<WRONG>>

3 Troubleshooting Guide

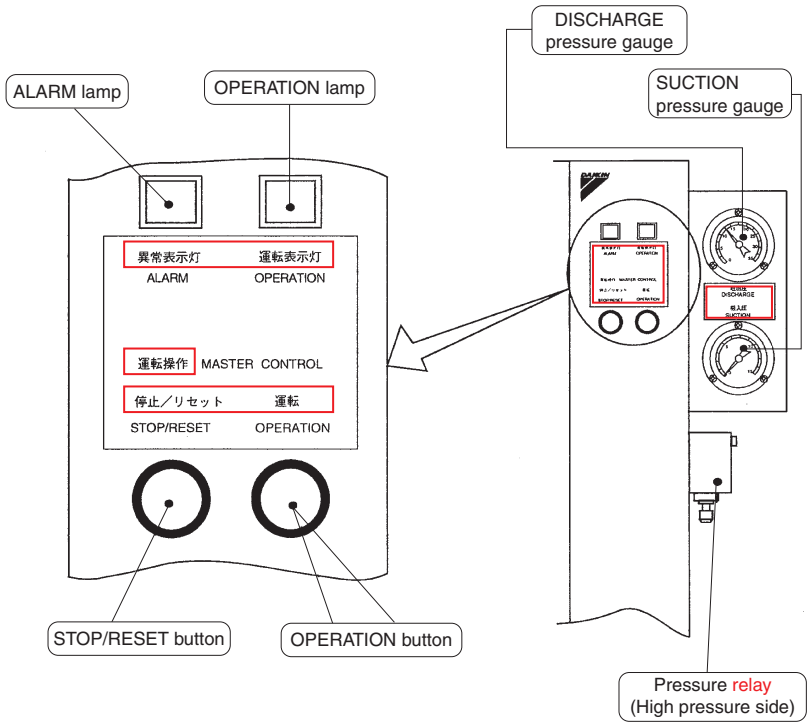
2 ALARM Lamp

● When one of the unit's safety devices trips, the OPERATION lamp goes out and the ALARM lamp lights up.

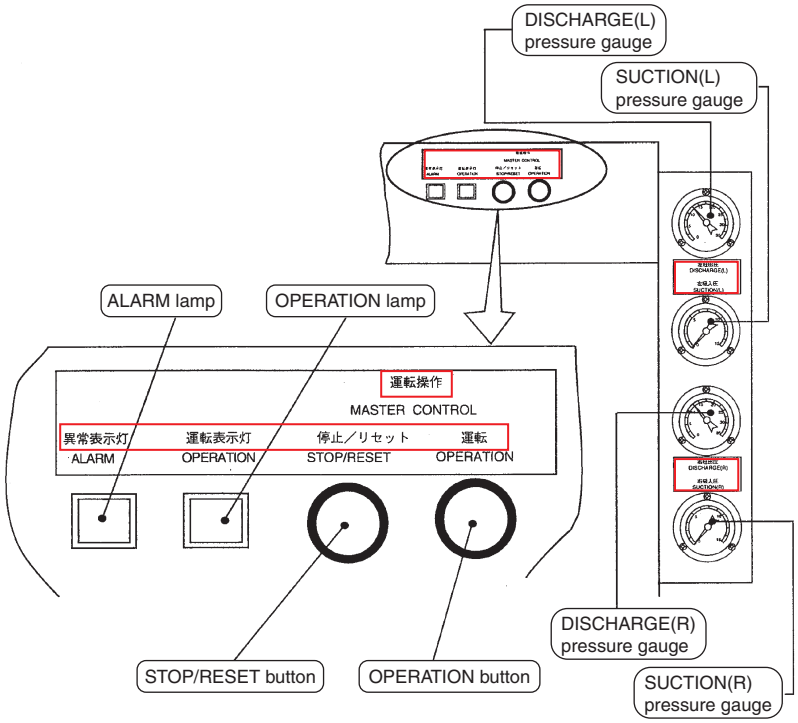
In such case, locate and eliminate the cause of the trouble (see page 45) and push the STOP/RESET button. Only then will the ALARM lamp go out and can the unit be restarted.

Note) if the pressure switch (high pressure protection) trips, follow the instructions on page 48 to reset the unit.

C7-UWJ1320, 1700B5Y, CUW60A5Y



C7-UWJ2650, 3350B5Y, CUW120A5Y

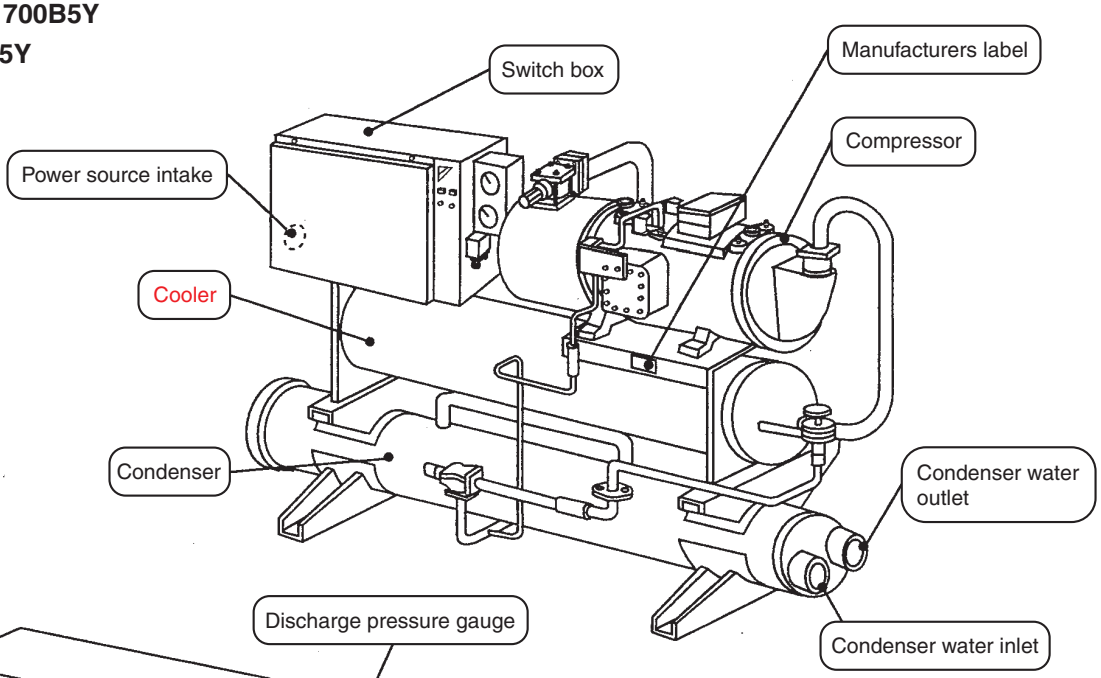


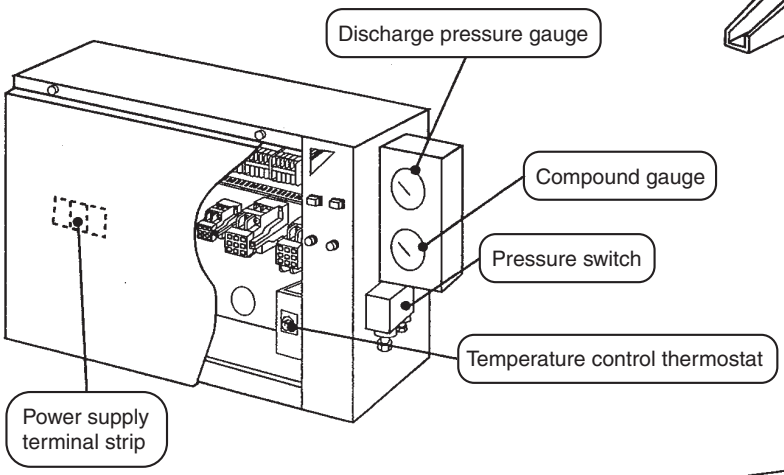
<<WRONG>>

4 Operation and Installation

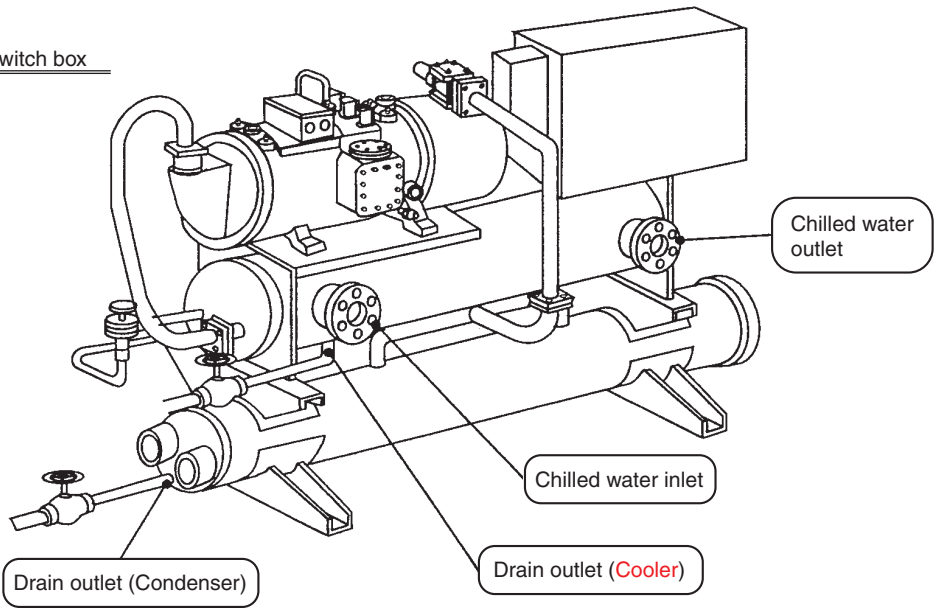
1 Names of Parts

C7-UWJ1320B5Y
C7-UWJ1700B5Y
CUW60A5Y





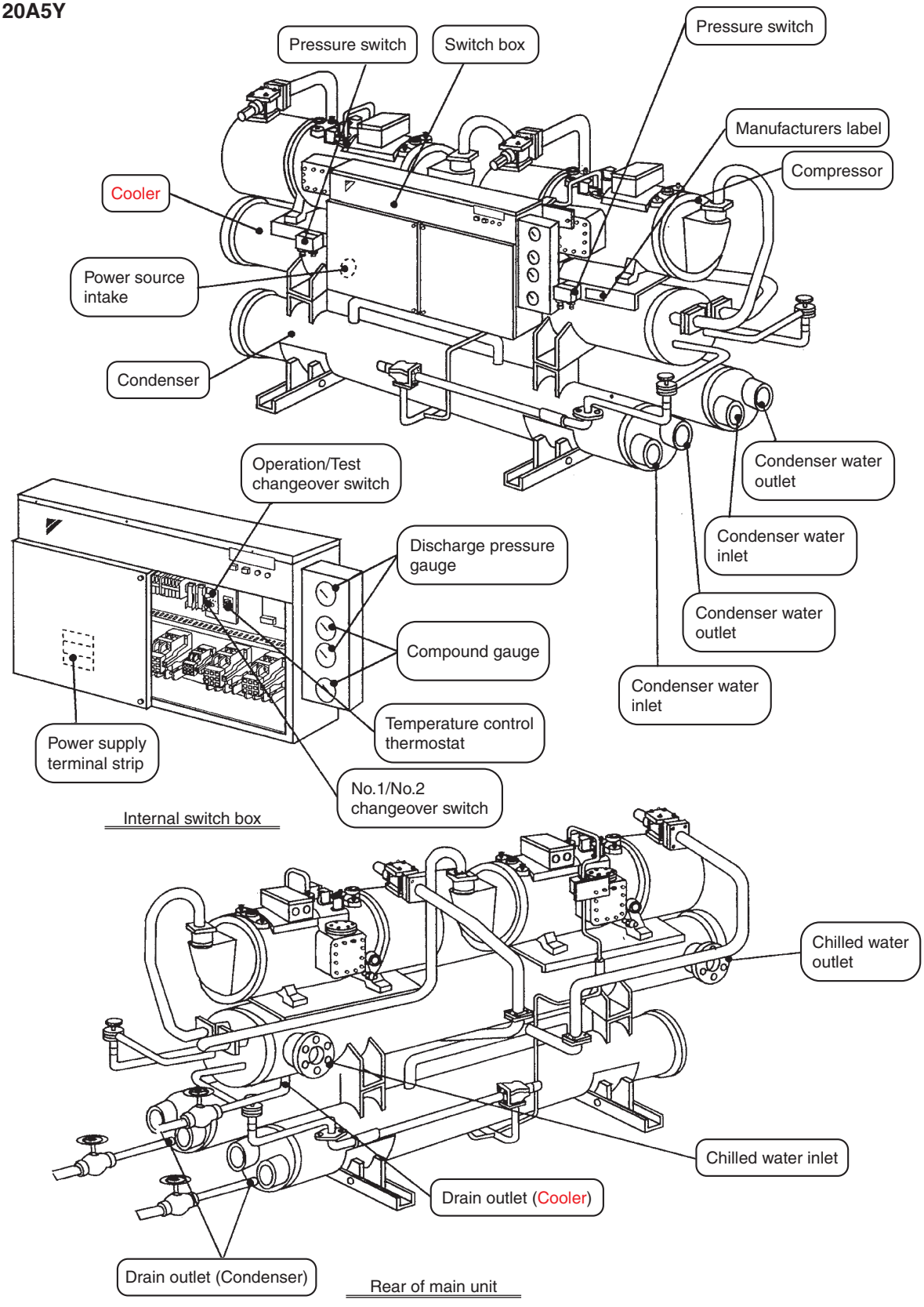
Internal switch box



Rear of main unit

<<WRONG>>

C7-UWJ2650B5Y
C7-UWJ3350B5Y
CUW120A5Y

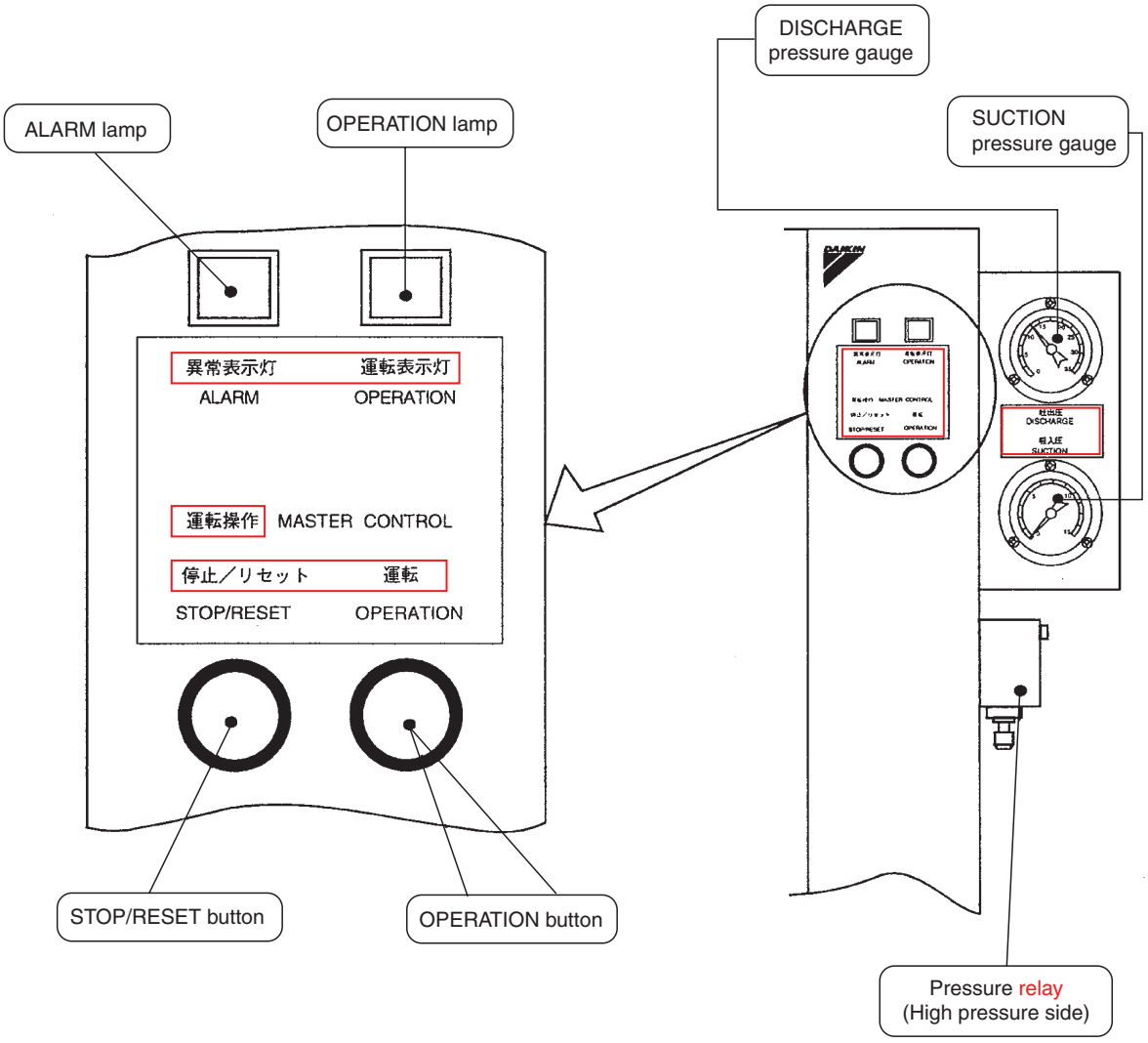


<<WRONG>>

2 Control Panel Names of Part and Functions

The unit is operated by push buttons on the switch box.

C7-UWJ1320, 1700B5Y, CUW60A5Y



●OPERATION button ..... Push to start operation.
(See page 34.)

●STOP/RESET button ..... Push to stop the unit or reset the unit when trouble occurs.
(See page 34.)

