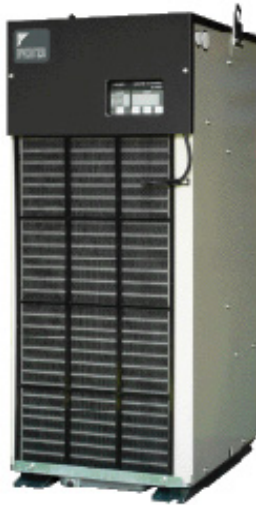


Instruction Manual

DAIKIN Water Chilling Unit ("CHILLER") AKW9 Series

Circulating type



Compliant with
RoHS

Models

Menu		Standard model	Built-in breaker model (-B)	CE model (-C)
Series				
With PUMP / TANK	AKW149	○	○	○
	AKW329	○	○	○
	AKW439	○	○	○
Without PUMP / TANK	AKW189	○	○	○
	AKW359	○	○	○
	AKW459	○	○	○

Thank you for purchasing DAIKIN Water Chilling Unit ("CHILLER")
This instruction manual includes instructions for using the Water Chilling Unit.
To ensure proper use of this product, be sure to read through this instruction manual before using it.
After reading this manual, keep it handy for your future reference.

Proper use results in power saving

If the air filter is clogged, the cooling performance deteriorates, causing excess power consumption.
Clean the air filter periodically to reduce power consumption.

PIM00364

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Installation
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Safety Precautions

Before using this product, read the following instructions carefully to ensure proper use.

- The instructions described below are intended to prevent injury or damage to you and other people.

Possible conditions that may result from improper handling are classified as follows:

 DANGER
<p>This category indicates urgently hazardous conditions that may result in death or serious injury.</p>







 WARNING
<p>This category indicates potentially hazardous conditions that may result in death or serious injury.</p>







 CAUTION
<p>This category indicates potentially hazardous conditions that may result in injury or property damage only.</p>

- All these instructions include important information on safety. Be sure to observe the instructions.
- **After reading this manual, be sure to keep it in place so that users can read it whenever required.**
- If this product is transferred to another person, be sure to attach this manual to the product.
- To use this product safely, be sure to observe the following instructions, and safety laws and regulations for the relevant standards listed below.

1. Industrial Safety and Health Law 2. Fire Service Law

Precautions for installation

 DANGER	
<p>Only qualified people can handle the unit.</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p>Transportation, installation, piping, electric wiring, operation, maintenance and inspection of the unit must be conducted by qualified people.</p> <p>Check the power supply (voltage, frequency and current).</p> </div> </div> <p style="text-align: center; font-size: small;">Mandatory</p>	<p>Check the weight, and hang the unit by the specified points.</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p>Check the weight of the unit with the nameplate to make sure that it does not exceed the rated load capacity of the carrier. Hang the unit by the points specified in the outline drawing. Failure to observe this instruction may result in fall or overturn of the unit, causing injury or property damage.</p> </div> </div> <p style="text-align: center; font-size: small;">Mandatory</p>
<p>Connect the power cable according to the procedure described in this instruction manual.</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p>Connect the power cable according to the procedure described in "Electric Wiring" on page .</p> </div> </div> <p style="text-align: center; font-size: small;">Forbidden</p>	<p>Ground the unit securely.</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p>If the unit is not grounded, you may get an electric shock.</p> </div> </div> <p style="text-align: center; font-size: small;">Ground cable connection</p>

 WARNING	
<p>Conduct electric wiring according to the ratings.</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p>Conduct electric wiring according to "Regulation on Electrical Facilities "and" internal Wiring Regulations" Improper wiring may result in burnout or fire.</p> <p>For overseas use, conduct electric wiring according to the local wiring standard.</p> </div> </div> <p style="text-align: center; font-size: small;">Mandatory</p>	<p>Fasten the unit during operation.</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p>Check the fastening points with the outline drawing, and fasten the unit securely with bolts or foundation bolts. Failure to observe this instruction may result in fall or overturn of the unit, if this unit is installed at an elevated position.</p> </div> </div> <p style="text-align: center; font-size: small;">Forbidden</p>
<p>Keep away from the unit when it is being carried with slings.</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p>Never get close to the unit when it is being carried with slings. Failure to observe this instruction may result in fall or overturn of the unit, causing injury or property damage.</p> </div> </div> <p style="text-align: center; font-size: small;">Forbidden</p>	<p>Do not install a duct</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p>If you install a duct at the exhaust port, the duct may fall.</p> </div> </div> <p style="text-align: center; font-size: small;">Forbidden</p>
<p>Do not climb on the CHILLER (when it is packaged)</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p>Do not climb on the CHILLER when it is transported or installed.</p> <p>You may become trapped under the CHILLER due to the package falling.</p> </div> </div> <p style="text-align: center; font-size: small;">Forbidden</p>	

⚠ CAUTION

Prepare a circuit breaker at user's site.



Mandatory

The Water Chilling Unit is not equipped with a circuit breaker. A circuit breaker (3-pole) exclusively for the Water Chilling Unit should be provided by user. (*)

To ensure safety, it is recommended to use an earth leakage breaker. To use an earth leakage breaker, select an inverter-compatible type. (Recommended: 15 mA or 20 mA)

* The distance between the contacts of the circuit breaker must be more than 3 mm.

Provide a flow switch for the main machine.



Mandatory

If the pump operation system has a fault, water cannot be supplied to the main machine. Normally in this case, the Water Chilling Unit detects the fault and outputs an alarm signal. However, it may not be detected depending on the fault mode. If the main machine must be protected even in such a case, provide a flow switch for the water flow path of the main machine to watch the water flow.

Do not tilt the unit.



Mandatory

During transportation (including storage), do not tilt the Water Chilling Unit more than 30°. If the unit is tilted more than 30°, the compressor may have a fault.

Precautions for use

⚠ DANGER

Before handling this unit, turn OFF the power supply.



Mandatory

Before handling this unit, be sure to turn OFF the power supply.

Handling this unit in live conditions may result in electric shock.

To prevent erroneous powering while handling this unit, use this unit with the power box locked.

Do not use the unit beyond specified operating conditions.



Mandatory

Do not use this unit in any condition other than those specified in the catalog or delivery specifications. Failure to observe this instruction may result in a serious accident, such as damage to the main machine, injury, fire and electric shock.

Do not handle the unit for 5 minutes after power supply is turned OFF.



Forbidden

During this period, electric discharge from the internal high-voltage parts (capacitors) has not been completed. Failure to observe this instruction may result in electric shock.

Do not use the unit in explosive atmosphere.



Forbidden

Do not install this unit in a place where evolution, inflow, retention or leak of inflammable gas may be expected, or where airborne carbon fiber is present. Failure to observe this instruction causes fire.

Do not operate the unit with the covers opened.



Forbidden

Do not operate the Water Chilling Unit with the unit casing or terminal covers of the motor or other electric parts removed. Failure to observe this instruction may result in electric shock.

Do not disassemble or repair the unit.



Do not disassemble

Do not modify this unit.

Any person other than DAIKIN authorized service personnel must not disassemble or repair this unit. Failure to observe this instruction causes fire, electric shock or injury.

If this unit is disassembled, repaired or modified by an unauthorized person, it shall not be beyond the scope of warranty.

Keep your hand or body away from the unit during operation.



Forbidden

During operation, the external casing may become extremely hot. Be careful that your hand or body does not directly touch it. Otherwise, you may get a burn.

Do not splash water.



Forbidden

Do not immerse this unit in water, or splash water on the unit. Failure to observe this instruction may result in short-circuit or electric shock.

Do not touch electric components with wet hands. Failure to observe this instruction may result in electric shock.

Observe the supervision and instructions of the safety manager



Forbidden

The appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

! WARNING

If refrigerant leaks, provide thorough ventilation.



Mandatory

If a large quantity of refrigerant is filled in the site, people in the site may be anesthetized or suffocated. With the CE model, MSDS (Material Safety Data Sheet) for the refrigerant is attached to the product. Take an action according to the MSDS.

Do not put a finger or foreign object in an aperture of the unit.



Caution

To ensure safety, a cover or casing is mounted to rotary parts. Do not put a finger or foreign object in an aperture of the cover or casing. Failure to observe this instruction may result in injury.

Use a commercial power supply.



Mandatory

Be sure to use a commercial power supply. Using an inverter power supply may result in burnout.

Do not step on the unit.



Forbidden

Do not sit or step on this unit. Failure to observe this instruction may result in fall or overturn of the unit, causing injury.

If the system is broken, the live parts may be exposed. Failure to observe this instruction may result in electric shock.

If an abnormal condition occurs, stop operation immediately.



Mandatory

If an abnormal condition occurs, stop operation of the unit, and leave it unused until the cause of the trouble is securely removed. Failure to observe this instruction may result in damage to the unit, electric shock, fire or injury.

Turn OFF the circuit breaker.



Mandatory

After stopping operation, be sure to turn OFF the circuit breaker.

When cleaning the unit, wear gloves.



Mandatory

Otherwise, you may cut your hand with the condenser fin edges. Furthermore, the internal compressor or motor frames and the refrigerant piping become extremely hot. If you touch these parts with bare hands, you may get a burn.

Do not turn ON/OFF the power supply frequently



Forbidden

Frequent turning ON/OFF of the power supply may cause failure of CHILLER.

Ensure the power ON time and OFF time is for two minutes or more separately.

! CAUTION

Do not use the unit in special atmosphere.



Forbidden

Do not use this unit in a special atmosphere including dust, oil mist or corrosive gas (H₂S, SO₂, NO₂, Cl₂, etc.), or at a high temperature or high humidity.

Do not put an obstacle near the air intake/exhaust port.



Forbidden

Do not put an obstacle within 500 mm from the air intake/exhaust port.

If air intake/exhaust flow is blocked, this unit may not provide the specified cooling capacity.

Do not install a duct at the exhaust port.

Perform daily check for water pollution.



Mandatory

Water pollution causes a fault or shortened service life of the pump. Use thorough caution about water pollution to satisfy the Water Quality Standard.

During transportation, fasten the unit securely.



Mandatory

Fasten this unit securely so that it will not be moved by vibration or external force during transportation. If storing vibration or external force is applied to the unit, the internal equipment may be damaged.

Do not install the noise generator around CHILLER



Mandatory

Do not install the noise generator around CHILLER because it may cause malfunction. If it must be installed, take measures on the noise generator side.

Ensure safety of the main machine before trial run.



Mandatory

Before executing a trial run, make sure that the main machine is set in safe conditions (the main machine will not run, or no accident occurs even if the main machine runs.)

Failure to observe this instruction may result in injury or damage to the machine.

Clean the air filter periodically.



Mandatory

Clean the air filter at least every two weeks.

If the air filter is clogged, the cooling capacity deteriorates, and power consumption increases.

Cancel operation lock before running the main machine.



Mandatory

Before you start running the main machine, cancel the operation lock status with the Water Cilling Unit operation panel. If you start the main machine in the operation lock status, it cannot be supplied with water, causing damage to the machine.

Do not run the pump without water.



Forbidden

Before start of operation, make sure that the water pipe is properly connected, and the tank is filled with water to an appropriate level.

Running the pump without water results in damage to the pump.

Check the unit before operation.



Check

Before start of operation, make sure that the water piping and electric wiring are properly conducted, and connecting parts are securely tightened.

Electrical Hazard

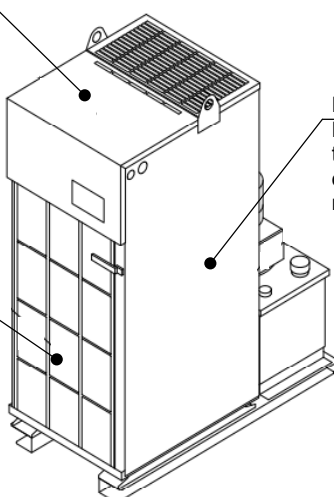
You may be seriously injured or killed because of an electric shock or fire. Do not open the cover of electric component box during the operation. Maintenance and inspection should be carried out by qualified personnel after the power supply is turned OFF.

Cut

When you carry out the maintenance work, wear gloves to prevent your hands from being cut by the heat exchanger.

Heat

Do not touch the external casing of the main unit or internal equipment during the operation (otherwise, you may burn yourself).



Water Chilling Unit and Accessories

* Some models do not come with accessories.

Check the following items:

1

Water Chilling Unit

Check the model name and serial No. (MFG. No.) on the nameplate attached to the right side of the Water Chilling Unit.

* The attachment position of the nameplate (including the machine label) may be different for some models.

2

Accessories

An accessory package*1 is attached to the top plate of the Water Chilling Unit.

Keep this manual in place where users can read it whenever required.

*1: Before operation, be sure to remove the accessory package. Otherwise, the package blocks exhaust air flow, resulting in cooling capacity deterioration.