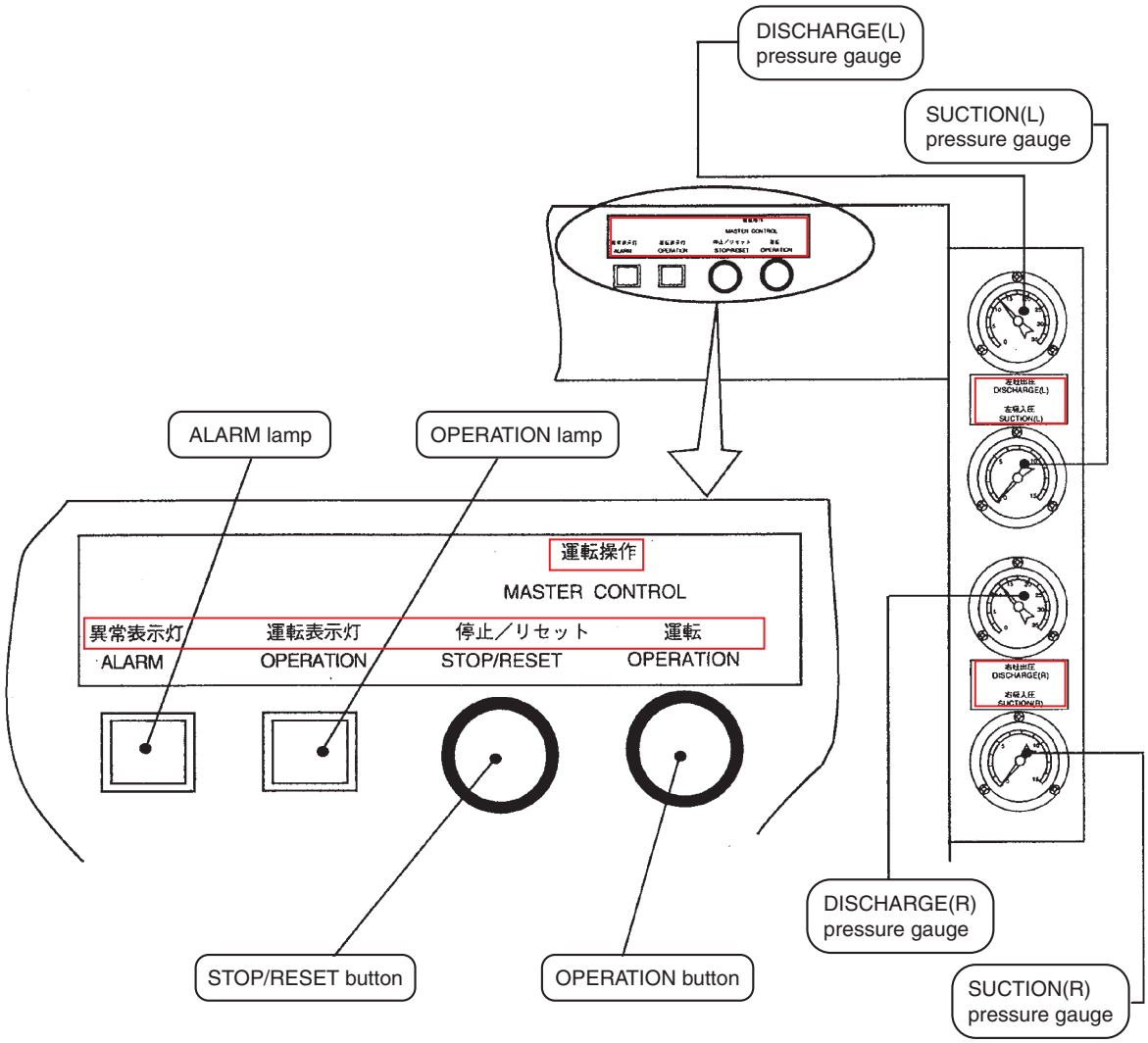
●OPERATION lamp ..... Lights while the unit is running.

●ALARM lamp ..... Lights when a safety device is tripped while the chiller is running.
(See page 47.)

<<WRONG>>

The unit is operated by push buttons on the switch box.

C7-UWJ2650, 3350B5Y, CUW120A5Y



●OPERATION button ..... Push to start operation.
(See page 35.)

●STOP/RESET button ..... Push to stop the unit or reset the unit when trouble occurs.
(See page 35.)

●OPERATION lamp ..... Lights while the unit is running.

●ALARM lamp ..... Lights when a safety device is tripped while the chiller is running.
(See page 47.)

<<WRONG>>

3 Installation

Installation location

- Be sure to provide sufficient space for maintenance.
- Do not install in a place with much humidity.
- The chiller should be installed to facilitate connection of water piping and electric wiring.
- Be sure to provide vibration isolation (vibration isolation pad, vibration isolation frame, etc.) in accordance with installation conditions. If vibration isolation is not provided, vibration could be transmitted from where it is installed, causing sound to be produced from the floor or walls in some cases. Proper vibration isolation is particularly important when the chiller is to be installed indoors.
- The unit produces drainage depending on operating state. Take drainage measures such as providing a drainage ditch, etc., as needed. See pages 24~25 for the location of the drain outlet.

Grounding

- Grounding work.

  To prevent electric shocks, be sure to ground the equipment. Qualification are required to perform the grounding work.

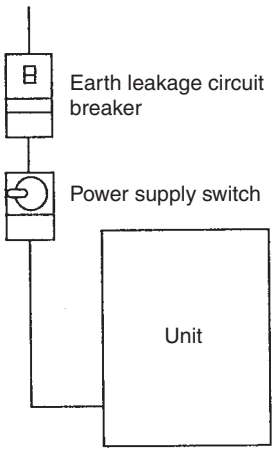
Power supply (3 phases, 380, 400, 415V/400, 440V, 50/60Hz)	C class grounding (3rd-class grounding in particular)

Electrical work

The nominal output of the chiller differs from that of a conventional electric motor. Be sure to select the size of the power supply cable in accordance with the specified instructions for external wiring. For details, consult with your DAIKIN dealer.

- Be sure to provide a power supply with a power supply switch.
- Be sure to connect an interlock so the compressor cannot be operated if the switch of the condenser water pump and chilled water pump is not on. A spare terminal is provided in the switch box for that purpose. For the connection method, refer to the wiring diagram on the front cover of the switch box.
- Wire so that the water pump can be operated independently. This is done so the pump can be operated in order to prevent freezing when the inside water temperature drops (low outdoor temp., etc.).
- Transformer and reverse phase protector are set to 400/400, 440V (50/60Hz).

  If power supplies differ, modify connection to match supply power supply (380V, 415V, etc.) in accordance with the wiring diagram.



<<WRONG>>

■ Water piping work

●Be sure to install a strainer on the water inlet side, and provide a dirt pocket in a suitable place.

If sand, dirt or rust gets into the water system, the metal materials will become mechanically corroded.

(The strainer and dirt pocket require periodic maintenance. Select a location that allows space for maintenance.)

●The chiller does not come with an attached water pump. Be sure to install a water pump that matches piping resistance.

●Install a flow regulating valve (gate valve) on the outlet/inlet water piping.

●Install a thermometer on the water inlets and outlets. This helps you know the operating condition of the chiller.

●The connection diameter is the same as piping. Use an item of same or larger diameter.

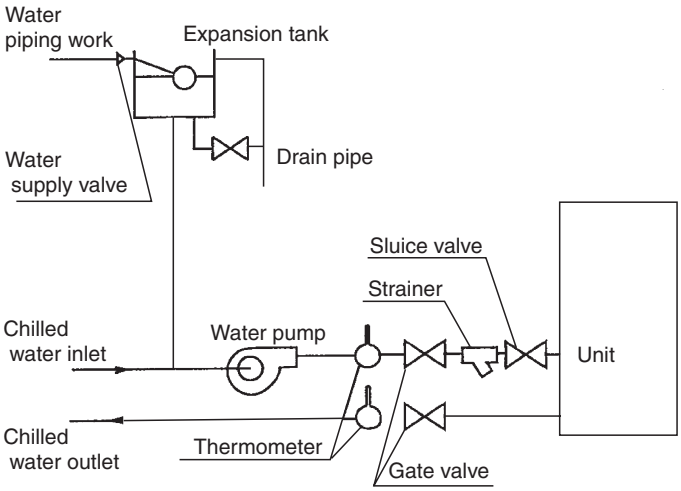
●Be sure to cold-insulate chilled water piping with anti-sweating tubing.

●Water quality standards for chilled water specify circulating water as a premise.
(See water quality standards on page 50.) Using sub-standard water could result in corrosion.

⚠ CAUTION

Be careful not to install the water inlet and outlet inversely.

If the inlet and outlet are connected inversely, the chiller will not function properly and could furthermore be damaged.

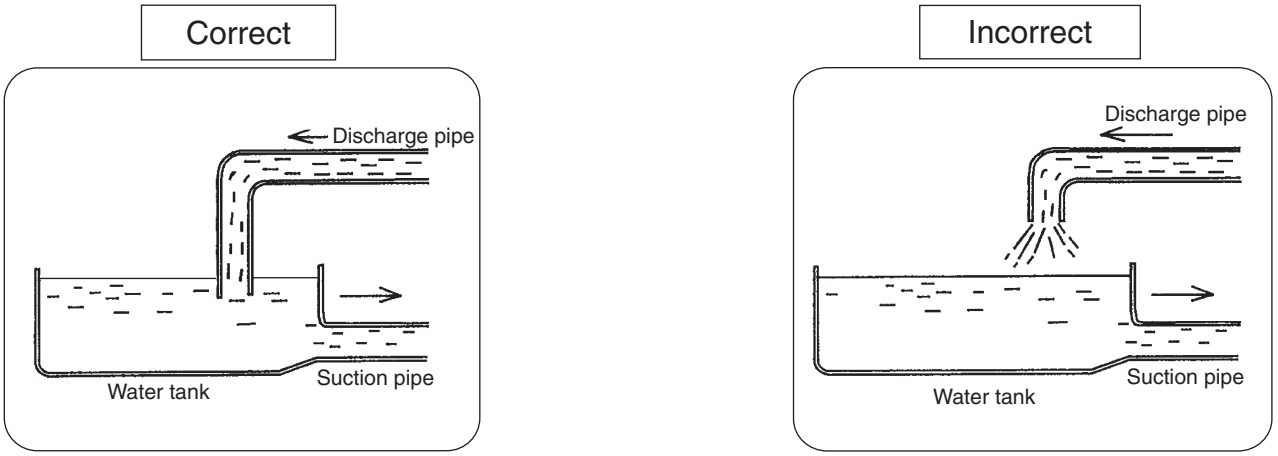


●Keep the water level within the operating range. We recommend using approx.70-150% rated water level. If the level is too low, performance could be reduced by adherence of scale, the freeze prevention sensor could be tripped, or gas leaks could develop due to pitting corrosion. If the level is too high, it could result in corrosion. Using the flow rate adjustment valve on the chiller's outlet, adjust the flow rate so that the difference in inlet and outlet water temperature is about 5°C when operating with a full load.

●Check the flow direction if the unit is equipped with a flow switch.

<<WRONG>>

●Do not aerate water in the water circulation system as shown in the figure below. Aerating the water causes the dissolved oxygen to increase, and pollutants in the atmosphere to condense in the water cause the water to become corrosive.



The discharge outlet must be below the water level of the water tank.

●Do not ground any other electrical equipment to the chiller's water piping.
This may cause electrolytic corrosion in some cases. Be sure to take rust prevention measures for piping buried in the ground.

●Note the flow speed of water in the system, the position of the expansion tank, and the position of the air purge plug in the piping so that cavitation is not produced.

■ Condenser water quality

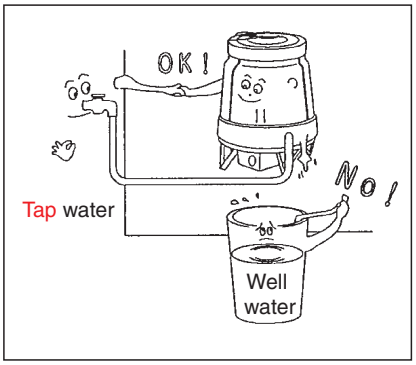
To keep the chiller operating to its full potential over an extended period of time, you should keep condenser water as clean as possible. Poor water quality reduces cooling performance, and contributes to greater power consumption. It can also significantly shorten the life of the chiller.

For water standards, see "Water quality" on page 50.

1. Precautions concerning water quality

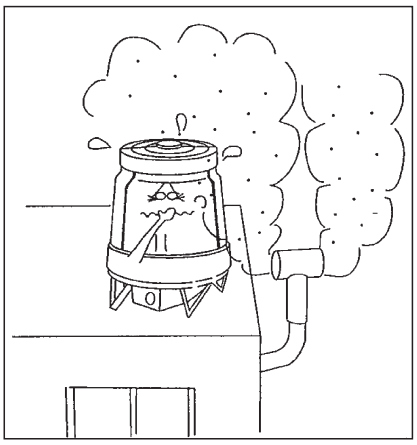
●Use tap water to fill the water tower.

●If using water from any source other than tap water, be sure to check the quality of the water. If the quality is substandard, you must add chemicals or increase drainage. Scale particularly tends to build up on the condenser when using well water. For details, contact your DAIKIN dealer.



<<WRONG>>

●Do not install the cooling tower near to exhaust outlets such as smokestacks. Smoke and corrosive gases drawn into the cooling tower will contaminate water inside and may eventually lead to corrosion inside the water chiller.



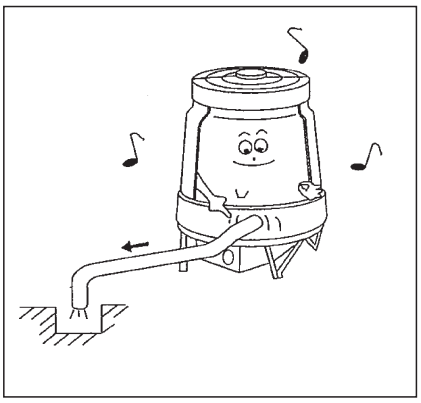
2. Maintenance and checks

●Condenser water circulation water is affected by concentration of dissolved oxygen caused by constant evaporation of water in the cooling tower.

●Force-blow water lines (repeatedly drain and refill the system to prevent water quality deterioration).
When the cooling tower runs for long periods of time, water quality deteriorates, leading possibly to scale deposits or corrosion inside the condenser.

For details, contact your DAIKIN dealer.

●If the cooling tower is not equipped for forced-blow, periodically change water inside.



3. Condenser cleaning

●Clean the condenser about once every season. When the cooling tower runs for long periods of time, scale and fungus may form inside. This lowers cooling capacity which may cause one of the safety devices to trip from time to time, and possibly prevent you from using the unit as you would normally.

●In areas where water quality cannot be ensured, clean the condenser more frequently.

●For help on cleaning cycles and how to clean the equipment, contact the place of purchase.

4. Concerning red water (chilled water and condenser water)

●Iron is used for piping and heat exchangers, and water may become reddened due to rust. This however causes no problem for normal operation.

4 Before Your Test Run

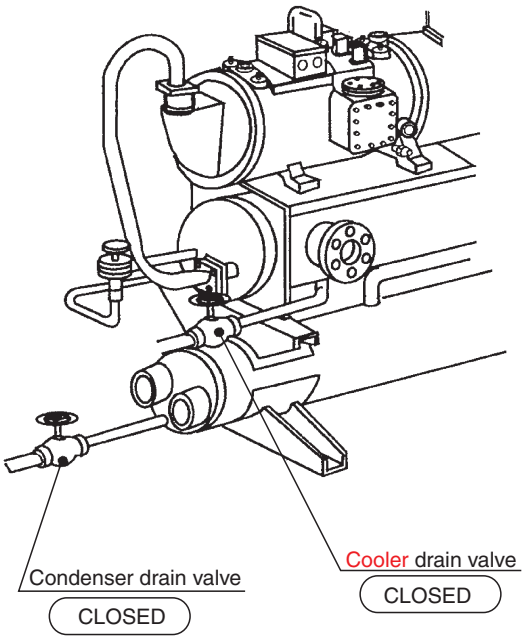
In order to protect the equipment, you should check the following before attempting test run. It would also be a good idea to read "**SAFETY**" once more before starting.

- Is the power supply properly connected? The required power supply is as follows.

Power supply	3 phases, 380, 400, 415/400, 440V, 50/60Hz

- Make sure the water drains of the condenser and evaporator are completely closed.
- Does the transformer match the power supply, and is the reverse phase protector properly connected. Factory set (50Hz-400V, 60Hz-400, 440V)
- Has the chiller been grounded?
- Is the water pump's interlock circuit connected?
- The power supply should be turned on six hours prior to operation to ensure that the compressor operates smoothly.
- Is the water pump filled with water?

  If not, open the water supply faucet and fill the water system with water while purging air from the system.



<<WRONG>>

5 Preparations

1. Turn the power supply switch ON.

●The unit comes with a crank case heater. To ensure the compressor starts up smoothly, leave this switch in the ON position during long periods of use, or otherwise, activate power at least 6 hours before starting the unit.

2. Fill the system with water.

●If the system has a cooling tower, make sure the gate valve regulating water flow is open before starting up the tower and the condenser water pump.

●Also with wells, make sure the gate valve regulating water flow is open before starting the condenser water pump.

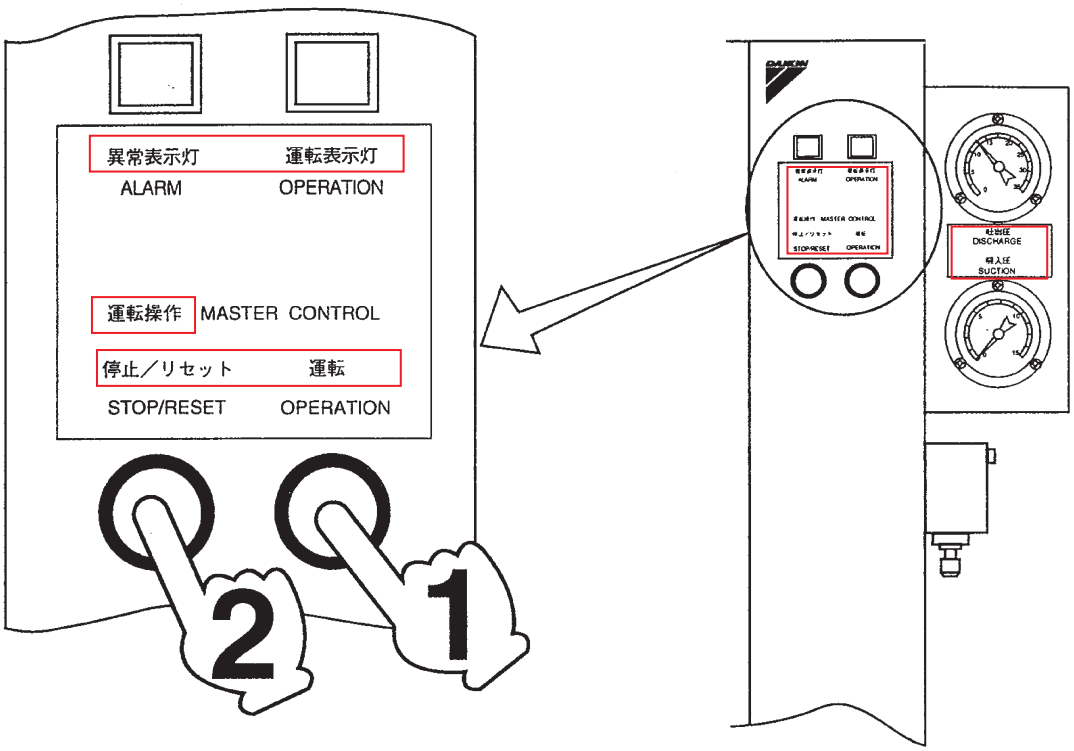
3. Set water circulating

●Purge the system.
To purge the system, open the air purge plug on the water chilling unit and the air purge cock on the fan coil unit. When the unit is filled with water, close the cock.
Note) The air purge plug is on the water outlet.