Accessory package



Water Chilling Unit

CHILLING UNIT DAIKIN INDUSTRIES, LTD.	
1-1 NISHI HITOTSUYA, SETTSU-SHI OSAKA, JAPAN 大阪府摂津市西一津屋1番1号	
RoHS	
MODEL	Model name
電源 (最大) POWER SOURCE (max.)	3~ 200V 50Hz 3~ 200V 60Hz 3~ 220V 60Hz
出力 OUTPUT	圧縮機 COMP. ポンプ PUMP ファン FAN 維持機 AGITATOR ヒータ HEATER
冷媒 REFRIGERANT	R410A : Type of refrigerant
冷凍機油 REF. OIL	FVC50K : Refrigerant line
最高使用圧力 M.O.P.	(max.)
定格運転圧力 (低圧側) R.O.P. (L.P.)	
製品質量 WEIGHT	
製品年 PRODUCT YEAR	
製品番号 MFG. No.	Manufacture No.
The followings are required to indicate by Japanese law only obligated in Japan.	
フロン回収・破壊法 第一種特定製品	
この製品には冷媒として、HFC が使われています。	
1. フロン類をみだりに大気中に放出することは禁じられています。	
2. この製品を廃棄する場合には、フロン類の回収が必要です。	
3. フロン類の種類及び数量は、上表に記載されています。	
MADE IN JAPAN	

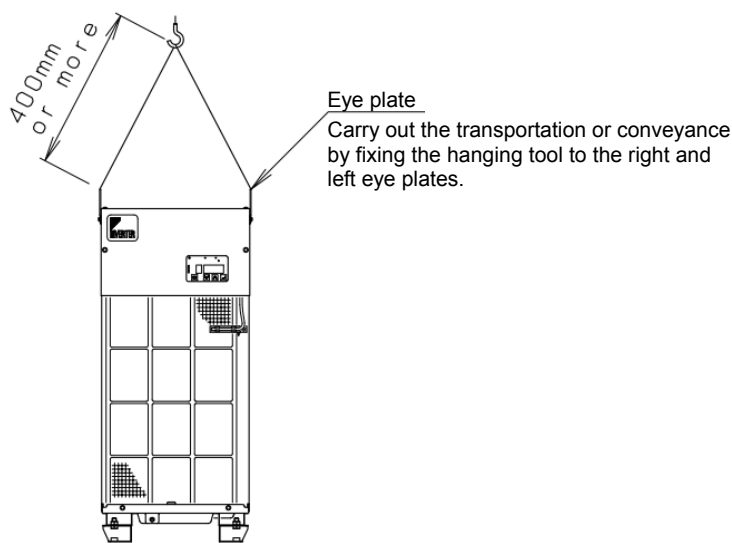
Machine nameplate

Method of Transportation/Conveyance/Storage

■ Precautions on transportation / conveyance / storage

1. During transportation or conveyance, wear gloves and a helmet.
2. Do not transport or convey the product by any method other than that specified below.
3. For a product with a tank, the unit may fall when transport or convey by hanging with the eye plate if the tank is filled with water.
Do not transport or convey the unit after installing the tank, which is prepared by the customer, by hanging the eye plate.
The unit may fall.
4. Set the ambient storage temperature to 0 to 55°C (annual average 25°C) and set the ambient humidity to 95% (RH) or less (annual average is less than 75%).
5. Stay away from the product during transportation or conveyance using the hanging tool.

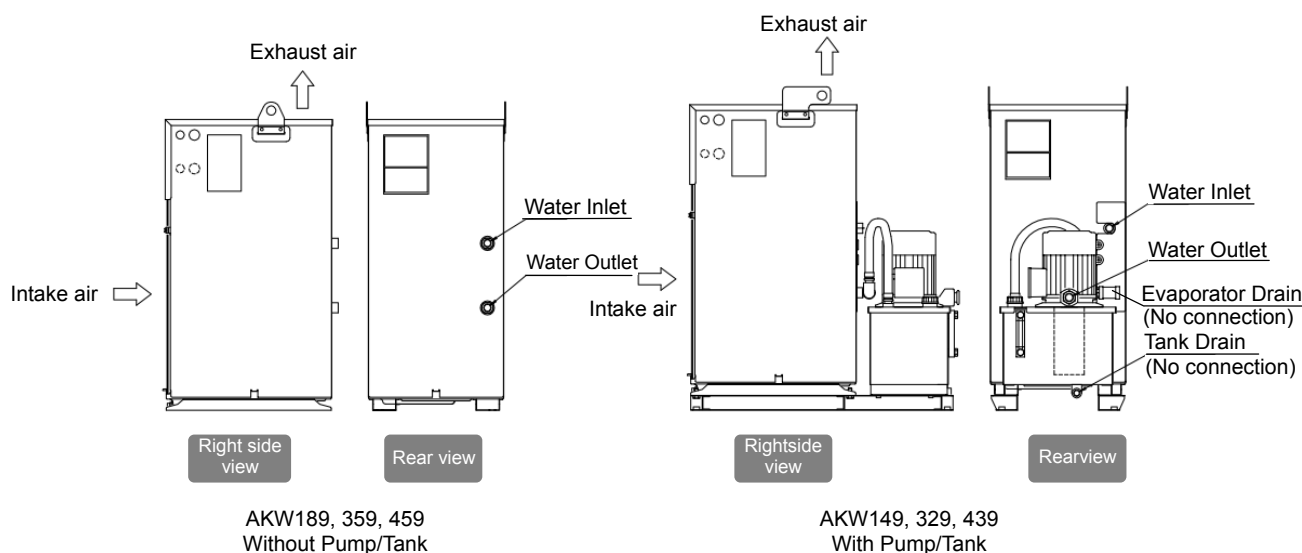
■ Carry out the transportation or conveyance according to the following method.



Precautions for Installation

Installation place and water piping

- To install this unit, select a place that meets the following conditions:
 1. Horizontal and rugged floor face (vertical interval 5 mm or less) When you install the product, fix it with a bolt (M10×20 hexagonal bolt is recommended).
 2. A place where the unit is not exposed to direct sunlight or heat.
 3. A place with proper ventilation and little humidity.
 4. A place where exhaust air does not circulate (exhaust air will not be taken into the unit).
 5. A place that allows easy access to piping and wiring.
 6. A place with little contaminant, waste, dust particles or oil mist.
(Ensure that no foreign matter enters the electric component box.)
 7. A place free from explosive atmosphere (evolution, inflow, retention or leak of inflammable gas)
 8. Do not install the unit outdoors.
 9. Keep any noise generating devices away from the unit. If it is difficult to do so, implement appropriate measures on the noise generating devices.
 10. Leave safe, sufficient space around the unit to ensure proper, trouble-free operations of the control panel.
- Do not place an object that may block air flow within 500 mm from the air intake/exhaust port.
- Water piping: Locations of the water inlet, water outlet and water drain are shown below.