●Open the gate valve regulating water flow before starting the chilled water pump.

6 How to Operate the Chiller

C7-UWJ1320, 1700B5Y, CUW60A5Y



1 OPERATION	Push the **OPERATION** button. The operation lamp then lights and the chiller starts running. (The compressor starts a little later.)

■To stop the unit

2 STOP	Push the **STOP / RESET** button. The chiller then stops running.

●Do not shut off the power.

3	Stop the chilled water and condenser water pumps. (See “Preparations” on page 33.)

4	Close all valves. (See “Preparations” on page 33.)

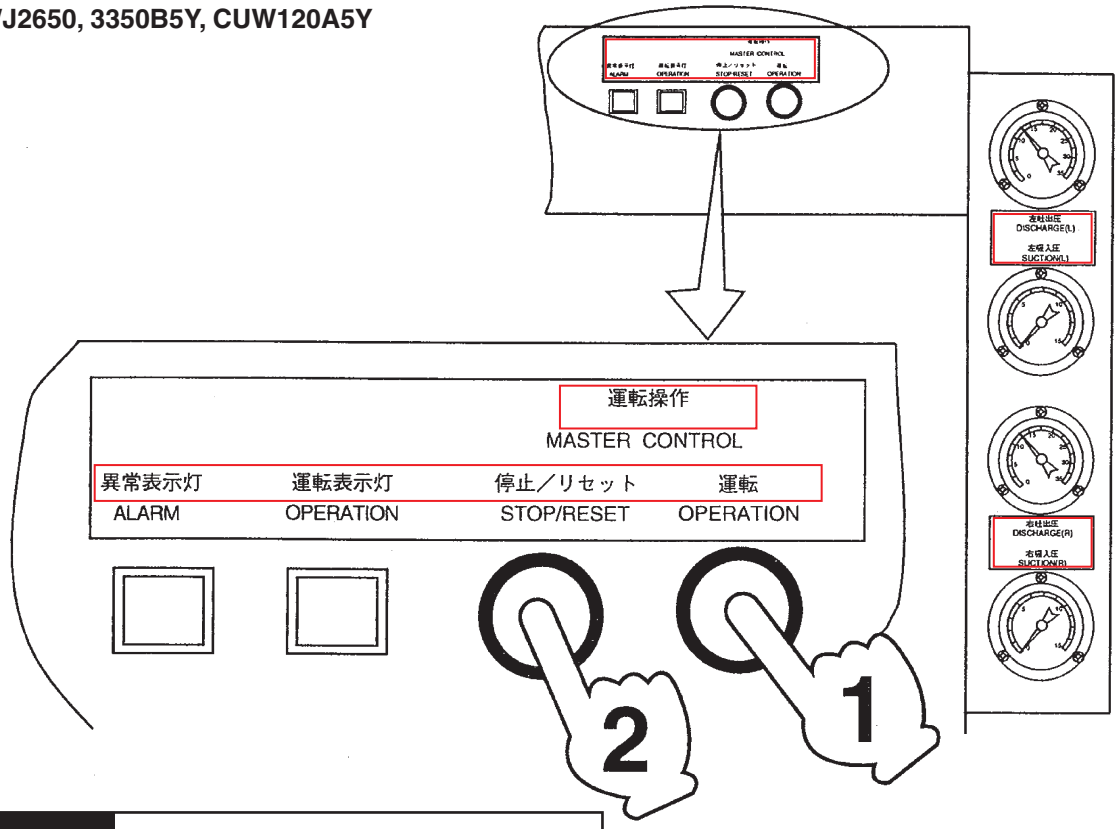
NOTE: Check the rotation direction of the compressor.

To check the rotation direction of the compressor, check the discharge pressure and suction pressure of the pressure gauge when the compressor starts.

If the pressure is abnormal, stop operation and consult with your DAIKIN dealer.

<<WRONG>>

C7-UWJ2650, 3350B5Y, CUW120A5Y



1 **OPERATION**	Push the **OPERATION** button. The operation lamp then lights and the chiller starts running. (The compressor starts a little later.)

■To stop the unit

2 **STOP**	Push the **STOP / RESET** button. The chiller then stops running.

●Do not shut off the power.

3	Stop the chilled water and condenser water pumps. (See “Preparations” on page 33.)

4	Close all valves. (See “Preparations” on page 33.)

NOTE: Check the rotation direction of the compressor.

To check the rotation direction of the compressor, check the discharge pressure and suction pressure of the pressure gauge when the compressor starts.

If the pressure is abnormal, stop operation and consult with your DAIKIN dealer.

<<WRONG>>

■ Temperature control thermostat

●The Thermostat is contained in the switch box inside the chiller.
(See “Names of Parts” on pages 24~25.)

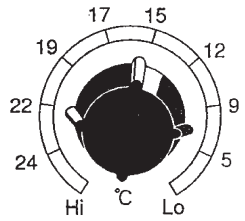
●Set water temperature with the thermostat.
Capacity is automatically controlled to keep water temperature constant.
Referring to the scale, set the knob so that cooling is normally 12°C.

●The thermostat setting scale is as shown in the figure on the right. The values are a guideline for machine inlet water temperature. When actually setting the thermostat, adjust within the working range (see page 49) while referring to the thermometers on the various chilled water pipes.

●Set the thermostat so that temperature at the outlet does not drop below 5°C while cooling. The temperature switch (freeze-up prevention) trips at 5°C, whereby stopping the chiller.

●If capacity becomes excessive, the compressor’s unloader is tripped by the thermostat, and capacity is reduced as follows.

目盛は入口水温の目安です。



ENTG.TEMPERATRE(APPROX.)

C7-UWJ1320B5Y • C7-UWJ1700B5Y • CUW60A5Y	100 → 70 → 40%
C7-UWJ2650B5Y • C7-UWJ3350B5Y • CUW120A5Y • CUW240A5Y	100 → 70 → 40 → 20%

If capacity becomes more excessive, the compressor will stop. In such case, the operation lamp will stay lit.

●Then, when the load rises, the chiller automatically restarts as indicated below.

C7-UWJ1320B5Y • C7-UWJ1700B5Y • CUW60A5Y	40%
C7-UWJ2650B5Y • C7-UWJ3350B5Y • CUW120A5Y • CUW240A5Y	20%

If the load becomes larger, sequential operation is executed in the opposite order of the previously mentioned capacity reduction.

<<WRONG>>

■ ALARM lamp

●When one of the unit's safety devices trips, the OPERATION lamp goes out and the ALARM lamp lights up.

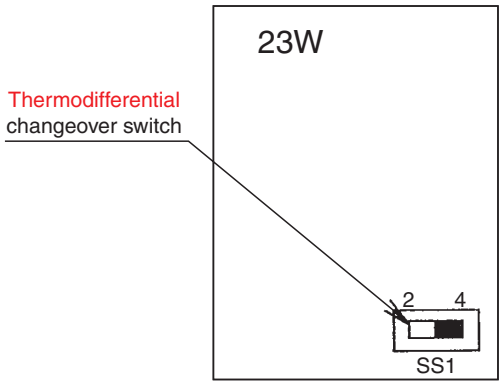
In such case, locate and eliminate the cause of the trouble (see page 47) and push the STOP/RESET button. Only then will the ALARM lamp go out and can the unit be restarted.

Note) if the pressure switch (high pressure protection) trips, follow the instructions on page 48 to reset the unit.

■ Selecting thermodifferential

●When the chiller cannot be used within the recommended working range (see page 49) because retained water level is low or for other reason, set thermodifferential changeover switch (SS1) to "4°C" . The factory setting is 2°C.

NOTE:
Do not change the setting while power is ON, to prevent trouble from occurring with the equipment.



7 Periodic Checks for Safety Devices

●**Periodically check safety devices and keep a record of checks in accordance with regulations on handling high pressure gases.**

●**Contact the place of purchase if a safety device fails to trip at its prescribed value. Values of safety devices are listed in the manufacturer's equipment specifications.**

1. Pressure switch (High pressure protection)

(1) Shut off condenser water supply.

(2) While watching the pressure gauge, check the pressure switch (high pressure protection) trips at the prescribed pressure.

(3) Reset the unit.
Note) the pressure switch (high pressure protection) must be reset by hand (see page 48)

(4) Start condenser water flow as before.

2. Safety valve

(CUW60A5Y, C7-UWJ3350B5Y, CUW120A5Y, CUW240A5Y)

●Detach the safety valve from the unit and pressurize.

3. Pressure gauge and compound gauge

●Compare gauges against a referential gauge.

Replace the gauges if off by more than half the smallest reading.

<<WRONG>>

4 Operation and Installation

⚠ Caution

- **Never touch parts which tend to become hot such as compressors and refrigerant piping.**

  Doing so could result in skin burning.

  Prohibited

- **Do not attempt to run the compressor by pushing the magnetic contactor with your finger.**

  Doing so could result in electrical shock or fire.

  Prohibited

- **Check open-closed state of all valves before usage,**

  Check valves against instructions given in the operation manual and on the nameplate.
  In particular, be sure safety valves are open while the equipment is running. If valves are open or closed when they shouldn't be, water may leak. and in worse cases. The equipment may catch fire or explode.

  Compulsory

■ Before inspecting

- ●It would be a good idea to read "**SAFETY**" once more before starting inspection.
- ●Be sure to let other maintenance technicians know that you are going to inspect the chiller.
- ●Push the **STOP/RESET** button to stop the unit.
- ●Place an "under inspection" warning curtain on the switch box.

■ Periodical inspection

- ●Check the water.
  Drain some of the water from the air purge plug. If the water is dirty, replace all the water in the system.
  Dirty water reduces operating capacity and causes corrosion of water heat exchangers and piping.
  (See water quality on page 50.)
- ●Check if the water volume has strayed from the operating range due to the strainer being clogged or the flow regulating valve being out of adjustment.
- ●Check if there is air in the water piping system.
  Even after air is purged at the beginning, air can still get inside the system. You should continue to purge the system from time to time.
- ●Clean the strainer filter periodically.
- ●Are any strange sounds being produced by the chiller?
  If so, check the source of the sounds and determine the cause.
  If you don't know where the sounds are coming from or what is causing them, contact your DAIKIN dealer.

■ Contract maintenance

- ●We recommend you enter a contract for maintenance with a DAIKIN after-sales service center or dealer capable of professional inspection.
  For details, contact your DAIKIN dealer.

<<WRONG>>

■ Daily checks

To maintain the unit in prime operating condition, check the following items daily, making adjustments where necessary and keeping a record of all checks.
Values under "Passing grade" are indicated for refrigerating machines under typical operating conditions.

When to check	Check item	Check method	Passing grade	Results
Daily	1.Discharge pressure	Check the pressure gauge.	1.1-1.7MPa (When cooling) 1.5-1.8MPa (When heating)	_____MPa
	2.Discharge pressure difference between left and right compressors (for 2 compressor circuits)	Check the pressure gauge.	Max. 0.1MPa	_____MPa
	3.Suction pressure	Check the compound gauge.	0.3-0.6MPa (When cooling) 0.3-0.6MPa (When heating)	_____MPa
	4.Suction pressure difference between left and right compressors (for 2 compressor circuits)	Check the compound gauge.	Max. 0.05MPa	_____MPa
	5.Power supply	Check the voltmeter.	Within ±10% of the rated voltage.	_____V
	6.Condenser water temperature at outlet	Check the thermometer.	30-40°C	_____°C
	7.Chilled (Hot) water temperature at outlet	Check the thermometer.	5-10°C (When cooling) 40-45°C (When heating)	_____°C
	8.Vibration and noises	Listen for noises and feel for vibrations.	No abnormal vibrations or noises.	_____
	9.Ambient temperature	Check the thermometer.	Max. 30°C	_____°C
Seasonally	1.Refrigerant charge	Check the condenser fluid gauge.	Refrigerant is within range on the gauge.	◯ Level gauge
	2.Machine oil charge	Check the compressor oil gauge.	Machine oil is within range on the gauge.	◯ Oil gauge
	3.Water quality	According to JIS K0101 or this manual.	See water quality standards on page 50.	_____

<<WRONG>>

9 Pump Down

1. Method of Pump Down

(1) Start the unit.

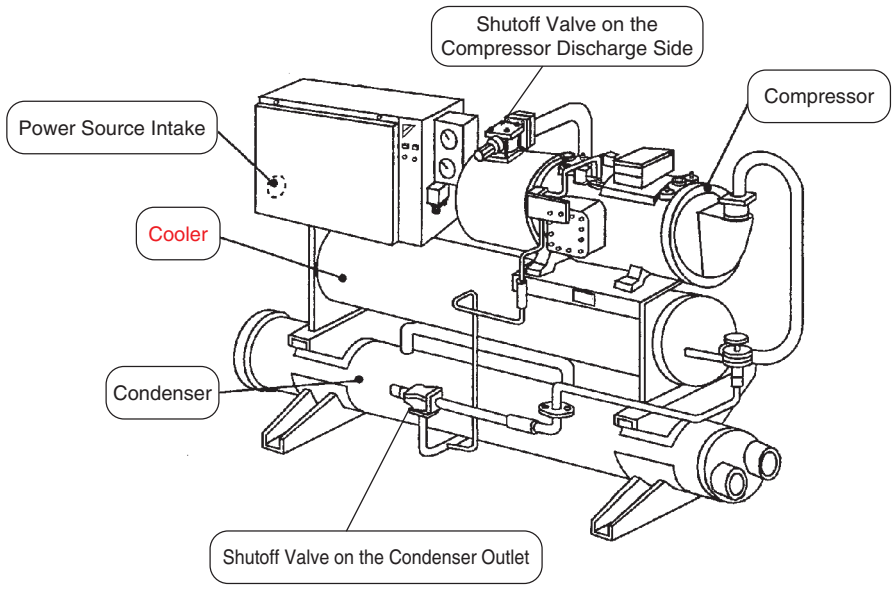
(2) Close the stop valve on the condenser outlet.

(3) If the pressure switch (Low pressure protection) trips, shut compressor discharge stop valve.

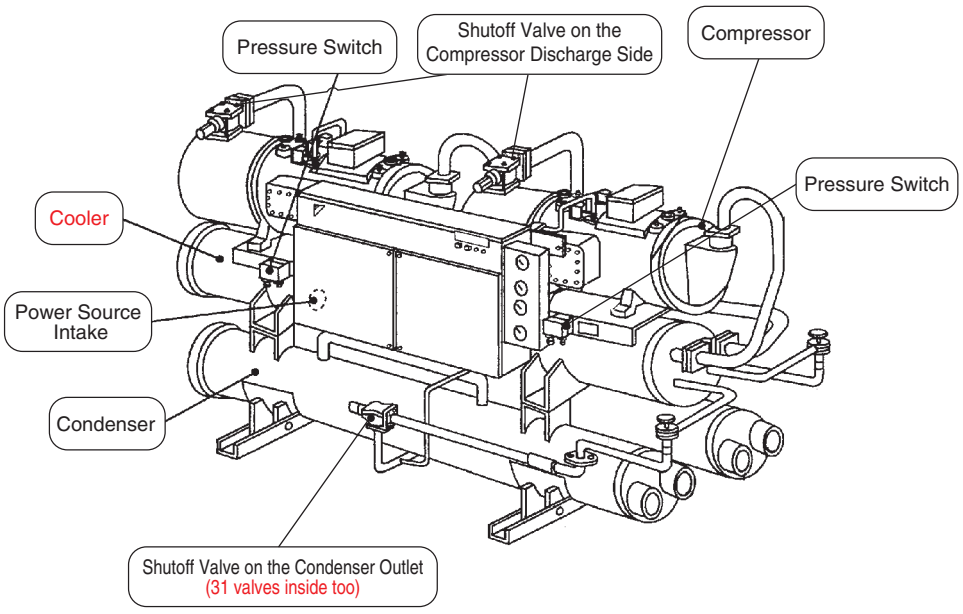
(4) Stop the unit.

Note) 1. Do not short-circuit the pressure switch (Low pressure protection) or the temperature switch (discharge gas) for any reason whatsoever.
2. Warm up the compressor for about 15 minutes before performing pump down.

C7-UWJ1320B5Y
C7-UWJ1700B5Y
CUW60A5Y



C7-UWJ2650B5Y
C7-UWJ3350B5Y
CUW120A5Y



<<WRONG>>

10 Precautions for Prolonged Idle Period

⚠Warning

- **Do not allow water to remain in the water piping during prolonged idle periods.**

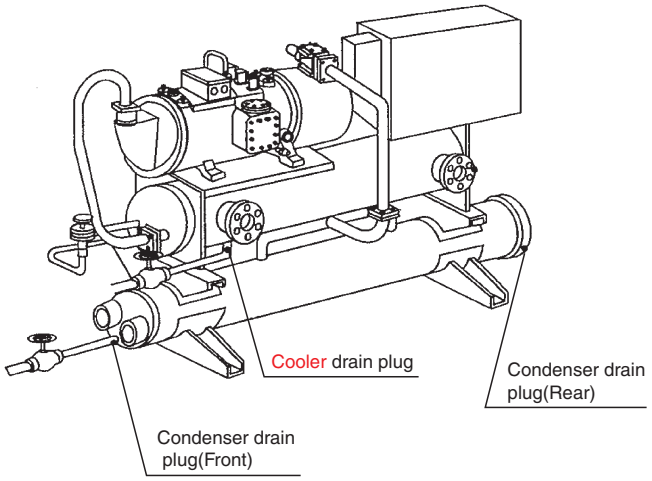
  For prolonged idle periods you should fill the water pipes with antifreeze or drain all the water from the pipes. Failure to do so could result in leaking.

●Be sure to turn off the power supply switch. If you forget to turn off the power supply switch, electricity is still supplied to the crank case heater, consuming several hundred watts of power.
In order to conserve electricity, be sure to turn off the power supply switch.

●Fully close primary side valves on the chilled water and condenser water circuits.

●In cold areas where freezing is always a winter possibility, drain the condenser and cooler completely before the cold season.

●After a prolonged idle time, you should turn the power supply switch on at least six hours before running the chiller again.
This is done in order to provide electricity to the crank case heater.



Drain plug dimensions

Models	Cooler	Condenser (Front)	Condenser (Rear)
C7-UWJ1320B5Y, C7-UWJ1700B5Y	PT3/4	PT1/4	PT1/2
CUW60A5Y, C7-UWJ2650B5Y, C7-3350B5Y, CUW120A5Y	PT1	PT1/4	PT1/2

<<WRONG>>

11 Precautions in Usage

■ Precautions in usage

●Except when not planning to use the unit for an extended period of time, do not turn OFF the power for any reason whatsoever even while the unit is merely stopped.
This ensures power is supplied to the heater even while the compressor is stopped, which makes the next start smoother.