1. Adjust water flow that becomes the amount of regulations.
2. Avoid using a valve in the middle of the piping.
If a valve is used, it causes a large pressure loss even when it is fully opened.
3. Wrap the pipe joints with sealing tape to prevent air entry or water leak.
4. Make sure that the water piping of the main machine is not blocked (fully closed).

Line filter


Attach a line filter with a small pressure loss to the water piping system.

- If the evaporator (cooler) in the Water Chilling Unit is clogged with dust, it causes not only cooling capacity deterioration, but also a fault of the compressor or pump.
- During adjustment at trial run, the line filter gathers much dust from the water piping system. Clean or replace the line filter before starting actual operation. Check the line filter periodically.
- The water pollution level must not exceed The Water Quality Standard.

Reference for Pipe Selection

Connection pipe diameter (Standard model)

Model Connection pipe	AKW149 • 329 • 439	AKW189 • 359 • 459
Water Inlet	Rc1/2	Rc1/2
Water Outlet	Rc1/2	Rc1/2
Evaporator Drain	Rc1/2	-
Tank Drain	Rc3/8	-

* For menu models, refer to "Model Identification and Specifications" on page 

Water Quality standard List

- Use cooling water in a standard for the water quality of the clear water level of the bottom table.
By Water Quality Guideline (JRA-GL-02-1994) of JRAIA

Item	Chemical Symbol	Water Quality Standard	Unit
p H		6 . 5 ~ 8 . 2	p H (2 5 °C)
Electrical Conductivity		Less than 0 . 2 ~ 3 0	m s / m (2 5 °C)
Chlrde Ion	C l	Less than 5 0	m g / l (p p m)
Sulphate Ion	S O ₄	Less than 5 0	m g / l (p p m)
Acid Consumption (p H 4 . 8)	C a C O ₃	Less than 5 0	m g / l (p p m)
Total Hardness		Less than 7 0	m g / l (p p m)
Calcium Hardness	C a C O ₃	Less than 5 0	m g / l (p p m)
Ion-shaped Silica	S i O ₂	Less than 3 0	m g / l (p p m)
Iron	F e	Less than 0 . 3	m g / l (p p m)
Copper	C u	Less than 0 . 1	m g / l (p p m)
Sulfide Ion	S - -	Without Ditection	m g / l (p p m)
Ammonium Ion	N H ₄ +	Less than 0 . 1	m g / l (p p m)
Residual Chlorine	C l	Less than 0 . 3	m g / l (p p m)
Free Carbon Dioxide	C O ₂	Less than 4 . 0	m g / l (p p m)
Stability Index	- - - -	6 . 0 ~ 7 . 0	

Electric Wiring

- Conduct electric wiring according to the local wiring standard.
- For the power supply, be sure to use the commercial power source. If you use the inverter power source or other power source, the product may cause burnout.
- The Water Chilling Unit (except for the “-B” model) is not equipped with a circuit breaker. A circuit breaker exclusively for the unit should be mounted to the main machine.
- For electric wiring, refer to the electric wiring diagram on the nameplate attached to the rear of the electrical equipment box cover.
- Do not change the wiring in the Water Chilling Unit. Do not touch the protection devices.

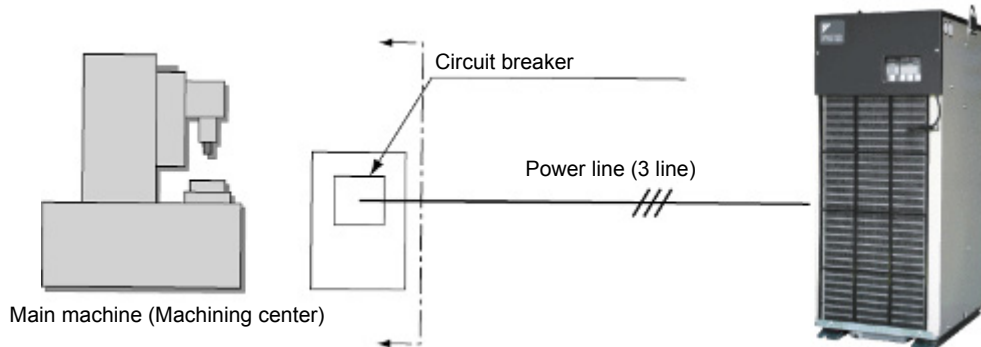
Starting/stopping the Water Chilling Unit

To turn ON the power supply for the Water Chilling Unit, the following three methods are available:

1

Directly starting/stopping the Water Chilling Unit with the main machine power supply

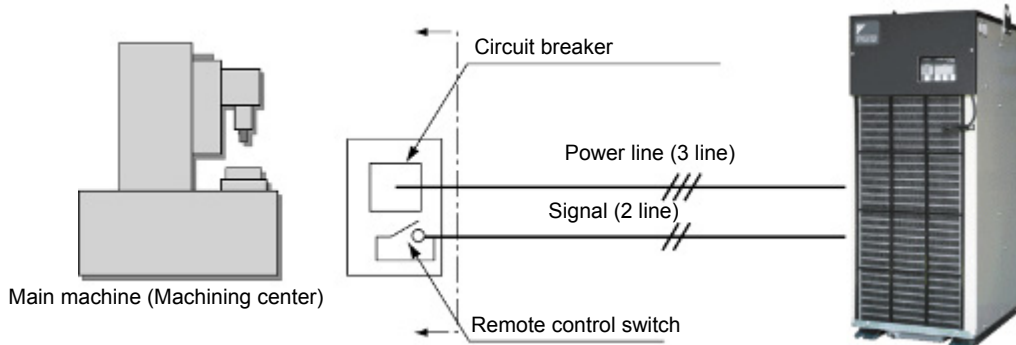
When the circuit breaker for the main machine is turned ON, the Water Chilling Unit starts operation. To stop the unit, turn OFF the circuit breaker for the main machine.



2





Starting/stopping the Water Chilling Unit with the remote control contact (see page 10)

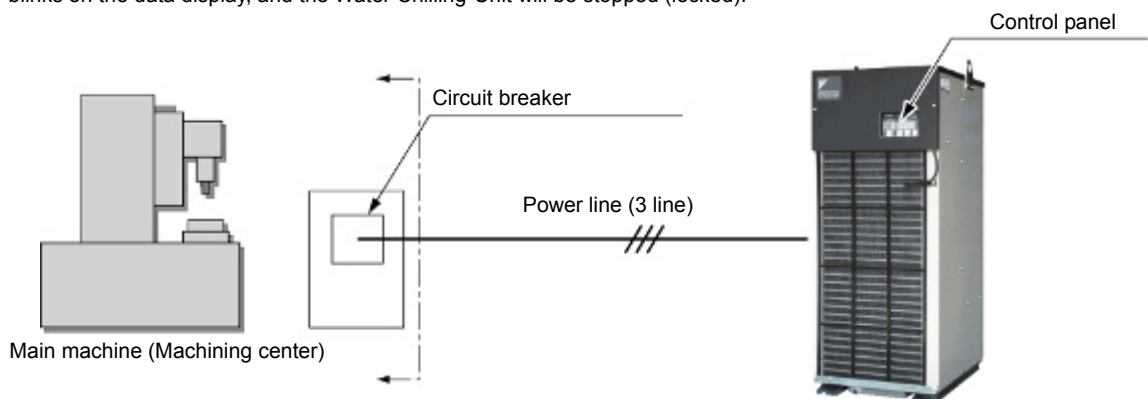
When the remote control switch is turned ON, the Water Chilling Unit starts operation. To stop the unit, turn OFF the remote control switch.