■ Machine oil

●The unit uses a special type of machine oil, therefore do not mix-in other types of oil.
Contact DAIKIN or the nearest service center to add or change machine oil.

The machine oil used in this unit: SUNISO 4GSD

■ Means of reading pressure

●When the compressor starts up, gauges will indicate pressure accordingly.

●While cooling, regulate condenser water flow rate in order that discharge gas pressure does not rise too far above the value below.

Discharge gas pressure when cooling.....16kg/cm^2(12kg/cm^2)

Note) The first figure is indicated for a cooling tower at 30°C, Whereas the figure in parentheses is indicated for a well at 18°C.

<<WRONG>>

12 What to do When Not Functioning Properly

The following cases are not malfunctions.

State of trouble	Cause
●The chiller is stopped during winter or nights when the outdoor temperature falls to a round 0°C, and only the pump runs (chiller is receiving electricity).	The chiller is equipped with a pump for preventing water inside the piping from freezing that force-operates. For details, see the wiring diagram.
●When stopped The compressor inside the chiller is hot if touched (chiller is receiving electricity).	Electricity is supplied to the crank case heater to warm the compressor so that the chiller can be started smoothly. This is not a malfunction.

Before requesting after-sales service, please check the following items.

State of trouble	Operation lamp	Cause	Disposal
Water pump / compressor doesn't start at all.	Off	Was there a power failure?	To be safe, turn the power supply switch off temporarily.
		Is the power supply switch turned on?	Turn the power supply switch on.
		Is the power supply fuse blown?	Replace the power supply fuse.
The water pump starts but water doesn't circulate.	Off	Is their a lack of make-up water?	Replenish sufficiently with make-up water. (Water is not pumped unless the water pump and suction pipe are filled with water.)
		Is the water pump turning in reverse?	Correct the turning direction of the water pump. (Set to clockwise as seen from the motor.)
		Is the valve in the water piping open sufficiently?	Open the valve in the water piping sufficiently.
Compressor does not work but the thermostat does.	On	Is the chilled water regulating valve opened enough?	Open the chilled water regulating valve.
		Is the thermostat properly adjusted?	Properly adjust the thermostat (See "Temperature control thermostat" page 36.)
Compressor stops while cooling and will not restart automatically.	Off	Are the chilled and condenser water flow regulating valve open the proper amount?	Open the flow regulating valve the proper amount.
		Is the thermostat properly adjusted?	Properly adjust the thermostat (See "Temperature control thermostat" page 36.)
		Is the strainer for the condenser water line clogged?	Unclog the strainer.

<<WRONG>>

State of trouble	Operation lamp	Cause	Disposal
Compressor stops shortly after cooling starts. (A few moments later, the unit restarts after pressing the pressure switch [High pressure protection] reset button and START button.)	Off	Is condenser water flowing to the condenser? Is water level low?	Supply a sufficient amount of condenser water.
		Is the condenser water pump down?	Activate the condenser water pump.
		Is the condenser line strainer clogged?	Unclog the strainer.
		(For system with cooling tower) (1)Is the tower fan rotating in reverse? Has it stopped? (2)Is the tower strainer clogged? (3)Is the nozzle clogged?	(See the cooling tower instruction manual.) (1)Set fan rotation in the correct direction. (2)Unclog the strainer. (3)Inspect and clean.

●If, after checking the items given above, the chiller is still not functioning properly, contact your DAIKIN dealer. Do not attempt to repair the problem yourself.
When you call, you should be prepared to give a description of the state of trouble and the model (see pages 24~25).

⚠Warning

- **If a malfunction occurs (burning smell, etc.), turn off the power supply switch and contact your DAIKIN dealer.**

  Continuing to operate while the chiller is malfunctioning can result in equipment damage, electrical shock or fire.

<<WRONG>>

■ Safety devices (EMERGENCY lamp lights when tripped)

●The chiller is equipped with safety devices to ensure safe operation.
When a safety device is tripped,the EMERGENCY lamp lights and the chiller stops.
The chilled water pump continues to operate when a safety device other than the overcurrent relay (pump motor) trips.

Safety device	Example causes
1. Pressure switch (High pressure protection)	(1) Either condenser water is not circulating or the water level is too low. (2) Condenser water temperature is abnormally high. (3) Scale or fungus has accumulated inside the condenser.
2. Temperature switch (Freeze protection)	(1) There is an extremely small amount of chilled water. (2) The thermostat is set lower than the standard setting.
3. Temperature switch (Discharge gas)	(1) The unit is short on refrigerant due to leaking. (2) Injection solenoid remains closed because of damage. (3) Condenser outlet stop valve is closed.
4. Temperature switch (Compressor motor protection)	(1) Same as for high pressure switch. (high pressure protection)
5. Pressure switch (Low pressure protection)	(1) Expansion valve remains closed because of damage. (2) Condenser outlet stop valve is closed. (3) Chilled water level is extremely low.
6. Reverse phase protection relay	(1) The power supply is connected by reverse phase.
7. Over-current relay (Compressor motor)	(1) Same as for pressure switch. (high pressure protection)

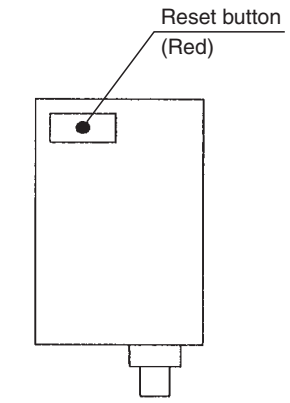
What to do when the pressure switch (high pressure protection) trips.

●The pressure switch (high pressure protection) has to be reset manually. If either of these safety devices trips, the chiller will not restart when the STOP/RESET button is pressed. (The moment that the operation button is pressed, the ALARM lamp will light up.)
You must push the reset button, and then push the STOP/RESET button before restarting.

●If you investigate but cannot determine the cause, contact your DAIKIN dealer immediately.

1. When the pressure switch (high pressure protection) trips

Some of the possible causes include low condenser water level, high condenser water temperature and contamination in the condenser. Investigate the cause and take the necessary remedial action before restarting the chiller.
(For installation position of pressure switches, see page 24~25.)



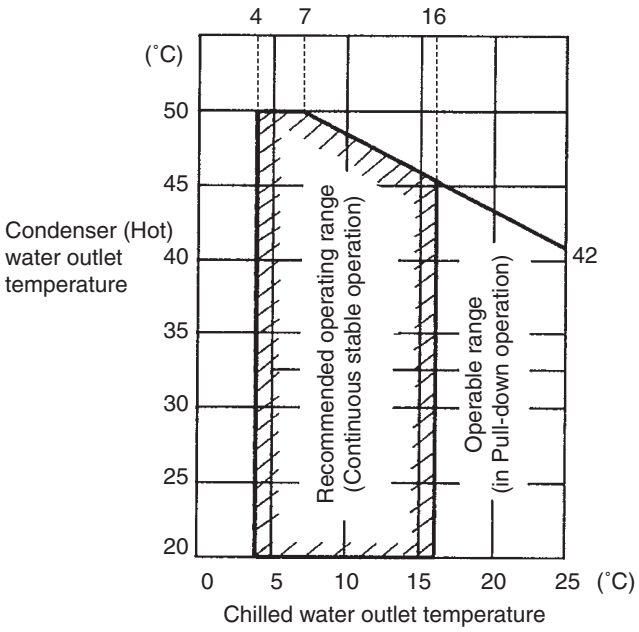
Pressure relay
(High pressure protection)

<<WRONG>>

13 Working Range

■ Working Range

●The chiller should be used only within the range indicated by slanted lines.



NOTE: Make sure the chiller is within the recommended operating range within one hour after starting operation.

●Make sure operation conforms to the following restrictions.

Item	Contents
Power supply voltage	Within ± 10% of rated voltage
Phase unbalance	Within ± 2% of rated voltage
Power supply frequency	Within ± 2% of rated
Chilled and condenser water temperature limits.	Working range given above
Pull-down duration	Within one hour (at no load)
Cooling capacity and input	According to JISB8613
Start/stop interval of compressor	Max. 6 operating and stopping times within one hour.
Chilled and condenser water quality	JRA-GL-02 water quality standard for chilled water system (See following page.) No soluble matters deteriorating copper and stainless steel shall be included.
Chilled and condenser water velocity	0.6~1.5 m/sec (Shell cooler) 0.7~2.5 m/sec (Shell condenser)
Chilled and condenser water pressure	Less than 0.69MPa {7 kg/cm^2} shall apply.
Installing location	Indoor (Take measures to keep rain off equipment)
Water dripping out of machine	Provide foundation with pit for various drainage.

Refer to technical reference materials for items not listed above.

<<WRONG>>

Water quality

The quality of chilled (hot) water and condenser water when the chiller is running largely affects the chiller's performance and life. It is therefore very important to check the quality of before using, and to monitor the quality of water after installing the chiller.
Water quality standard values are as shown in the table below according to Japan Refrigeration and Air Conditioning Industry Association (JRA).
Water quality of make-up water and circulating water should be checked separately with a certain amount of make-up water and blow, while maintaining circulating water standards. Water should be treated with chemicals as required.

Water quality standards for condenser water, chilled water, hot water, and make-up water

From JRA GL-02-1994 "Guideline of Water Quality for Refrigerators and Air Conditioning Equipment"

※ JRA: Japan Refrigeration and Air Conditioning Industry Association

	Item (1)(6)	Condenser water system (4)			Chilled water system		Tendency (2)	
		Circulation system		Pass-through system				
		Circulation water	Make-up water	Passing water	Circulation water (Max.20°C)	Make-up water	Corrosion	Scale deposit
Standard item	pH(25°C)	6.5~8.2	6.0~8.0	6.8~8.0	6.8~8.0	6.8~8.0	○	○
	Electrical Conductivity (mS/m)(25°C)(1) { μS/cm}(25°C)	Less than 80 {Less than 800}	Less than 30 {Less than 300}	Less than 40 {Less than 400}	Less than 40 {Less than 400}	Less than 30 {Less than 300}	○	○
	Chloride ions ($mgcl^-/\ell$)	Less than 200	Less than 50	Less than 50	Less than 50	Less than 50	○	
	Sulfate ions ($mgSO_4^{2-}/\ell$)	Less than 200	Less than 50	Less than 50	Less than 50	Less than 50	○	
	Acid consumption (pH4.8) ($mgCaCO_3/\ell$)	Less than 100	Less than 50	Less than 50	Less than 50	Less than 50		○
	Total hardness ($mgCaCO_3/\ell$)	Less than 200	Less than 70	Less than 70	Less than 70	Less than 70		○
	Calcium hardness ($mgCaCO_3/\ell$)	Less than 150	Less than 50	Less than 50	Less than 50	Less than 50		○
	Ionic-state silica ($mgSiO_2/\ell$)	Less than 50	Less than 30	Less than 30	Less than 30	Less than 30		○
Reference item	Iron ($mgFe/\ell$)	Less than 1.0	Less than 0.3	Less than 1.0	Less than 1.0	Less than 0.3	○	○
	Copper ($mgCu/\ell$)	Less than 0.3	Less than 0.1	Less than 1.0	Less than 1.0	Less than 0.1	○	
	Sulfide ion (mgS^{2-}/ℓ)	Shall not be detected	Shall not be detected	Shall not be detected	Shall not be detected	Shall not be detected	○	
	Ammonium ion ($mgNH_4^+/\ell$)	Less than 1.0	Less than 0.1	Less than 1.0	Less than 1.0	Less than 0.1	○	
	Residual chlorine ($mgCl/\ell$)	Less than 0.3	Less than 0.3	Less than 0.3	Less than 0.3	Less than 0.3	○	
	Free carbon dioxide ($mgCO_2/\ell$)	Less than 4.0	Less than 4.0	Less than 4.0	Less than 4.0	Less than 4.0		
	Stability index	6.0~7.0	—	—	—	—	○	○

Notes: (1) The item names, their definitions and units are based on the standard JISK0101. The units and figures inside the parentheses are based on the conventional units, written fore reference.
(2) The circle marks in the columns on the right indicate tendency for corrosion or scale to develop.
(3) Corrosion has a tendency to occur when water temperature is high (40°C or higher), and if metals with no protective coating whatever are directly exposed to water, it would be a good idea to take effective measures against corrosion such as adding a corrosion inhibitor or deaeration treatment.
(4) In a condenser water circuit that uses a closed cooling tower.
Condenser water and make-up water must satisfy its water quality standards for hot water system and passing water and make-up water must satisfy those for condenser water systems.
(5) Supply or make-up water should be tap water (from water-works) or water for industrial use. Pure water, neutral water or softened water should not be used.
(6) The 15 items in the table above represent typical causes of corrosion and scale.

<<WRONG>>

2 Air Conditioning Equipment Design Procedure

The air-cooled heat pump chiller (UWY) is a heat source unit for a centralized cooling/heating system and, when combined with air handling units (AV) or fan coil units (FW), the chiller can be used for cooling or heating. Select an optimum combination out of various UWY centralized cooling/heating systems considering applications and shapes of buildings, surrounding conditions, maintenance control, etc.

Step 1 Design Conditions

- Ambient temperature at cooling or heating ··· Use the ambient temperature that creates the maximum difference from the sol-air for temperature.
- Room temperature for cooling or heating
- Operating time ..... Pay special attention to buildings such as bars or amusement halls where air conditioning equipment is used at different time of a day compared with ordinary office buildings. Air conditioning load fluctuations, particularly cooling load changes, are large in these buildings.
- Operating period
- Startup time ····· Pay attention to cases where operating time is limited. Places like a public hall must be cooled or heated to a specified level before they are actually used.
- Simultaneous use rate — Be sure to consult with clients for determining the rate of simultaneous use.
  - Houses ... 0.4 to 0.6 during cooling, 0.6 to 0.8 during heating
  - Ordinary building ... 1.0 during cooling and heating (same rate for heating and cooling)

Step 2 Building conditions

- Air conditioning area ... Pay careful attention when using corridors, etc. for routing return circuits using ducts, etc. The return circuits must be included in the air conditioning area.
- Structure

Step 3 Load calculation

- Calculate design load according to the above conditions.

Step 4 Selection of air-cooled heat pump chillers

- Determination of water temperature
  Chiller outlet water temperature ..... 5°C to 7°C for chilled water temperature during cooling and 43°C to 47°C for hot water temperature during heating.

When designing for ordinary houses, set the hot water temperature during heating to 45°C to 50°C to shorten the heating startup time.

- Required capacity of the chiller UWY

= load x simultaneous use rate x 1.1
Chiller UWY capacity≥Required capacity (heat loss)
Select a chiller UWY to satisfy both the cooling and heating capacities.

Step 5 Selection of an air conditioner

- Select an air conditioner that satisfies both the cooling and heating capacities. For many houses, air conditioners are used for cooling or heating individual rooms, not for all the rooms. Therefore, when selecting an air conditioner, assume that surrounding rooms are not air conditioned.

Step 6 Determining piping size

- Circulation water flow rate — Determine the circulation water flow rate based on the air conditioner. When the flow rate exceeds the limit flow rate specified for the chiller, consider providing a snubber tank.
- Loss resistance ..... Select a pipe size so that its loss resistance for 1m is within 30 to 100 mmH2O and the passage water speed must be less than 3m for larger size.

Step 7 Selection of circulation water pump

<<WRONG>>

2 Specifications

1 Standard Specifications

Water chilling unit (Water cooled type)

Item			Model	C7-UWJ1320B5Y	C7-UWJ1700B5Y	CUW60A5Y
☆Cooling	Capacity ($^{50}/_{60}$Hz)	kW		118/132	150/170	180/200
	Chilled water flow rate ($^{50}/_{60}$Hz)	ℓ/min		338/378	430/487	516/573
	Pressure drop ($^{50}/_{60}$Hz)	ℓ/min		421/478	532/615	641/725
Power source				3 phase 380, 400, 415V/400, 440 VAC 50/60Hz		
Control power source				Single phase 200 VAC 50/60Hz		
Type				Water chilling unit (Water cooled type)		
Exterior				Ivory white (5Y7.5/1)		
External dimensions	H × W × D	mm		1360×2325×650	1390×2430×725	1425×2460×725
Compressor	Model			ZH3LSFYE(50Hz) ZH3LSFYB(60Hz)	ZH5MLFYE/ ZH5MLFYB	ZH5LLFYE/ ZH5LLFYB
	Type			Hermetically sealed scroll type	Semi-hermetically sealed single scroll type	
	Motor output×No.of units	kW		30×1	37×1	45×1
	Starting system			人–△ start		
Heat exchanger on water side	Model			CXC2118	CXC2120	CF3220-C6
	Type			Shell and cross fine tube type		
	No. of units			1		
Evaporator	Model			DHG2414	DHG2418	DHD3220-C6
	Type			Brazed plate type	Shell and HI-X tube type	
	No. of units			1		
Refrigerant control				Thermal expansion valve		
Thermostat				Electronic thermostat for chilled water		
Capacity control		%		100-70-40-0		
Insulation material				Foam polyethylene		
Protection device				See page 13		
Refrig-erant	Name			R22		
	Charge	kg		16	20	24
Refriger-ation oil	Name			SUNISO 4GSD		
	Charge	ℓ		7.5	10	
Pipe con-nections	Condenser water inlet/outlet			PT3 Internal thread		PT4 Internal thread
	Chilled water inlet/outlet			PT3 Internal thread		4B Flange (JIS10K)
	Drain outlet			PT$^{3}/_{4}$ Internal thread for chilled water PT$^{1}/_{4}$ Internal thread for cooling water	PT1 Internal thread for chilled water, PT1$^{1}/_{4}$ Internal thread for cooling water	
Weight (operating weight)		kg		775(830)	960(1020)	1025(1105)
Standard accessories				Instruction manual, Installation manual, strainer for chilled and cooling water, warranty card, fuse	Instruction manual, warranty card, fuse, foundation bolt, vibration-isolating pad, warning sign.	
[In case of modified heat-pump]---Only the specifications different from standard specifications are indicated.						
★Heating	Capacity ($^{50}/_{60}$Hz)	kW		46.8/52.7	175/204	212/240
	Hot water flow rate ($^{50}/_{60}$Hz)	ℓ/min		134/151	502/586	606/690
	Chilled water flow rate ($^{50}/_{60}$Hz)	ℓ/min		60/66	226/256	271/302
Hot water thermostat				Electronic thermostat for chilled water		

(Notes)

☆1: The values shown are based on leaving chilled water outlet temperature of 7°C, inlet/outlet temperature difference of 5°C, and condenser water inlet temperature of 30°C D.B.

★2: The values shown are based on leaving hot water outlet temperature of 45°C, inlet/outlet temperature difference of 5°C, and chilled water inlet temperature of 15.5°C D.B.

<<CORRECT>>

Water chilling unit (Water cooled type)

Item \ Model				C7-UWJ2650B5Y	C7-UWJ3350B5Y	CUW120A5Y	CUW240A5Y
☆Cooling	Capacity	($^{50}/_{60}$Hz)	kW	236/265	300/335	355/400	760/800
	Chilled water flow rate	($^{50}/_{60}$Hz)	ℓ/min	677/760	860/960	1018/1147	2178/2294
	Pressure drop	($^{50}/_{60}$Hz)	ℓ/min	841/960	1064/1214	1266/1449	2550/2910
Power source				3 phase 380, 400, 415V/400, 440 VAC 50/60Hz			3 phase 380V, 50Hz
Control power source				Single phase 200 VAC 50/60Hz			220VAC 50/60Hz
Type				Water chilling unit (Water cooled type)			
Exterior				Ivory white (5Y7.5/1)			
External dimensions	H×W×D		mm	1310×2835×900	1525×2785×995	1525×2840×980	2180×2855×1455
Compressor	Model			ZH3LSFYE/ ZH3LSFYB	ZH5MLFYE/ ZH5MLFYB	ZH5LLFYE/ ZH5LLFYB	ZH9SLFCYE
	Type			Semi-hermetically sealed single scroll type			Semi-hermetic single screw type
	Motor output×No.of units		kW	30×2	37×2	40×2	90×2
	Starting system			人−△ start			
Heat exchanger on water side	Model			CXC1920	CXC2120-1	CXC2420-14	CF4520-C12
	Type			Shell and cross fine tube type			
	No. of units			2			
Evaporator	Model			DHG2724	DHG3222	DHG3224	DHD4020-C24
	Type			Shell and HI-X tube type			Dry Expansion shell and Hi-x Tube Type
	No. of units			1			2
Refrigerant control				Thermal expansion valve			
Thermostat				Electronic thermostat for chilled water			
Capacity control			%	100-70-40-20-0			
Insulation material				Foam polyethylene			
Protection device				See page 13			
Refrig-erant	Name			R22			
	Charge		kg	16×2	20×2	24×2	60×2
Refriger-ation oil	Name			SUNISO 4GSD			
	Charge		ℓ	7.5×2	10×2	10×2	14×2
Pipe con-nections	Condenser water inlet/outlet			PT3 Internal thread		PT4 Internal thread	6B flange (connect to ϕ159 tube)
	Chilled water inlet/outlet			4B Flange (JIS10K)		5B Flange (JIS10K)	Inlet 6B flange (connect to ϕ 159 tube) Outlet 5B flange (connect to ϕ 140 tube)
	Drain outlet			PT1 Internal thread for chilled water, PT1¼ Internal thread for cooling water			-
Weight (operating weight)			kg	1395(1500)	1790(1925)	1930(2085)	4880(5380)
Standard accessories				Instruction manual, warranty card, fuse, foundation bolt, vibration-isolating pad, warning sign.			Operation manual, fuse, warranty, mating flange
[In case of modified heat-pump]---Only the specifications different from standard specifications are indicated.							
★Heating	Capacity	($^{50}/_{60}$Hz)	kW	277/319	350/403	422/485	838/985
	Hot water flow rate	($^{50}/_{60}$Hz)	ℓ/min	795/914	1004/1156	1197/1380	2405/2755
	Chilled water flow rate	($^{50}/_{60}$Hz)	ℓ/min	356/401	452/509	535/605	1055/1210
Hot water thermostat				Electronic thermostat for chilled water			

(Notes)

☆1: The values shown are based on leaving chilled water outlet temperature of 7°C, inlet/outlet temperature difference of 5°C, and condenser water inlet temperature of 30°C D.B.

★2: The values shown are based on leaving hot water outlet temperature of 45°C, inlet/outlet temperature difference of 5°C, and chilled water inlet temperature of 15.5°C D.B.

<<CORRECT>>

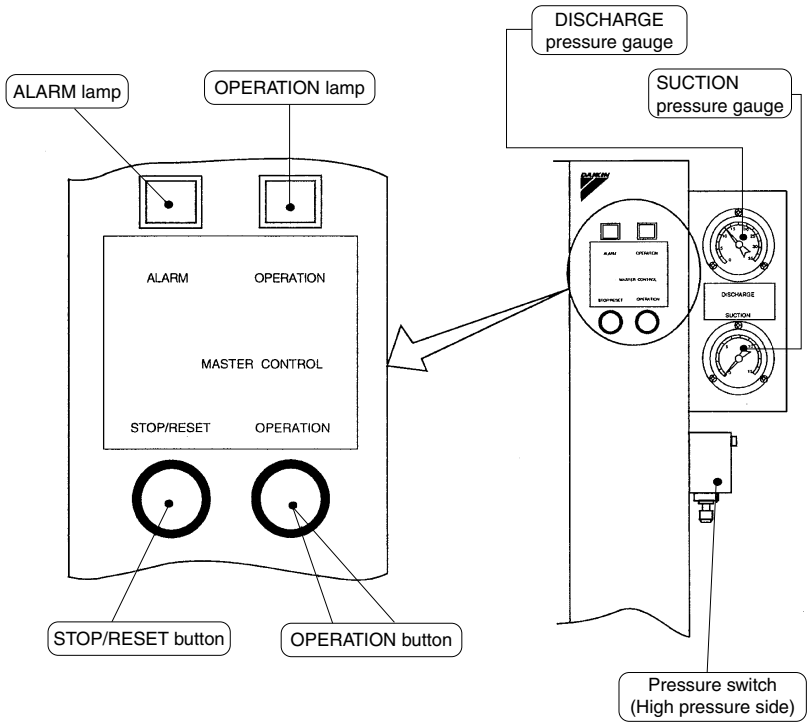
2 ALARM Lamp

● When one of the unit's safety devices trips, the OPERATION lamp goes out and the ALARM lamp lights up.

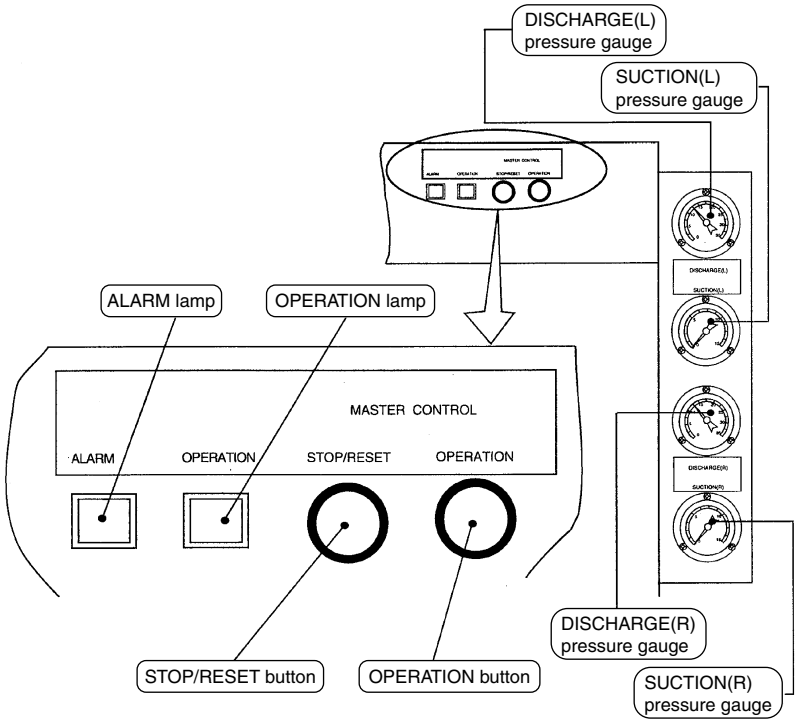
In such case, locate and eliminate the cause of the trouble (see page 45) and push the STOP/RESET button. Only then will the ALARM lamp go out and can the unit be restarted.

Note) if the pressure switch (high pressure protection) trips, follow the instructions on page 48 to reset the unit.

C7-UWJ1320, 1700B5Y, CUW60A5Y



C7-UWJ2650, 3350B5Y, CUW120A5Y

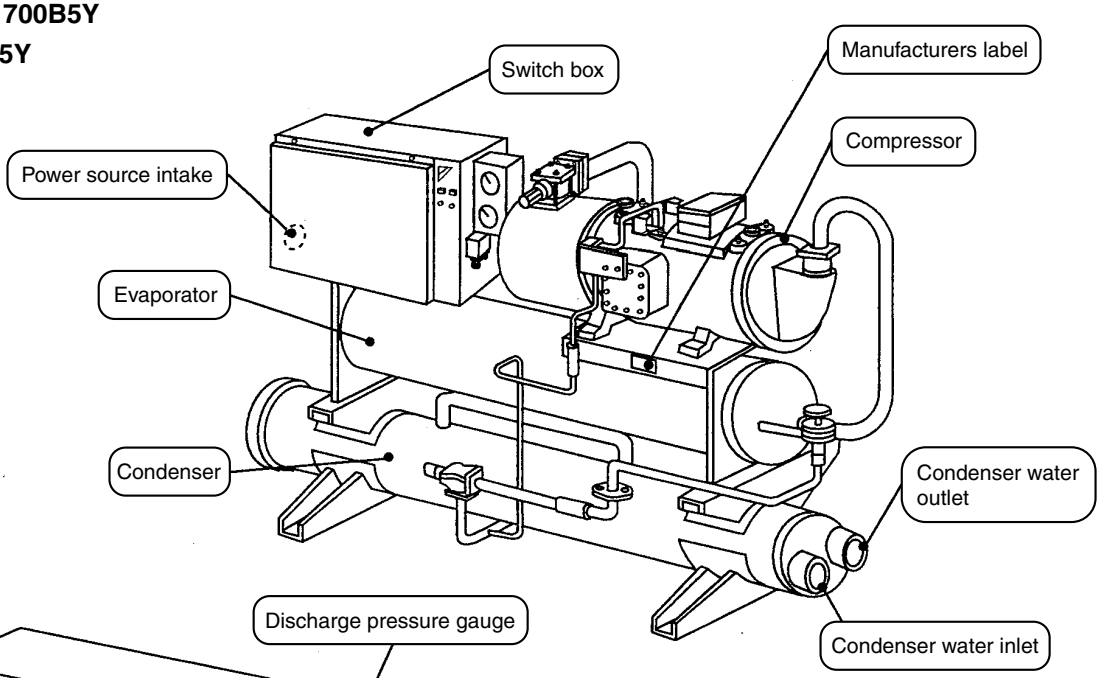


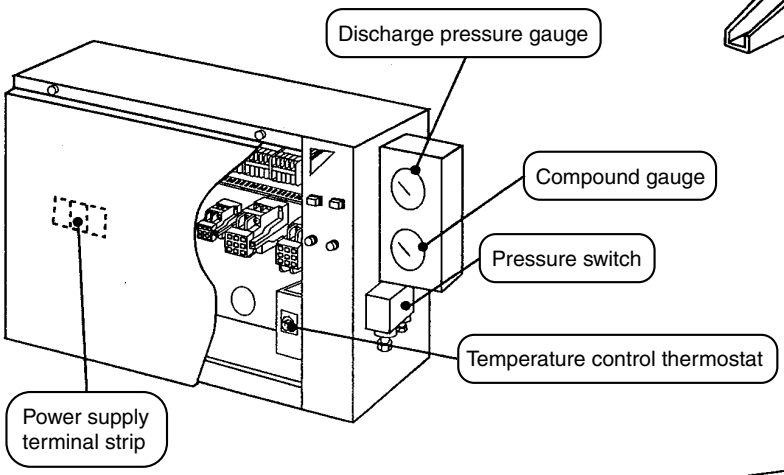
<<CORRECT>>

4 Operation and Installation

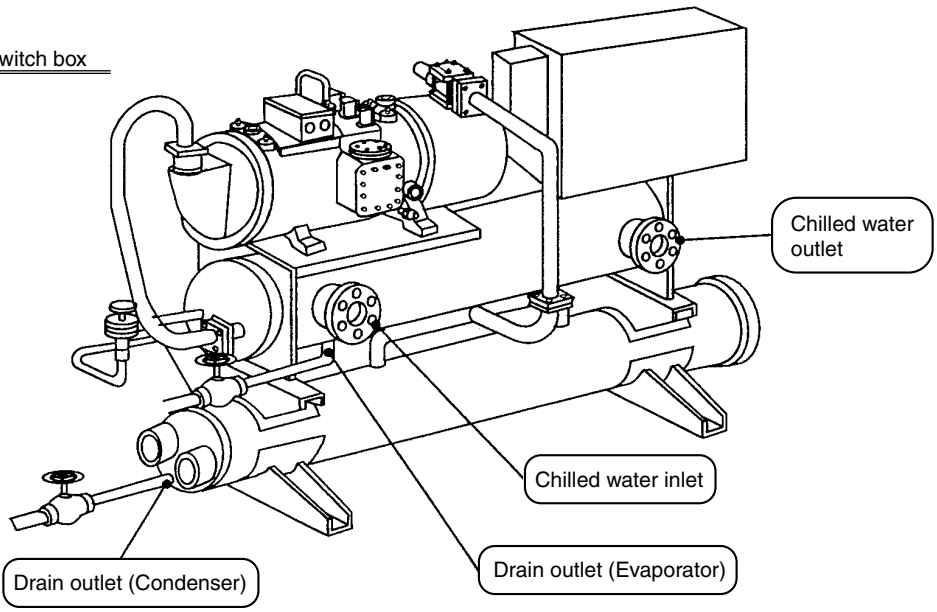
1 Names of Parts

C7-UWJ1320B5Y
C7-UWJ1700B5Y
CUW60A5Y





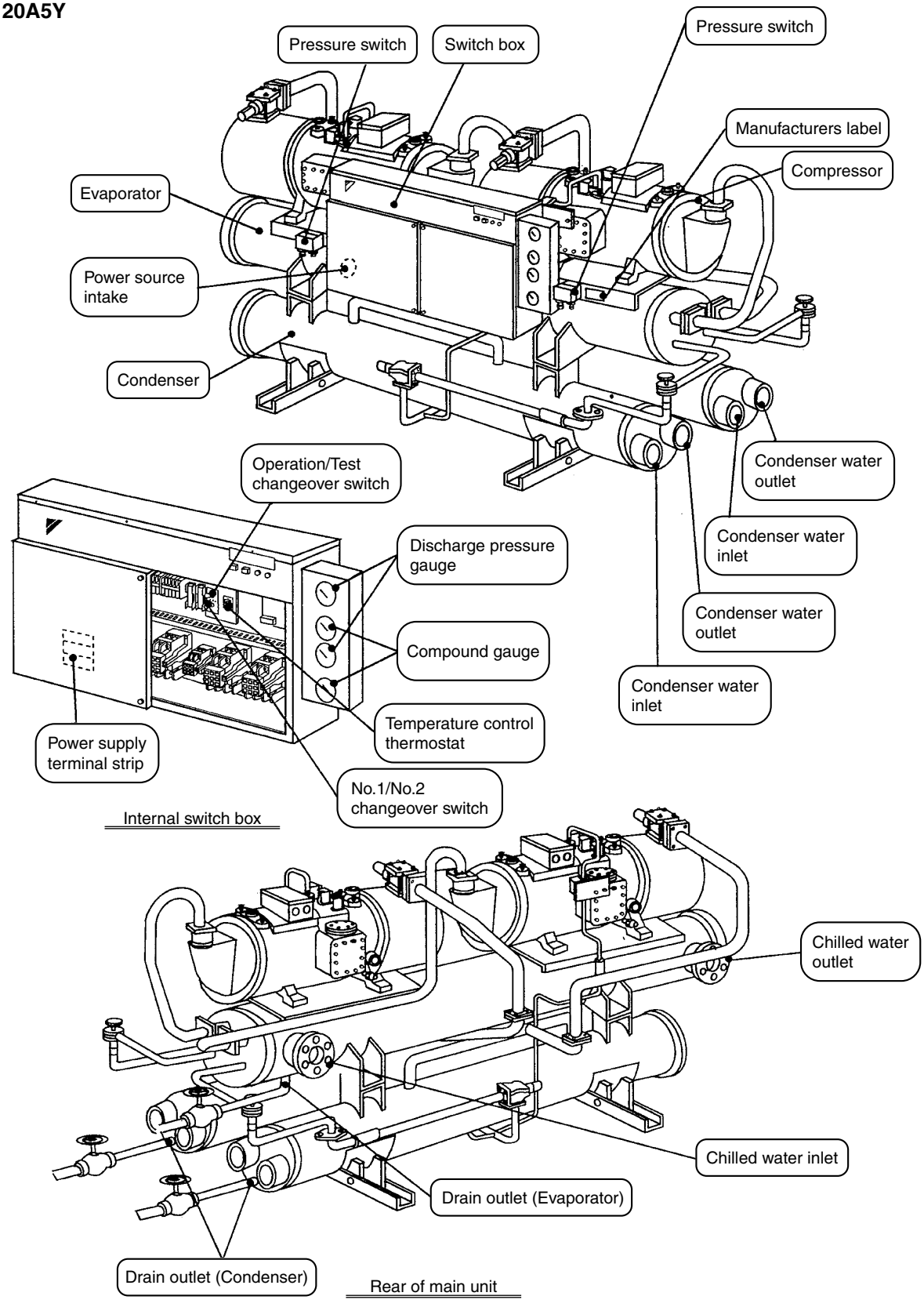
Internal switch box



Rear of main unit

<<CORRECT>>

C7-UWJ2650B5Y
C7-UWJ3350B5Y
CUW120A5Y

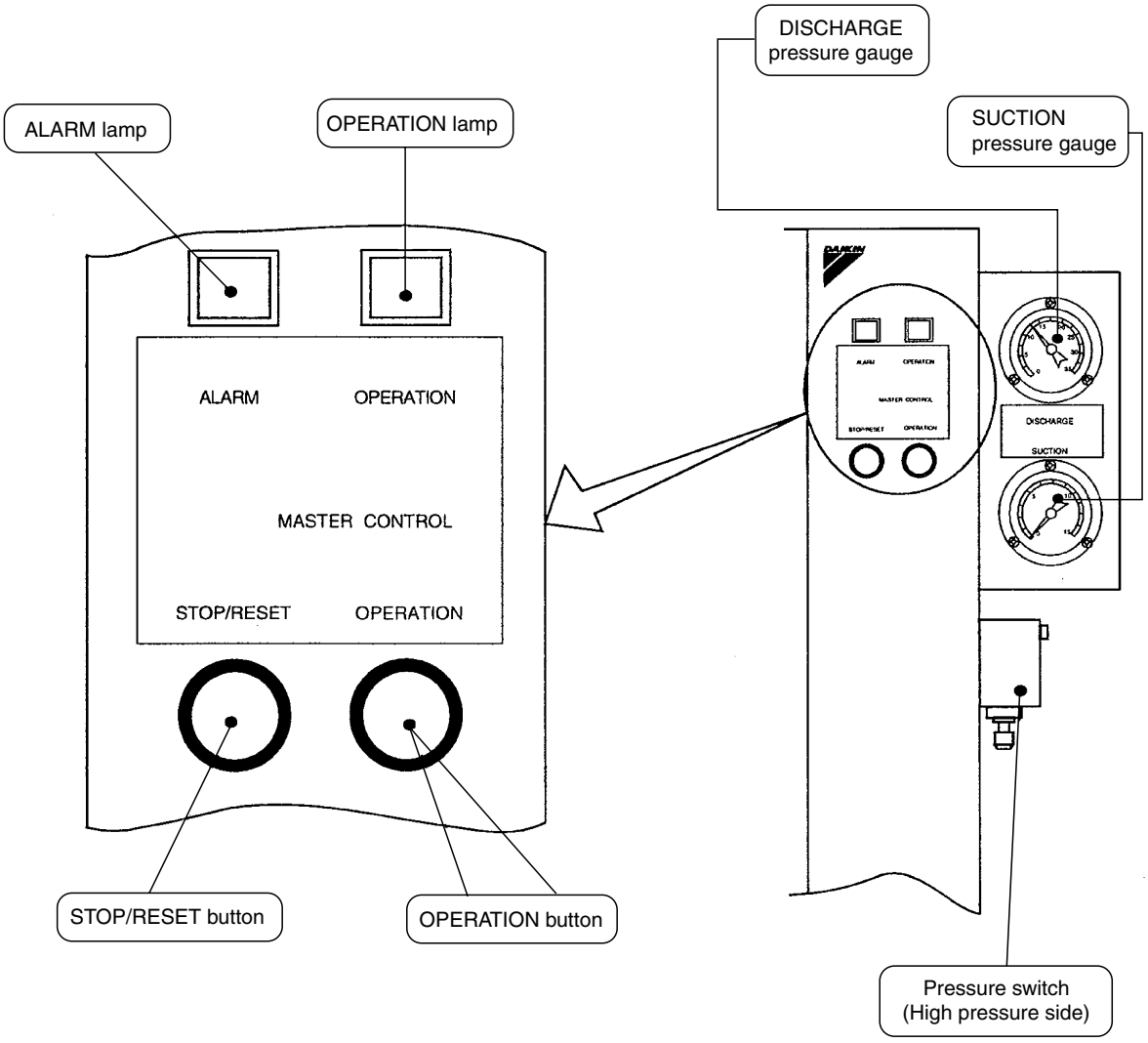


<<CORRECT>>

2 Control Panel Names of Part and Functions

The unit is operated by push buttons on the switch box.