3

Starting/stopping the Water Chilling Unit with the control panel

If you keep pressing the  and  keys for at least 5 seconds in the “operation lock” mode, the Water Chilling Unit starts operation according to preset conditions. If you keep pressing the  and  keys for at least 5 seconds during operation, “Loc” blinks on the data display, and the Water Chilling Unit will be stopped (locked).



Mounting a circuit breaker

The Water Chilling Unit (Except"-B") is not equipped with a circuit breaker. Be sure to mount a 3-pole circuit breaker (*) exclusively for the Water Chilling Unit to the main machine. For the breaker capacity, refer to the specifications of each model (see page 13).

To ensure safety, it is recommended to use an earth leakage breaker.

* The distance between the contacts of the circuit breaker must be more than 3 mm.

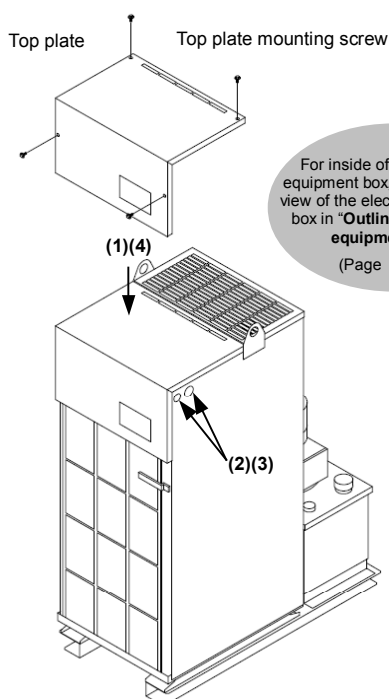
CAUTION



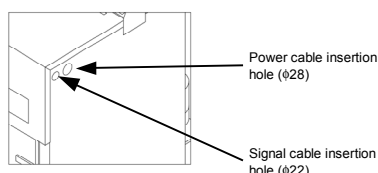
To use an earth leakage breaker, select an inverter-compatible type.
If the earth leakage breaker is not inverter-compatible, it may malfunction due to high-frequency noise of the inverter.
(Recommended product: 15 mA or 20 mA)

Wiring procedure

Top plate
Top plate mounting screw



For inside of the electrical equipment box, refer to the top view of the electrical equipment box in "Outline of electrical equipment box" (Page 10)



1


Remove the top plate mounting screws, and remove the top plate.

2

1. Insert the power cable into the power cable insertion hole (φ28) in the side plate of the unit.
2. Insert the remote control signal cable and external output signal cable into the signal cable insertion hole (φ22) in the side plate of the unit.

* Use conduits with IP54 or higher for wiring intake to allow the electric component box to have a protective structure equivalent to IP54.
If the electric component box is affected by electrical noise, use conduits or shielded cables. Allow a proper distance from the potential noise source.

3

1. Connect the ground cable to the  (ground) terminal. Use green/yellow ground cable.

2. Connect the power cable to the power supply terminal block.
Connect the power cable to the breaker if CHILLER is supplied with breaker.

- When you remove the power cables, follow the instructions above in reverse.
(Default setting is breaker OFF.)
- The cable size should conform to those listed below, or a larger size.

Cable type	AKW149 / 329 / 439 / 189 / 359 / 459 series
Model/Serial name	
JIS	Heat-resistant vinyl, 2.0 mm ²
UL cable	UL1015 AWG#14 (equivalent to 2.0 mm ²)
IEC/CENELEC cable	2.5 mm ² (60245 IEC53/H05RR-F)

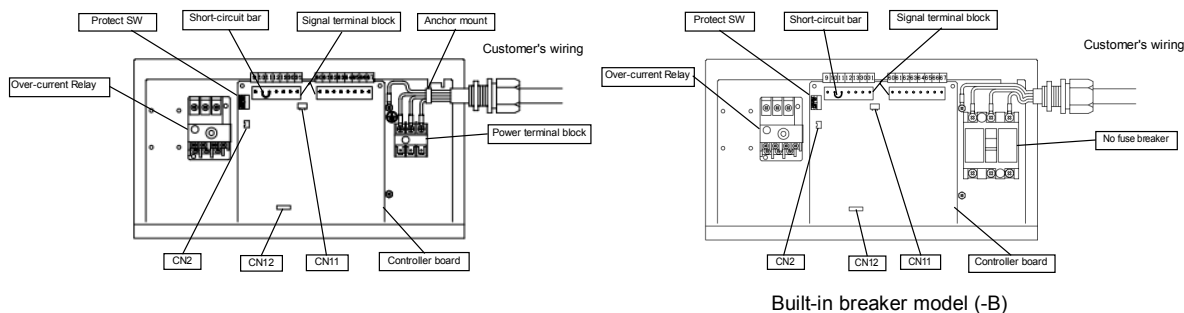
- For each wiring, use M4 (M5 for the terminal with a breaker) coated round crimp-style terminal. (For the crimp tool, use the specified tool.
Carry out the processing of the crimp-style terminal to prevent short circuits between phases.)
- The tightening torque of the screw to the terminal block should be 0.98 to 1.47N·m.
- Carry out the processing of the wiring carefully not to damage the electric wire coating.
- Fix the electric wire and the signal wire to the anchor mount with tie wrap. (See page 10)
- For remote control input connecting procedure, refer to page 10
- For external output contact connecting procedure, refer to page 11

4

Re-mount the top plate, and fasten it with the screws.

- Secure the top plate attachment screw with 1N·m to maintain the protection structure of the electric component box.

Outline of electrical equipment box (Typical)



Terminal screw size and tightening torque

(N·m)		
Terminal block for standard model (Including -C)	M4	0.98 - 1.47
Breaker terminals (-B)	M5	2 - 3

- Protect switch (erroneous operation prevention)
The factory default setting of this switch is OFF but some nonstandard units are set to ON.
Pay attention when you attempt to change any of the operation setting, parameter setting or timer setting.
- CN2 (OP2 terminal)
Alarm will be generated on malfunction by connecting an external protecting device and setting the parameter (n003) (see "Alarm Setting for Optional Protecting Device (Installed by user)" on page 33).
- CN11
Replace this connector with the returned water temperature thermistor (optional) when you attempt returned water temperature control.
- CN12
Connect the lead provided in the unit to the optional communication board.

Connection of remote control input

To execute remote control, connect the cable according to the procedure below.

1

Local procurement items

Component	Single-pole, single-throw remote control switch, or "a" contact that enables operation command output (Note) Select a switch whose minimum allowable load is 12 VDC and 5 mA.
Wiring material	Single-core cable: $\phi 1.2$ (AWG16), or twisted cable: 1.25 mm^2 (AWG16), Bar-type crimp terminal (*)

* Recommended Model (Manufacturer): TGN TC-1.25-9T (Nichifu)
APA-1.25N (Daido Solderless Terminal Mfg.)

2

Remove the short-circuit bar (between terminals [10] and [11]) on the terminal block in the electrical equipment box.

(For the crimp tool, use the specified tool.)

3

Connect the cable specified in 1 above between terminals [10] and [11].

* 12 VDC is applied across these terminals (Terminal [10]: negative polarity, [11]: positive polarity).

Connection of external output contact

To output the Water Chilling Unit operation status signal to the main machine, connect the required signal cable to the signal terminal block according to the procedure below. For details of alarms, refer to "Alarm list" (page 41). For details of warnings, refer to "Warning list" (page 41).

To use an output contact, change the parameter setting, and make sure that the output contact normally operates.

(For parameter setting changing procedure, refer to page 26.)

1. Bar-type Terminal and cable size

Bar-type Terminal	Cable size		
	JIS cable	IEC cable	UL cable
*	0.25mm ² - 1.25mm ²	0.3mm ² - 1.5mm ²	AWG#22 - #16

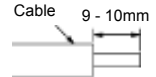
* Recommended Model (Manufacturer): TGN TC-1.25-9T (Nichifu)
APA-1.25N (Daido Solderless Terminal Mfg.)

2. Connect each cable by using a bar-type crimp terminal.

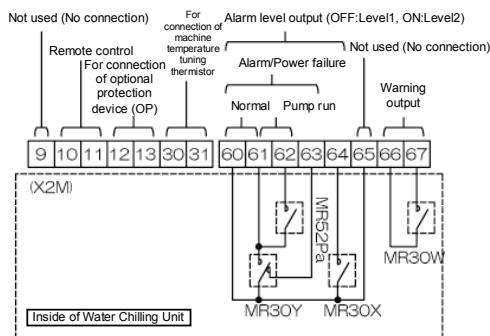
3. Use a twisted cable.

4. When a 2-core IEC cable is used, the cable size should be 0.5 to 1.5 mm².

When you use a stripped wire, strip the sheath 9 to 10mm from the end of the wire.



1 External output circuit



(For alarm levels, refer to page 44.)

CAUTION



- The contact capacity is as follows:
Resistance load: 30 VDC, 2 A
- The minimum allowable load is as follows:
10 μ A, 10 mV
- To connect an inductive load, be sure to use a surge absorber.

2 Alarm and warning output logic

The alarm and warning output logic can be changed depending on the parameter setting. (See page 33.)

3 When the power supply is turned ON, external output becomes unstable.

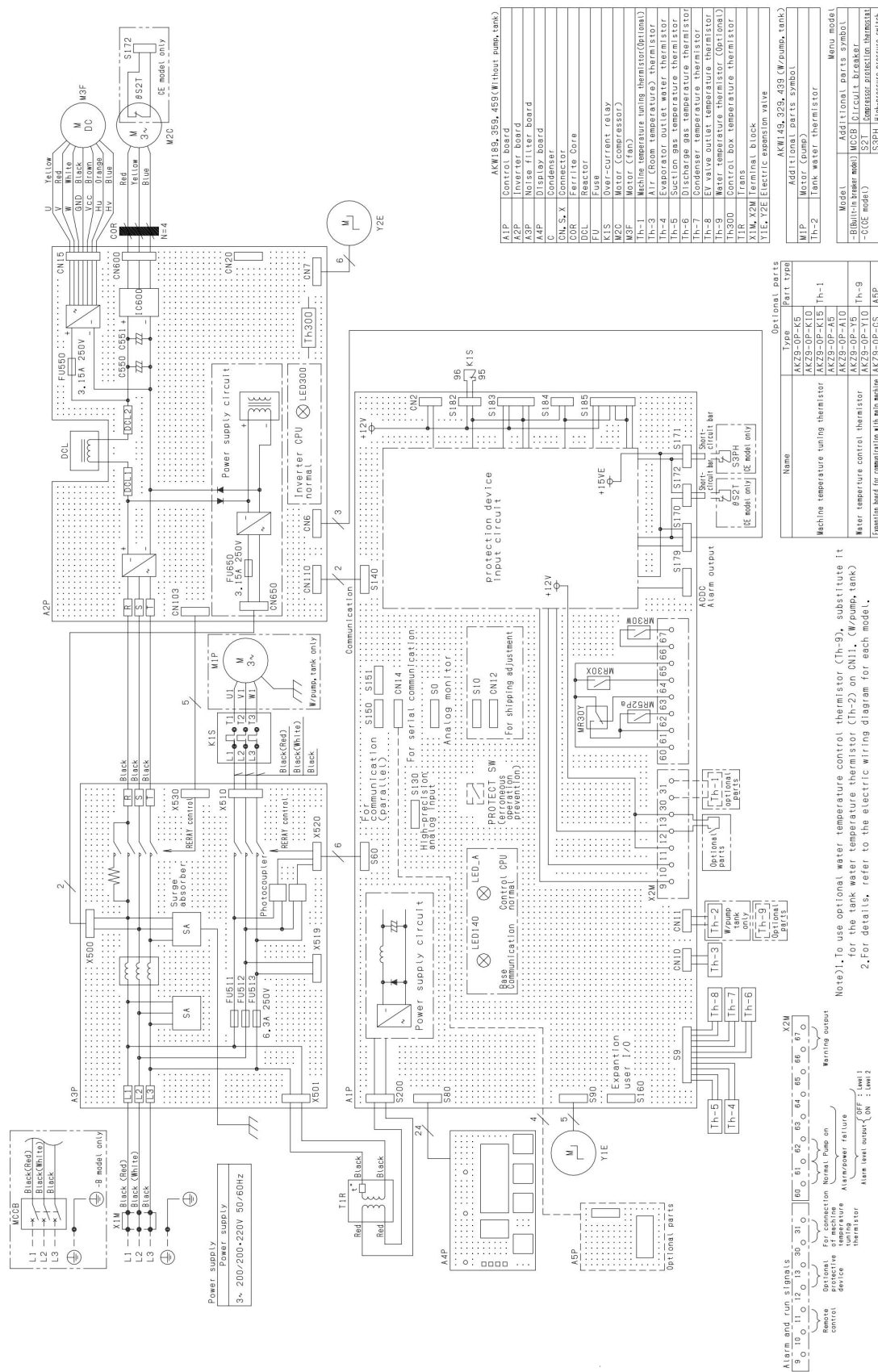
Set up the main machine sequence program so that the external output signal is ignored for one second after power-ON.