C7-UWJ1320, 1700B5Y, CUW60A5Y



●OPERATION button ..... Push to start operation.
(See page 34.)

●STOP/RESET button ..... Push to stop the unit or reset the unit when trouble occurs.
(See page 34.)

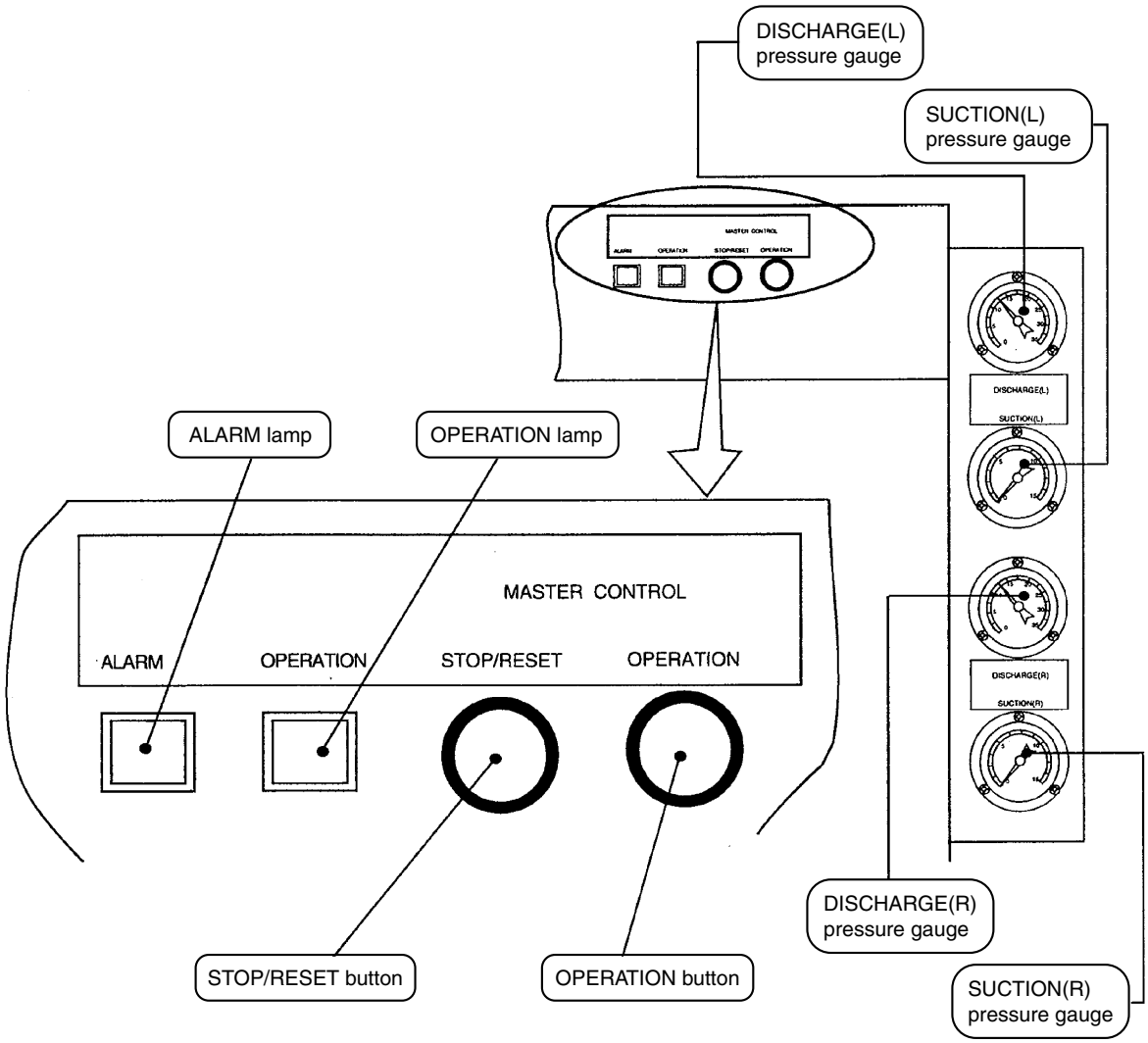
●OPERATION lamp ..... Lights while the unit is running.

●ALARM lamp ..... Lights when a safety device is tripped while the chiller is running.
(See page 47.)

<<CORRECT>>

The unit is operated by push buttons on the switch box.

C7-UWJ2650, 3350B5Y, CUW120A5Y



●OPERATION button ..... Push to start operation.
(See page 35.)

●STOP/RESET button ..... Push to stop the unit or reset the unit when trouble occurs.
(See page 35.)

●OPERATION lamp ..... Lights while the unit is running.

●ALARM lamp ..... Lights when a safety device is tripped while the chiller is running.
(See page 47.)

3 Installation

■ Installation location

- ●Be sure to provide sufficient space for maintenance.
- ●Do not install in a place with high humidity.
- ●The chiller should be installed to facilitate connection of water piping and electric wiring.
- ●Be sure to provide vibration isolation (vibration isolation pad, vibration isolation frame, etc.) in accordance with installation conditions. If vibration isolation is not provided, vibration could be transmitted from where it is installed, causing sound to be produced from the floor or walls in some cases. Proper vibration isolation is particularly important when the chiller is to be installed indoors.
- ●The unit produces drainage depending on operating state. Take drainage measures such as providing a drainage ditch, etc., as needed. See pages 24~25 for the location of the drain outlet.

■ Grounding

- ●Grounding work.

  To prevent electric shocks, be sure to ground the equipment. Qualification are required to perform the grounding work.

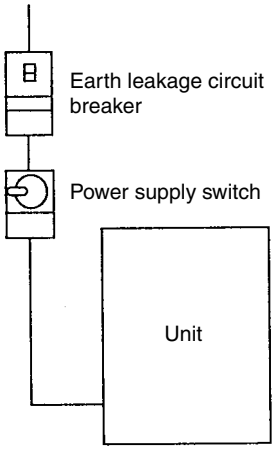
Power supply (3 phases, 380, 400, 415V/400, 440V, 50/60Hz)	C class grounding (3rd-class grounding in particular)

■ Electrical work

The nominal output of the chiller differs from that of a conventional electric motor. Be sure to select the size of the power supply cable in accordance with the specified instructions for external wiring. For details, consult with your DAIKIN dealer.

- ●Be sure to provide a power supply with a power supply switch and earth leakage circuit breaker.
- ●Be sure to connect an interlock so the compressor cannot be operated if the switch of the condenser water pump and chilled water pump is not on. A spare terminal is provided in the switch box for that purpose. For the connection method, refer to the wiring diagram on the front cover of the switch box.
- ●Wire so that the water pump can be operated independently. This is done so the pump can be operated in order to prevent freezing when the inside water temperature drops (low outdoor temp., etc.).
- ●Transformer and reverse phase protector are set to 400/400, 440V (50/60Hz).

  If power supplies differ from above, modify connection to match power supply (380V, 415V, etc.) in accordance with the wiring diagram.



<<CORRECT>>

■ Water piping work

●Be sure to install a strainer on the water inlet side, and provide a dirt pocket in a suitable place.

If sand, dirt or rust gets into the water system, the metal materials will become mechanically corroded.

(The strainer and dirt pocket require periodic maintenance. Select a location that allows space for maintenance.)

●The chiller does not come with water pump. Be sure to install a water pump that matches piping resistance.

●Install a flow regulating valve (gate valve) on the outlet/inlet water piping.

●Install a thermometer on the water inlets and outlets. This helps you know the operating condition of the chiller.

●The connection diameter is the same as piping. Use an item of same or larger diameter.

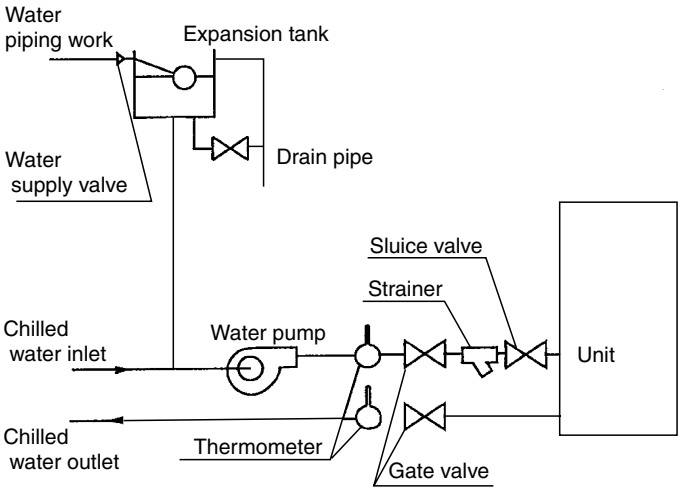
●Be sure to cold-insulate chilled water piping with anti-sweating tubing.

●Water quality standards for chilled water specify circulating water as a premise.
(See water quality standards on page 50.) Using sub-standard water could result in corrosion.

⚠ CAUTION

Be careful not to install the water inlet and outlet inversely.

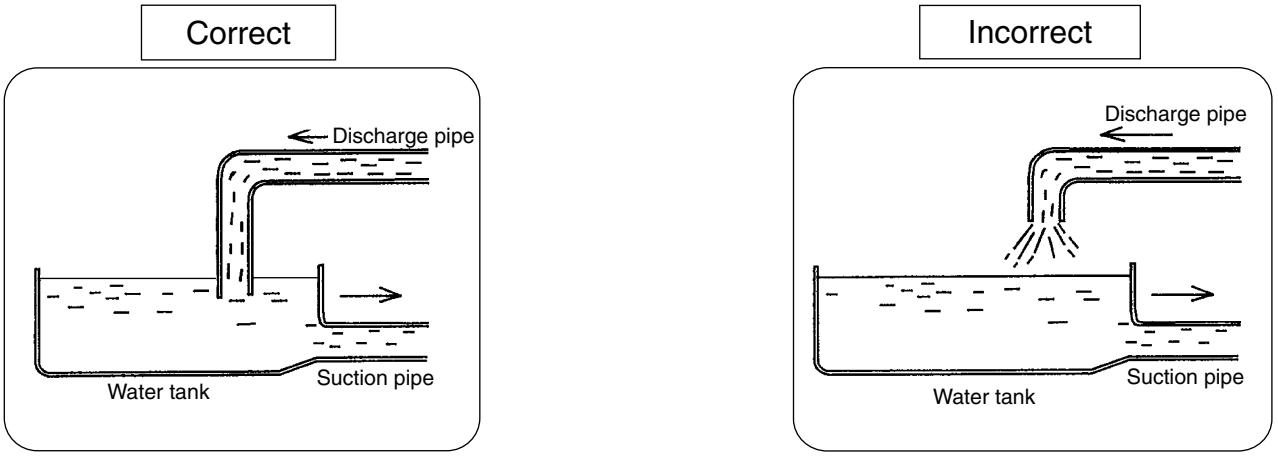
If the inlet and outlet are connected inversely, the chiller will not function properly and could furthermore be damaged.



●Keep the water level within the operating range. We recommend using approx.70-150% rated water level. If the level is too low, performance could be reduced by adherence of scale, the freeze prevention sensor could be tripped, or gas leaks could develop due to pitting corrosion. If the level is too high, it could result in corrosion. Using the flow regulating valve on the chiller's outlet, adjust the flow rate so that the difference in inlet and outlet water temperature is about 5°C when operating with a full load.

●Check the flow direction if the unit is equipped with a flow switch.

●Do not aerate water in the water circulation system as shown in the figure below. Aerating the water causes the dissolved oxygen to increase, and pollutants in the atmosphere to condense in the water cause the water to become corrosive.



The discharge outlet must be below the water level of the water tank.

●Do not ground any other electrical equipment to the chiller's water piping.
This may cause electrolytic corrosion in some cases. Be sure to take rust prevention measures for piping buried in the ground.

●Note the flow speed of water in the system, the position of the expansion tank, and the position of the air purge plug in the piping so that cavitation is not produced.

■ Condenser water quality

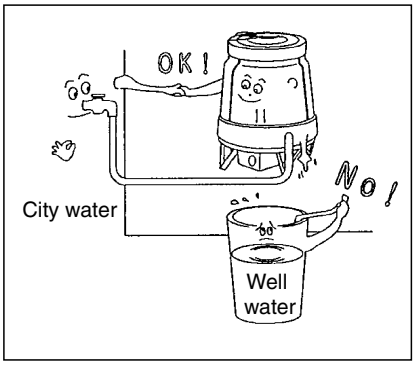
To keep the chiller operating to its full potential over an extended period of time, you should keep condenser water as clean as possible. Poor water quality reduces cooling performance, and contributes to greater power consumption. It can also significantly shorten the life of the chiller.

For water standards, see "Water quality" on page 50.

1. Precautions concerning water quality

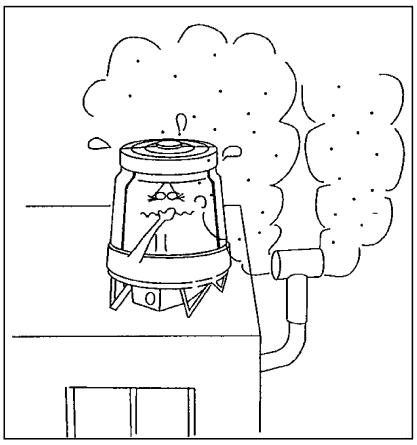
●Use city water to fill the water tower.

●If using water from any source other than city water, be sure to check the quality of the water. If the quality is not complied with standard, you must add chemicals or increase drainage. Scale particularly tends to build up on the condenser when using well water. For details, contact your DAIKIN dealer.



<<CORRECT>>

●Do not install the cooling tower near to exhaust outlets such as smokestacks. Smoke and corrosive gases drawn into the cooling tower will contaminate water inside and may eventually lead to corrosion inside the water chiller.



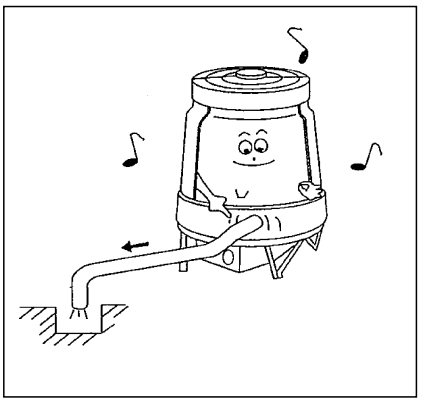
2. Maintenance and checks

●Condenser water circulation water is affected by concentration of dissolved oxygen caused by constant evaporation of water in the cooling tower.

●Forced-blow water lines (repeatedly drain and refill the system to prevent water quality deterioration).
When the cooling tower runs for long periods of time, water quality deteriorates, leading possibly to scale deposits or corrosion inside the condenser.

For details, contact your DAIKIN dealer.

●If the cooling tower is not equipped for forced-blow, periodically change water inside.



3. Condenser cleaning

●Clean the condenser about once every season. When the cooling tower runs for long periods of time, scale and fungus may form inside. This lowers cooling capacity which may cause one of the safety devices to trip from time to time, and possibly prevent you from using the unit as you would normally.

●In areas where water quality cannot be ensured, clean the condenser more frequently.

●For help on cleaning cycles and how to clean the equipment, contact the place of purchase.

4. Concerning red water (chilled water and condenser water)

●Iron is used for piping and heat exchangers, and water may become reddened due to rust. This however causes no problem for normal operation.

4 Before Your Test Run

In order to protect the equipment, you should check the following before attempting test run. It would also be necessary to read "**SAFETY**" once more before starting.

●Is the power supply properly connected? The required power supply is as follows.

Power supply	3 phases, 380, 400, 415/400, 440V, 50/60Hz

●Make sure the water drain valves of the condenser and evaporator are completely closed.

●Does the transformer connection match the power supply, and is the reverse phase protector properly connected. Factory set (50Hz-400V, 60Hz-400, 440V)

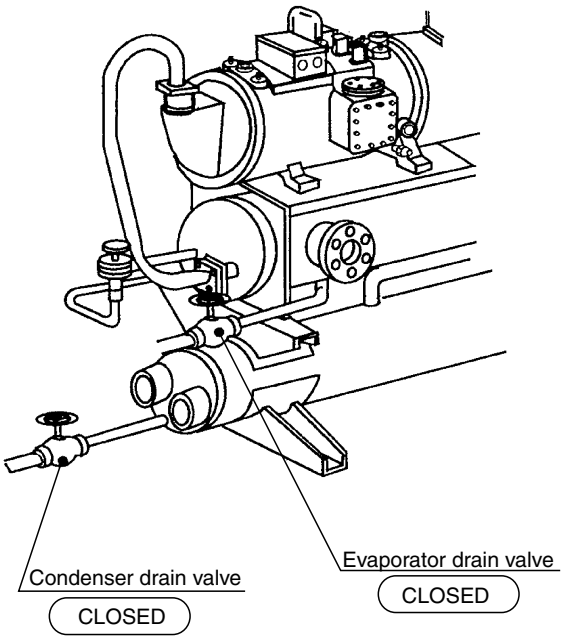
●Has the chiller been grounded?

●Is the water pump's interlock circuit connected?

●The power supply should be turned on six hours prior to operation to ensure that the compressor operates smoothly.

●Is the water pump filled with water?

If not, open the water supply faucet and fill the water system with water while purging air from the system.



<<CORRECT>>

5 Preparations

1. Turn the power supply switch ON.

●The unit comes with a crank case heater. To ensure the compressor starts up smoothly, leave this switch in the ON position during long periods of use, or otherwise, activate power at least 6 hours before starting the unit.

2. Fill the system with water.

●If the system has a cooling tower, make sure the gate valve regulating water flow is open before starting up the tower and the condenser water pump.

●Also if you use well water, make sure the gate valve regulating water flow is open before starting the condenser water pump.

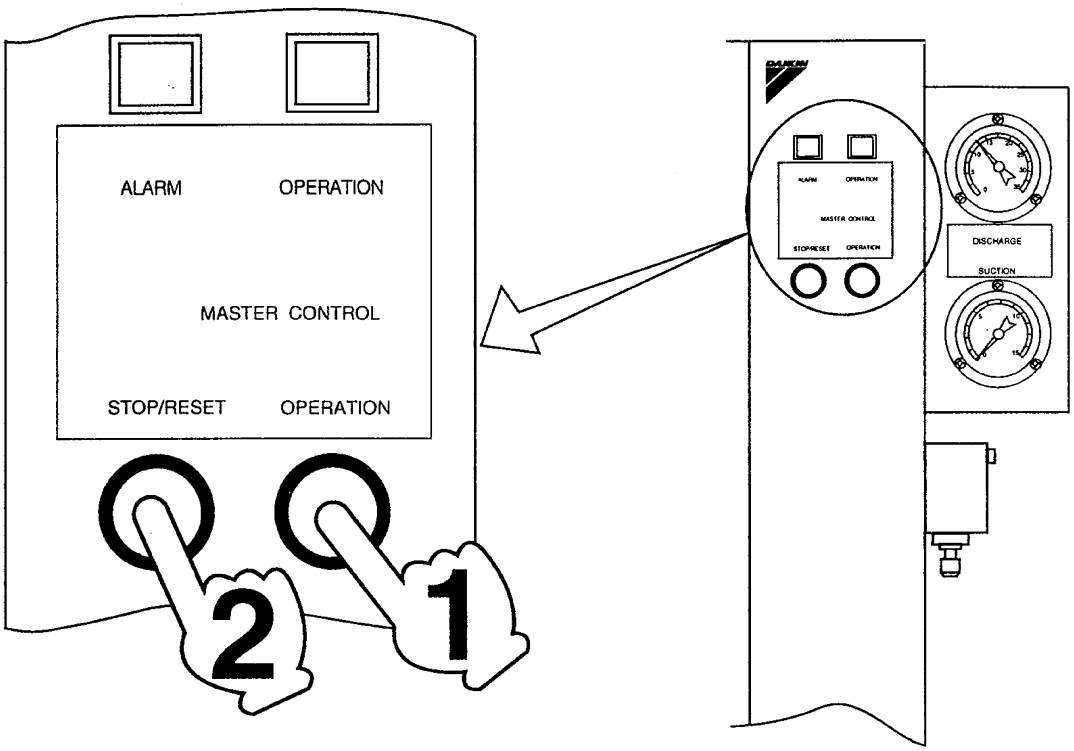
3. Set water circulating

●Purge the system.
To purge the system, open the air purge plug on the water chilling unit and the air purge cock on the fan coil unit. When the unit is filled with water, close the cock.
Note) The air purge plug is on the water outlet.

●Open the gate valve regulating water flow before starting the chilled water pump.

6 How to Operate the Chiller

C7-UWJ1320, 1700B5Y, CUW60A5Y



1 OPERATION	Push the **OPERATION** button. The operation lamp then lights and the chiller starts running. (The compressor starts a little later.)

■ To stop the unit

2 STOP	Push the **STOP / RESET** button. The chiller then stops running.

● Do not shut off the power.

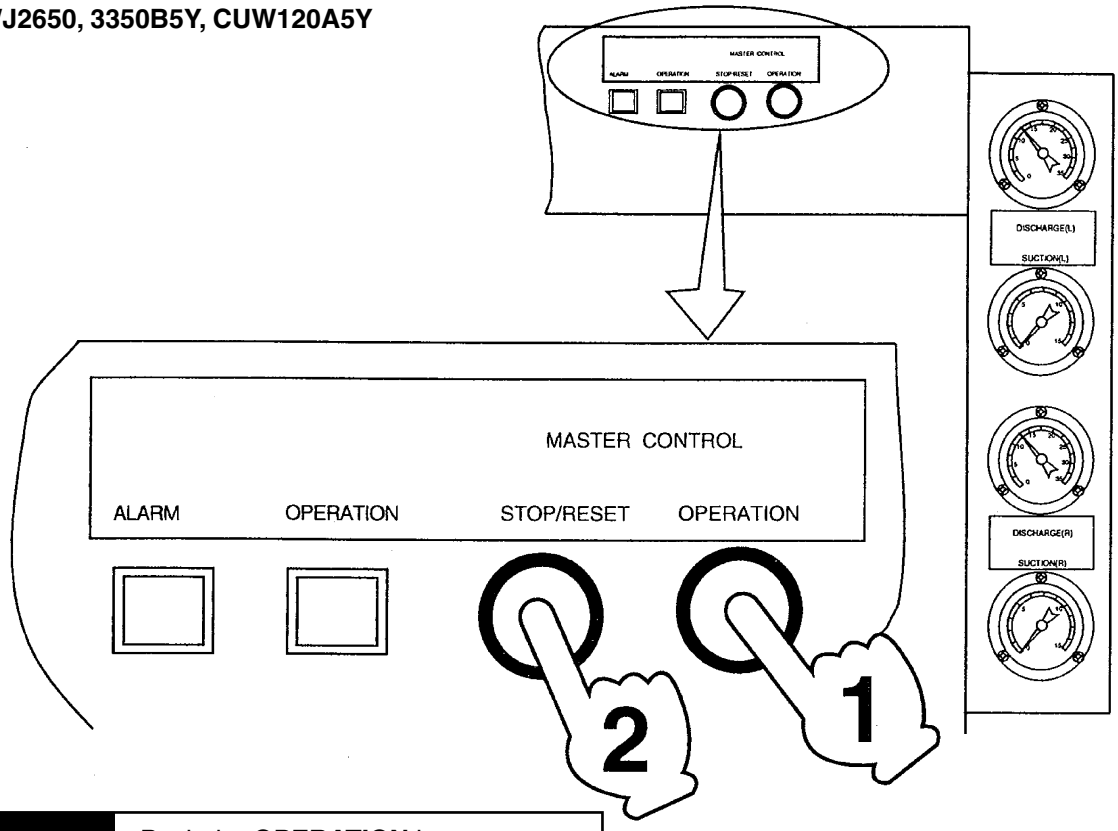
3	Stop the chilled water and condenser water pumps. (See “Preparations” on page 33.)
4	Close all valves. (See “Preparations” on page 33.)

NOTE: Check the rotation direction of the compressor.

To check the rotation direction of the compressor, check the discharge pressure and suction pressure of the pressure gauge when the compressor starts.
If the pressure is abnormal, stop operation and consult with your DAIKIN dealer.

<<CORRECT>>

C7-UWJ2650, 3350B5Y, CUW120A5Y



1 OPERATION	Push the **OPERATION** button. The operation lamp then lights and the chiller starts running. (The compressor starts a little later.)

■To stop the unit

2 STOP	Push the **STOP / RESET** button. The chiller then stops running.

●Do not shut off the power.

3	Stop the chilled water and condenser water pumps. (See “Preparations” on page 33.)

4	Close all valves. (See “Preparations” on page 33.)

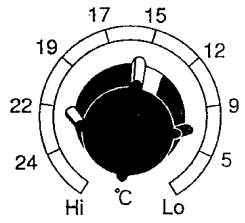
NOTE: Check the rotation direction of the compressor.

To check the rotation direction of the compressor, check the discharge pressure and suction pressure of the pressure gauge when the compressor starts.

If the pressure is abnormal, stop operation and consult with your DAIKIN dealer.

■ Temperature control thermostat

- The Thermostat is contained in the switch box inside the chiller. (See “Names of Parts” on pages 24~25.)
- Set water temperature with the thermostat. Capacity is automatically controlled to keep water temperature constant. Referring to the scale, set the knob so that cooling is normally 12°C.
- The thermostat setting scale is as shown in the figure on the right. The values are a guideline for chiller inlet water temperature. When actually setting the thermostat, adjust within the working range (see page 49) while referring to the thermometers on the various chilled water pipes.
- Set the thermostat so that temperature at the outlet does not drop below 5°C while cooling. The temperature switch (freeze-up prevention) trips at 5°C, whereby stopping the chiller.
- If capacity becomes excessive, the compressor’s unloader is tripped by the thermostat, and capacity is reduced as follows.



ENTG.TEMPERATRE(APPROX.)

C7-UWJ1320B5Y • C7-UWJ1700B5Y • CUW60A5Y	100 → 70 → 40%
C7-UWJ2650B5Y • C7-UWJ3350B5Y • CUW120A5Y • CUW240A5Y	100 → 70 → 40 → 20%

If capacity becomes more excessive, the compressor will stop. In such case, the operation lamp will stay lit.

- Then, when the load rises, the chiller automatically restarts as indicated below.

C7-UWJ1320B5Y • C7-UWJ1700B5Y • CUW60A5Y	40%
C7-UWJ2650B5Y • C7-UWJ3350B5Y • CUW120A5Y • CUW240A5Y	20%

If the load becomes larger, sequential operation is executed in the opposite order of the previously mentioned capacity reduction.

■ ALARM lamp

●When one of the unit's safety devices trips, the OPERATION lamp goes out and the ALARM lamp lights up.

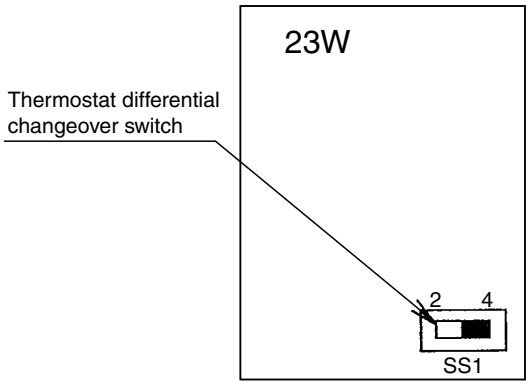
In such case, locate and eliminate the cause of the trouble (see page 47) and push the STOP/RESET button. Only then will the ALARM lamp go out and can the unit be restarted.

Note) if the pressure switch (high pressure protection) trips, follow the instructions on page 48 to reset the unit.

■ Selecting thermostat differential

●When the chiller cannot be used within the recommended working range (see page 49) because retained water level is low or for other reason, set thermostat differential changeover switch (SS1) to "4°C" . The factory setting is 2°C.

NOTE:
Do not change the setting while power is ON, to prevent trouble from occurring with the chiller.



7 Periodic Checks for Safety Devices

●**Periodically check safety devices and keep a record of checks in accordance with regulations on handling high pressure gases.**

●**Contact the place of purchase if a safety device fails to trip at its prescribed value. Values of safety devices are listed in the manufacturer's equipment specifications.**

1. Pressure switch (High pressure protection)

(1) Shut off condenser water supply.

(2) While watching the pressure gauge, check the pressure switch (high pressure protection) trips at the prescribed pressure.

(3) Reset the unit.
Note) the pressure switch (high pressure protection) must be reset by hand (see page 48)

(4) Start condenser water flow as before.

2. Safety valve

(CUW60A5Y, C7-UWJ3350B5Y, CUW120A5Y, CUW240A5Y)

●Remove the safety valve from the unit and test it.

3. Pressure gauge and compound gauge

●Compare gauges against a cirtified gauge.

Replace the gauges if the sale is off by more than half the smallest reading.

4 Operation and Installation

⚠ Caution

- **Never touch parts which tend to become hot such as compressors and refrigerant piping.**

  Doing so could result in skin burning.

  Prohibited

- **Do not attempt to run the compressor by pushing the magnetic contactor with your finger.**

  Doing so could result in electrical shock or fire.

  Prohibited

- **Check open-closed state of all valves before usage,**

  Check valves against instructions given in the operation manual and on the nameplate.
  In particular, be sure safety valves are open while the equipment is running. If valves are open or closed when they shouldn't be, water may leak. and in worse cases. The equipment may catch fire or explode.

  Compulsory

■ Before inspecting

- ●It would be a good idea to read "**SAFETY**" once more before starting inspection.
- ●Be sure to let other maintenance technicians know that you are going to inspect the chiller.
- ●Push the **STOP/RESET** button to stop the unit.
- ●Place an "under inspection" warning sign on the switch box.

■ Periodical inspection

- ●Check the water.
  Drain some of the water from the air purge plug. If the water is dirty, replace all the water in the system.
  Dirty water reduces operating capacity and causes corrosion of water heat exchangers and piping.
  (See water quality on page 50.)
- ●Check if the water volume is out from the operating range due to the strainer being clogged or the flow regulating valve being out of adjustment.
- ●Check if there is air in the water piping system.
  Even after air is purged at the beginning, air can still get inside the system. You should continue to purge the system from time to time.
- ●Clean the strainer periodically.
- ●Are any strange sounds being produced by the chiller?
  If so, check the source of the sounds and determine the cause.
  If you don't know where the sounds are coming from or what is causing them, contact your DAIKIN dealer.

■ Contract maintenance

- ●We recommend you to enter a maintenance contract with a DAIKIN after-sales service center or dealer capable of professional inspection.
  For details, contact your DAIKIN dealer.

■ Daily checks

To maintain the unit in prime operating condition, check the following items daily, making adjustments where necessary and keeping a record of all checks.
Values under "Passing grade" are indicated for chiller under typical operating conditions.

When to check	Check item	Check method	Passing grade	Results
Daily	1.Discharge pressure	Check the pressure gauge.	1.1-1.7MPa (When cooling) 1.5-1.8MPa (When heating)	_____MPa
	2.Discharge pressure difference between left and right compressors (for 2 compressor circuits)	Check the pressure gauge.	Max. 0.1MPa	_____MPa
	3.Suction pressure	Check the compound gauge.	0.3-0.6MPa (When cooling) 0.3-0.6MPa (When heating)	_____MPa
	4.Suction pressure difference between left and right compressors (for 2 compressor circuits)	Check the compound gauge.	Max. 0.05MPa	_____MPa
	5.Power supply	Check the voltmeter.	Within ±10% of the rated voltage.	_____V
	6.Condenser water temperature at outlet	Check the thermometer.	30-40°C	_____°C
	7.Chilled (Hot) water temperature at outlet	Check the thermometer.	5-10°C (When cooling) 40-45°C (When heating)	_____°C
	8.Vibration and noises	Listen for noises and feel for vibrations.	No abnormal vibrations or noises.	_____
	9.Ambient temperature	Check the thermometer.	Max. 30°C	_____°C
Seasonally	1.Refrigerant charge	Check the condenser liquid level gauge.	Refrigerant is within range on the gauge.	◯ Level gauge
	2.Refrigerant oil charge	Check the compressor oil gauge.	Refrigerant oil is within range on the gauge.	◯ Oil gauge
	3.Water quality	According to JIS K0101 or this manual.	See water quality standards on page 50.	_____

9 Pump Down

1. Method of Pump Down

(1) Start the unit.

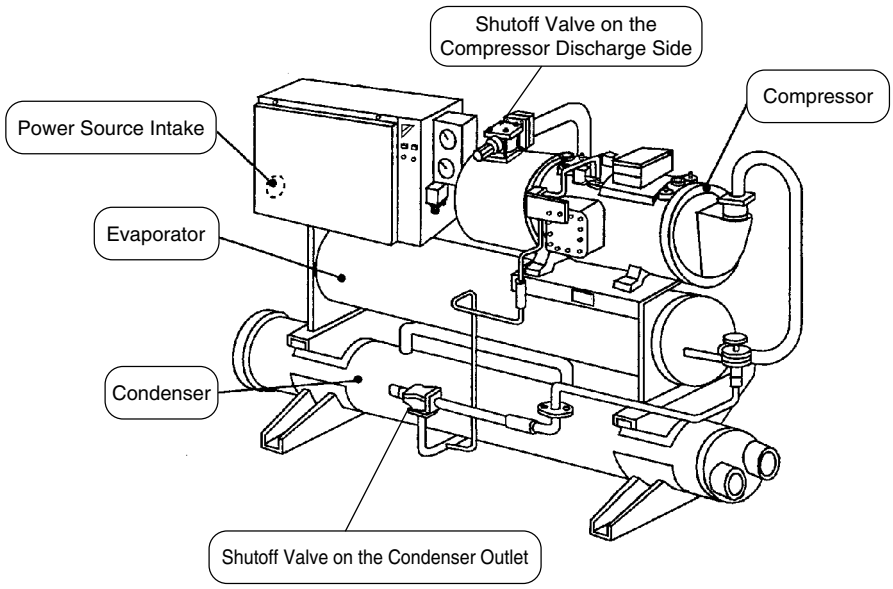
(2) Close the stop valve on the condenser outlet.

(3) If the pressure switch (Low pressure protection) trips, shut compressor discharge stop valve.

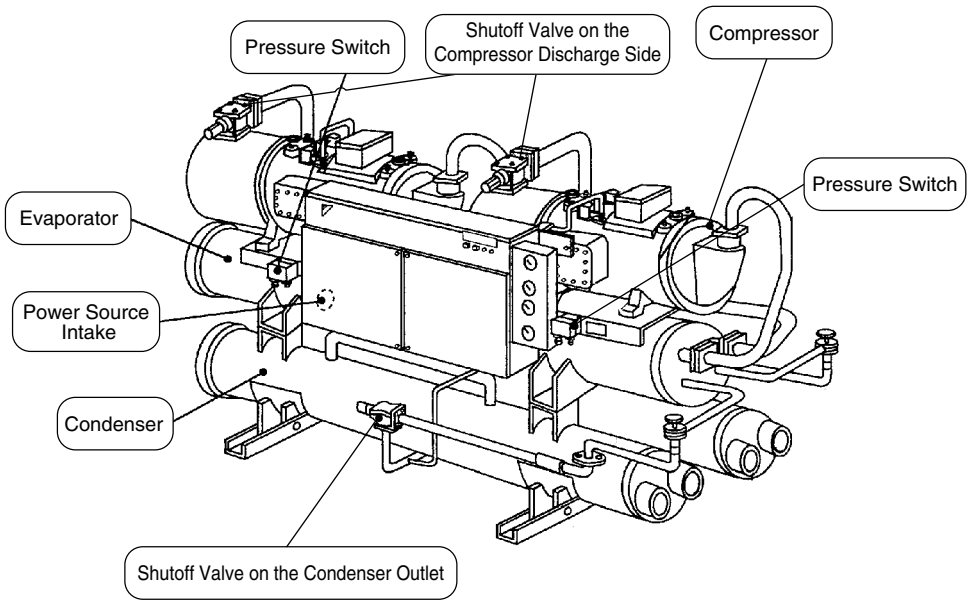
(4) Stop the unit.