Value of the first digit in alarm and warning output logic parameter (n001)	
0 (Factory setting) [Positive action]	1 ["b" contact]
 Normal	 Normal or power failure
 Alarm or power failure	 Alarm

External output timing chart

Operation status			Power ON				
Preset condition	Power OFF (including power failure)		Run	Alarm level 2	Run	Alarm level 1	Run
	OFF		ON	Reset	Reset	Reset	Reset
	ON		OFF	ON	OFF	ON	OFF
Mode and terminal symbol of external output contact	Output logic parameter setting: "0"	Power supply	OFF	ON	OFF	ON	OFF
		Remote control contact	OFF	ON	OFF	ON	OFF
		Operation panel	OFF	ON	OFF	ON	OFF
		Normal ("a" contact)	OFF	ON	OFF	ON	OFF
	Output logic parameter setting: "1"	Alarm/Stop (Power OFF) ("b" contact)	OFF	ON	OFF	ON	OFF
		Pump run ("a" contact)	OFF	ON	OFF	ON	OFF
		Alarm level	OFF	ON	OFF	ON	OFF
		Alarm ("a" contact)	OFF	ON	OFF	ON	OFF

Electric wiring diagram (Typical: AKW329)



Model Identification and Specifications

Specifications (AKW149 • 329 • 439 • 189 • 359 • 459)

Compliant with
ROHS

Water Chilling Unit equivalent horsepower (HP)				0.5			1.2			1.5			0.5			1.2			1.5							
Model				AKW149 ²			AKW329 ²			AKW439 ²			AKW189			AKW359			AKW459							
				Stan- dard	-B	-C	Stan- dard	-B	-C	Stan- dard	-B	-C	Stan- dard	-B	-C	Stan- dard	-B	-C	Stan- dard	-B	-C					
Cooling capacity (50/60Hz) ¹				Kw			1.4/1.4			3.2/3.2			4.3/4.3			1.8/1.8			3.5/3.5			4.5/4.5				
Power supply ²				Kw			3-phase AC200/200 · 220V 50/60Hz																			
Circuit voltage				Main circuit			3-phase AC200/200 · 220V 50/60Hz																			
				Operation circuit			DC12/24V																			
Max. power consumption Max. current consumption				200V	50Hz	1.20kW/4.5A			1.71kW/6.4A			1.97kW/7.4A			0.79kW/3.2A			1.29kW/5.2A			1.59kW/6.1A					
				200V	60Hz	1.36kW/4.8A			1.87kW/6.6A			2.20kW/7.8A			0.79kW/3.2A			1.29kW/6.0A			1.61kW/6.0A					
				220V	60Hz	1.36kW/4.8A			1.87kW/6.6A			2.20kW/7.8A			0.79kW/3.0A			1.29kW/4.7A			1.61kW/4.5A					
Exterior color				Ivory White																						
Outer dimensions (H x W x D)				690X360X700			815X360X700			915X360X700			650X360X440			775X360X440			875X360X440							
Compressor (Fully-enclosed DC swing type)				Equivalent to 0.4kW			Equivalent to 0.75kW			Equivalent to 1.1kW			Equivalent to 0.4kW			Equivalent to 0.75kW			Equivalent to 1.1kW							
Evaporator				Brazing plate type																						
Condenser				Cross fin coil type																						
Propeller fan		Motor	250 , 54W			300 , 54W			250 , 54W			300 , 54W			250 , 54W			300 , 54W								
Water pump		Motor	0.325/0.520kW X 2P															-			-			-		
		Discharge rate	L/min			6 ~ 15L/min			-			-			-			-								
		Water head	m			25/37 ^{±7%} at 10L/min			-			-			-			-								
Temperature control (Selectable)	Tuning type	Reference	Room or Machine temperature ³ (Factory setting:Room temperature: Mode 5)															Room or Machine temperature ³ (Factory setting:Room temperature: Mode 3)								
		Control target	Evaporator outlet water temperature or Tank water temperature																							
	Fixed type	Tuning range	K			Within -9.9 ~ 9.9 relative to reference temperature (Factory setting: 0.0)																				
		Control target	Evaporator outlet water temperature or Tank water temperature																							
		Range	10 ~ 40																							
Refrigerant control				Inverter compressor rotation speed + Electronic expansion valve for main circuit																						
Refrigerant(New Refrigerant:R410) ⁴				Kg			0.49			0.72			0.98			0.49			0.72			0.98				
Loading weight				Over-current relay (Pump motor), Reverse-phase protector, Restart prevention timer, Low room temperature protection thermostat High water temperature protection thermostat, Low water temperature protection thermostat, discharge pipe temperature thermostat Suction pipe temperature thermostat, Condenser temperature thermostat, refrigerant leak detector, inverter protector High-pressure switch ("C" only), Compressor protection thermostat ("C" only), No fuse breaker ("B" only)																						
Protection device																										
Operating range	Room temperature	10 ~ 40																								
		10 ~ 40																								
		0.24/0.36Mpa (50/60Hz) at 10L/min			0.24/0.36Mpa (50/60Hz) at 10L/min			-			-			-			-									
		-			-			-			0.5MPa															
Water circuit Internal pressure resistant																										
Applicable water				Industrial purified water · Ethylene glycol (Antifreeze fluid)																						
Connection pipe		Water inlet	Rc1/2																							
		Water outlet	Rc1/2																							
		Evaporator drain	Rc1/2 (Fastened with plug)															-			-			-		
		Tank drain	Rc3/8 (Fastened with plug)															-			-			-		
Sound level (Measured at 1m from front of unit At 1m height, in anechoic room)				dB(A)			60 ⁹			61 ⁹			62 ⁹			60 ⁹			61 ⁹			62 ⁹				
Transportation vibration resistance ⁶				Vertical: 14.7m/S ² (1.5G) x 2.5h 7.5~100Hz sweep/5min.																						
Ingress protection				IP2X ⁵																						
Weight		Kg	61			65			68			36			40			43								
Internal circuit beaker (Rated current)		A	-	10	-	-	10	-	-	10	-	-	10	-	-	10	-	-	10	-	-	10	-			
Water tank (volume)		L	10															-			-			-		
Local procurement item /Circuit breaker (Rated current) ⁷		A	10 (required for the models other than "-B")																							