Note) 1. Do not short-circuit the pressure switch (Low pressure protection) or the temperature switch (discharge gas) for any reason whatsoever.
2. Operate the compressor for about 15 minutes before performing pump down.

C7-UWJ1320B5Y
C7-UWJ1700B5Y
CUW60A5Y



C7-UWJ2650B5Y
C7-UWJ3350B5Y
CUW120A5Y



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10 Precautions for Prolonged Idle Period

⚠Warning

- **Do not allow water to remain in the water piping during prolonged idle periods.**

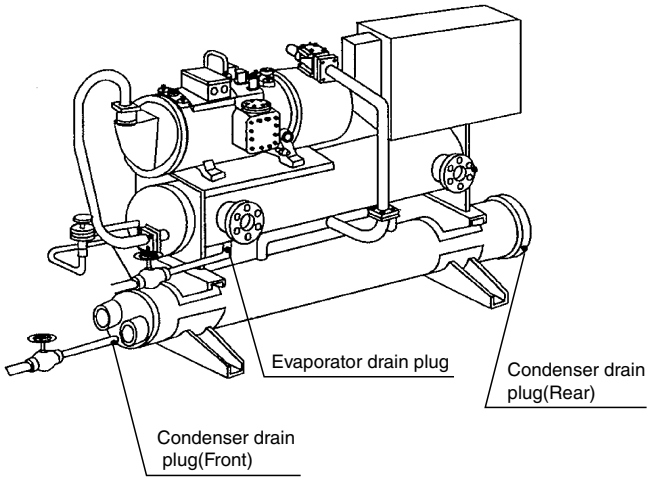
  For prolonged idle periods you should fill the water pipes with antifreeze or drain all the water from the pipes. Failure to do so could result in freezing of water.

●Be sure to turn off the power supply switch. If you forget to turn off the power supply switch, electricity is still supplied to the crank case heater, consuming several hundred watts of power.
In order to conserve electricity, be sure to turn off the power supply switch.

●Fully close primary side valves on the chilled water and condenser water circuits.

●In cold areas where freezing is always a winter possibility, drain the condenser and evaporator water completely before the cold season.

●After a prolonged idle time, you should turn the power supply switch on at least six hours before running the chiller again.
This is done in order to provide electricity to the crank case heater.



Drain plug dimensions

Models	Evaporator	Condenser (Front)	Condenser (Rear)
C7-UWJ1320B5Y, C7-UWJ1700B5Y	PT3/4	PT1/4	PT1/2
CUW60A5Y, C7-UWJ2650B5Y, C7-3350B5Y, CUW120A5Y	PT1	PT1/4	PT1/2

11 Precautions in Usage

■ Precautions in usage

●Except when not planning to use the unit for an extended period of time, do not turn OFF the power for any reason whatsoever even while the unit is merely stopped.
This ensures power is supplied to the heater even while the compressor is stopped, which makes the next start smoother.

■ Refrigerant oil

●The unit uses a special type of refrigerant oil, therefore do not mix-in other types of oil.
Contact DAIKIN or the nearest service center to add or change refrigerant oil.

The refrigerant oil used in this unit: SUNISO 4GSD

■ Means of reading pressure

●When the compressor starts up, gauges will indicate pressure accordingly.

●While cooling, regulate condenser water flow rate in order that discharge gas pressure does not rise too far above the value below.

Discharge gas pressure when cooling.....16kg/cm^2(12kg/cm^2)

Note) The first figure is indicated for a cooling tower at 30°C, Whereas the figure in parentheses is indicated for a well at 18°C.

12 What to do When Not Functioning Properly

The following cases are not malfunctions.

State of trouble	Cause
●The chiller is stopped during winter or nights when the outdoor temperature falls to a round 0°C, and only the pump runs (chiller is receiving electricity).	The chiller is equipped with a pump for preventing water inside the piping from freezing that force-operates. For details, see the wiring diagram.
●When stopped The compressor inside the chiller is hot if touched (chiller is receiving electricity).	Electricity is supplied to the crank case heater to warm the compressor so that the chiller can be started smoothly. This is not a malfunction.

Before requesting after-sales service, please check the following items.

State of trouble	Operation lamp	Cause	Disposal
Water pump / compressor doesn't start at all.	Off	Was there a power failure?	To be safe, turn the power supply switch off temporarily.
		Is the power supply switch turned on?	Turn the power supply switch on.
		Is the power supply fuse blown?	Replace the power supply fuse.
The water pump starts but water doesn't circulate.	Off	Is their a lack of make-up water?	Replenish sufficiently with make-up water. (Water is not pumped unless the water pump and suction pipe are filled with water.)
		Is the water pump turning in reverse?	Correct the turning direction of the water pump. (Set to clockwise as seen from the motor.)
		Is the valve in the water piping open sufficiently?	Open the valve in the water piping sufficiently.
Chilled water temperature is abnormal.	On	Is the water supply valve of chilled water expansion tank opened enough?	Open the water supply valve of chilled water expansion tank.
		Is the thermostat properly adjusted?	Properly adjust the thermostat (See "Temperature control thermostat" page 36.)
Compressor stops while cooling and will not restart automatically.	Off	Are the chilled and condenser water flow regulating valve open properly?	Open the flow regulating valve properly.
		Is the thermostat properly adjusted?	Properly adjust the thermostat (See "Temperature control thermostat" page 36.)
		Is the strainer for the condenser water line clogged?	Clean the strainer.

State of trouble	Operation lamp	Cause	Disposal
Compressor stops shortly after cooling starts. (A few moments later, the unit restarts after pressing the pressure switch [High pressure protection] reset button and START button.)	Off	Is condenser water flowing to the condenser? Is water level low?	Supply a sufficient amount of condenser water.
		Is the condenser water pump operating?	Operate the condenser water pump.
		Is the condenser line strainer clogged?	Clean the strainer.
		(For system with cooling tower) (1)Is the tower fan rotating in reverse? Has it stopped? (2)Is the tower strainer clogged? (3)Is the nozzle clogged?	(See the cooling tower instruction manual.) (1)Set fan rotation in the correct direction. (2)Clean the strainer. (3)Inspect and clean.

●If, after checking the items given above, the chiller is still not functioning properly, contact your DAIKIN dealer. Do not attempt to repair the problem yourself.
When you call, you should be prepared to give a description of the state of trouble and the model (see pages 24~25).

⚠Warning

- **If a malfunction occurs (burning smell, etc.), turn off the power supply switch and contact your DAIKIN dealer.**

  Continuing to operate while the chiller is malfunctioning can result in equipment damage, electrical shock or fire.

■ Safety devices (EMERGENCY lamp lights when tripped)

●The chiller is equipped with safety devices to ensure safe operation.
When a safety device is tripped,the EMERGENCY lamp lights and the chiller stops.
The chilled water pump continues to operate when a safety device other than the overcurrent relay (pump motor) trips.

Safety device	Example causes
1. Pressure switch (High pressure protection)	(1) Either condenser water is not circulating or the water level is too low. (2) Condenser water temperature is abnormally high. (3) Scale or fungus has accumulated inside the condenser.
2. Temperature switch (Freeze protection)	(1) There is an extremely small amount of chilled water. (2) The thermostat is set lower than the standard setting.
3. Temperature switch (Discharge gas)	(1) The unit is short of refrigerant due to leaking. (2) Injection solenoid remains closed because of damage. (3) Condenser outlet stop valve is closed.
4. Temperature switch (Compressor motor protection)	(1) Same as for high pressure switch. (high pressure protection)
5. Pressure switch (Low pressure protection)	(1) Expansion valve remains closed because of damage. (2) Condenser outlet stop valve is closed. (3) Chilled water level is extremely low.
6. Reverse phase protection relay	(1) The power supply is connected by reverse phase.
7. Over-current relay (Compressor motor)	(1) Same as for pressure switch. (high pressure protection)

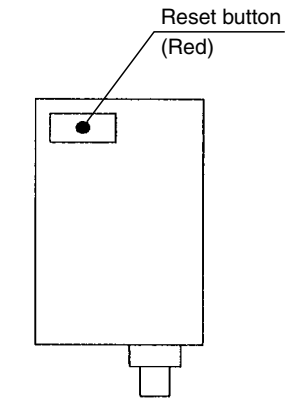
■ What to do when the pressure switch (high pressure protection) trips.

●The pressure switch (high pressure protection) has to be reset manually. If either of these safety devices trips, the chiller will not restart when the STOP/RESET button is pressed. (The moment that the operation button is pressed, the ALARM lamp will light up.)
You must push the reset button, and then push the STOP/RESET button before restarting.

●If you investigate but cannot determine the cause, contact your DAIKIN dealer immediately.

1. When the pressure switch (high pressure protection) trips

Some of the possible causes include low condenser water level, high condenser water temperature and contamination in the condenser. Investigate the cause and take the necessary remedial action before restarting the chiller.
(For installation location of pressure switches, see page 24~25.)



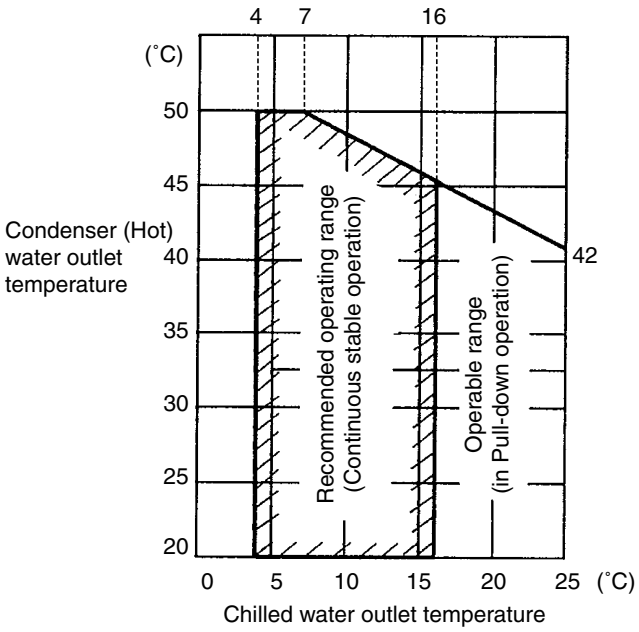
Pressure switch
(High pressure protection)

<<CORRECT>>

13 Working Range

■ Working Range

●The chiller should be used only within the range indicated by slanted lines.



NOTE: Make sure the chiller is within the recommended operating range within one hour after starting operation.

●Make sure operation conforms to the following restrictions.

Item	Contents
Power supply voltage	Within ± 10% of rated voltage
Phase unbalance	Within ± 2% of rated voltage
Power supply frequency	Within ± 2% of rated
Chilled and condenser water temperature limits.	Working range given above
Pull-down duration	Within one hour (at no load)
Cooling capacity and input	According to JISB8613
Start/stop interval of compressor	Max. 6 operating and stopping times within one hour.
Chilled and condenser water quality	JRA-GL-02 water quality standard for chilled water system (See following page.) No soluble matters deteriorating copper and stainless steel shall be included.
Chilled and condenser water velocity	0.6~1.5 m/sec (Shell evaporator) 0.7~2.5 m/sec (Shell condenser)
Chilled and condenser water pressure	Less than 0.69MPa {7 kg/cm^2} shall apply.
Installing location	Indoor (Take measures to keep rain off equipment)
Water dripping out of chiller	Provide foundation with pit for various drainage.

Refer to technical reference materials for items not listed above.

■ Water quality

The quality of chilled (hot) water and condenser water when the chiller is running largely affects the chiller's performance and life. It is therefore very important to check the quality of before using, and to monitor the quality of water after installing the chiller.
Water quality standard values are as shown in the table below according to Japan Refrigeration and Air Conditioning Industry Association (JRA).
Water quality of make-up water and circulating water should be checked separately with a certain amount of make-up water and blow, while maintaining circulating water standards. Water should be treated with chemicals as required.

Water quality standards for condenser water, chilled water, hot water, and make-up water

From JRA GL-02-1994 "Guideline of Water Quality for Refrigerators and Air Conditioning Equipment"

※ JRA: Japan Refrigeration and Air Conditioning Industry Association

	Item (1)(6)	Condenser water system (4)			Chilled water system		Tendency (2)	
		Circulation system		Pass-through system				
		Circulation water	Make-up water	Passing water	Circulation water (Max.20°C)	Make-up water	Corrosion	Scale deposit
Standard item	pH(25°C)	6.5~8.2	6.0~8.0	6.8~8.0	6.8~8.0	6.8~8.0	○	○
	Electrical Conductivity (mS/m)(25°C)(1) { μS/cm}(25°C)	Less than 80 {Less than 800}	Less than 30 {Less than 300}	Less than 40 {Less than 400}	Less than 40 {Less than 400}	Less than 30 {Less than 300}	○	○
	Chloride ions ($mgcl^-/\ell$)	Less than 200	Less than 50	Less than 50	Less than 50	Less than 50	○	
	Sulfate ions ($mgSO_4^{2-}/\ell$)	Less than 200	Less than 50	Less than 50	Less than 50	Less than 50	○	
	Acid consumption (pH4.8) ($mgCaCO_3/\ell$)	Less than 100	Less than 50	Less than 50	Less than 50	Less than 50		○
	Total hardness ($mgCaCO_3/\ell$)	Less than 200	Less than 70	Less than 70	Less than 70	Less than 70		○
	Calcium hardness ($mgCaCO_3/\ell$)	Less than 150	Less than 50	Less than 50	Less than 50	Less than 50		○
	Ionic-state silica ($mgSiO_2/\ell$)	Less than 50	Less than 30	Less than 30	Less than 30	Less than 30		○
Reference item	Iron ($mgFe/\ell$)	Less than 1.0	Less than 0.3	Less than 1.0	Less than 1.0	Less than 0.3	○	○
	Copper ($mgCu/\ell$)	Less than 0.3	Less than 0.1	Less than 1.0	Less than 1.0	Less than 0.1	○	
	Sulfide ion (mgS^{2-}/ℓ)	Shall not be detected	Shall not be detected	Shall not be detected	Shall not be detected	Shall not be detected	○	
	Ammonium ion ($mgNH_4^+/\ell$)	Less than 1.0	Less than 0.1	Less than 1.0	Less than 1.0	Less than 0.1	○	
	Residual chlorine ($mgCl/\ell$)	Less than 0.3	Less than 0.3	Less than 0.3	Less than 0.3	Less than 0.3	○	
	Free carbon dioxide ($mgCO_2/\ell$)	Less than 4.0	Less than 4.0	Less than 4.0	Less than 4.0	Less than 4.0		
	Stability index	6.0~7.0	—	—	—	—	○	○

Notes: (1) The item names, their definitions and units are based on the standard JISK0101. The units and figures inside the parentheses are based on the conventional units, written fore reference.
(2) The circle marks in the columns on the right indicate tendency for corrosion or scale to develop.
(3) Corrosion has a tendency to occur when water temperature is high (40°C or higher), and if metals with no protective coating whatever are directly exposed to water, it would be a good idea to take effective measures against corrosion such as adding a corrosion inhibitor or deaeration treatment.
(4) In a condenser water circuit that uses a closed cooling tower.
Condenser water and make-up water must satisfy its water quality standards for hot water system and passing water and make-up water must satisfy those for condenser water systems.
(5) Supply or make-up water should be city water (from water-works) or water for industrial use. Pure water, neutral water or softened water should not be used.
(6) The 15 items in the table above represent typical causes of corrosion and scale.

<<CORRECT>>

2 Air Conditioning Equipment Design Procedure

The air-cooled heat pump chiller (UWY) is a heat source unit for a centralized cooling/heating system and, when combined with air handling units (AV) or fan coil units (FW), the chiller can be used for cooling or heating. Select an optimum combination out of various UWY centralized cooling/heating systems considering applications and shapes of buildings, surrounding conditions, maintenance control, etc.

Step 1 Design Conditions

- Ambient temperature at cooling or heating ··· Use the ambient temperature when the sol-air temperature is maximum.
- Room temperature for cooling or heating
- Operating time ..... Pay special attention to buildings such as bars or amusement halls where air conditioning equipment is used at different time of a day compared with ordinary office buildings. Air conditioning load fluctuations, particularly cooling load changes, are large in these buildings.
- Operating period
- Startup time ····· Pay attention to cases where operating time is limited. Places like a public hall must be cooled or heated to a specified level before they are actually used.
- Simultaneous use rate Be sure to consult with clients for determining the rate of simultaneous use.
  Houses ... 0.4 to 0.6 during cooling, 0.6 to 0.8 during heating
  Ordinary building ... 1.0 during cooling and heating (same rate for heating and cooling)

Step 2 Building conditions

- Air conditioning area ... Pay careful attention when using corridors, etc. for routing return circuits using ducts, etc. The return circuits must be included in the air conditioning area.
- Structure

Step 3 Load calculation

- Calculate design load according to the above conditions.

Step 4 Selection of air-cooled heat pump chillers

- Determination of water temperature
  Chiller outlet water temperature ..... 5°C to 7°C for chilled water temperature during cooling and 43°C to 47°C for hot water temperature during heating.

When designing for ordinary houses, set the hot water temperature during heating to 45°C to 50°C to shorten the heating startup time.

- Required capacity of the chiller UWY

= load x simultaneous use rate x 1.1
Chiller UWY capacity≥Required capacity (heat loss)
Select a chiller UWY to satisfy both the cooling and heating capacities.

Step 5 Selection of an air conditioner

- Select an air conditioner that satisfies both the cooling and heating capacities. For many houses, air conditioners are used for cooling or heating individual rooms, not for all the rooms. Therefore, when selecting an air conditioner, assume that surrounding rooms are not air conditioned.

Step 6 Determining piping size

- Circulation water flow rate — Determine the circulation water flow rate based on the air conditioner side. When the flow rate exceeds the limit flow rate specified for the chiller, consider providing a snubber tank.
- Loss resistance — Select a pipe size so that its loss resistance for 1m is within 30 to 100 mmH2O and the passage water speed must be less than 3m for larger size.

Step 7 Selection of circulation water pump