Model identification

AKW	*	*	9	-	*
-----	---	---	---	---	---

Menu symbol (Note 1)
Or Numbering symbol

Distinction symbol

Series symbol (9 series)

Nominal cooling capacity (Note 2)

Series name AKW: Energy-saving high-precision
Inverter water chilling unit

(Note 1) Menu symbol

- B : Circuit breaker (with built-in breaker)
- C : CE-conformable

(Note 2) Nominal cooling capacity

Indicates cooling capacity at standard point with commercial
Power supply frequency of 60Hz. (Evaporator outlet water temperature
and room temperature: 25 °)

- 14 : 1.4kW
- 18 : 1.8kW
- 32 : 3.2kW
- 35 : 3.5kW
- 43 : 4.3kW
- 45 : 4.5kW

Note) *1: Cooling capacity is the value at standard point (Evaporator outlet water temperature and room temperature: 25°C). The product tolerance is approx. ± 5%.

*2: Be sure to use a commercial power supply. Using an inverter power supply may result in burnout. Voltage fluctuation range should be within ± 10%. If voltage fluctuation exceeds ± 10%, consult DAIKIN.

*3: The optional machine temperature tuning thermistor is required. (For details, see page 34.)

*4: The "-C" model is supplied with MSDS (Material Safety Data Sheet) for refrigerant R410A.

*5: Electric unit protective structure: IP54 or equivalent (Use conduits higher than IP54 for the knock out hole)

*6: Performance for transportation vibration refers to the performance of standard units.

*7: No line breaker is included in this product. It must be separately provided by the customer.

*8: The yellow line on the tank water level gauge shows the highest water level, and the red line shows the lowest water level.

*9: For energy-saving purposes, the rotation speed of a fan will vary according to the room temperature.
This may change its noise level as well, but it does not constitute a failure.

Handling

Before
Operation

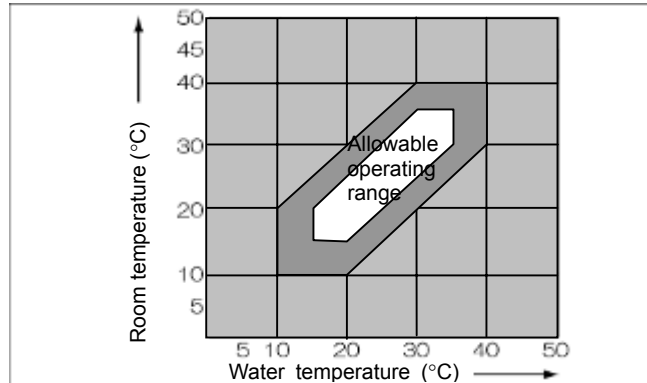
Before Operation

Before operating the Water Chilling Unit, check the following items:

1

Operating environment

- Check the atmosphere for any factor (dust, oil mist, high temperature, high humidity, etc.) that may adversely affect the unit.
- Check if the unit is not installed in explosive atmosphere (that may cause evolution, inflow, retention or leak of inflammable gas).
- The operating range is limited. Make sure that the operating conditions are within the following range.
(Note: If this unit is operated out of the specified range, the protection devices may be activated, or the service life may be shortened.)



2

Installation

- Check if the unit has been securely fastened with bolts or foundation bolts.
- Check for any obstacle that blocks air intake or exhaust flow.
(Do not put an obstacle within 500 mm from the air intake/exhaust port.)

3

Water piping

- Check the water piping for leak.
- Check if an appropriate quantity of water is filled in the tank. (Never run the pump without water. Otherwise, the pump may be damaged.)
- Check if the main machine water piping is not blocked (fully closed). (If the unit is operated with the main machine water piping blocked (fully closed), it causes fault of the unit. It is recommended to observe water flow with flow meter or some observation equipment.)
- Check if the pressure loss is within the specified range. (Refer to "Precautions for Installation" on page 6.)
- Check if the main machine water piping is equipped with a flow switch.
(To protect the main machine, it is recommended to mount a flow switch.)

4

Applicable water

- The Water Chilling Unit is intended for industrial purified water and ethylene glycol (Antifreeze fluid).
Use water that satisfies the water quality standard.



CAUTION



Before operating the Water Chilling Unit, be sure to read through this instruction manual and understand the contents of this manual.

5

Electric wiring

- Check if the cable size is larger than the specified size. (Refer to "Wiring procedure" on page 9.)
- Check if the ground cable is securely connected.
- Be sure to use a commercial power supply. Using an inverter power supply may result in burnout.
- Check if the power supply voltage is within the following range:
50 Hz.....200 V \pm 10%
60 Hz.....200/220 V \pm 10%
- Check if a circuit breaker is provided exclusively for each Water Chilling Unit.

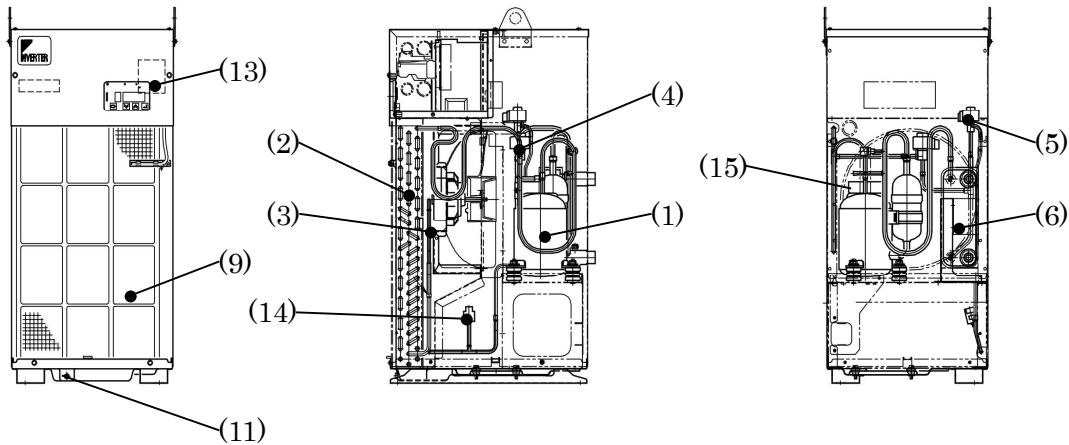
6

For customers who use a model on which a pump is not mounted

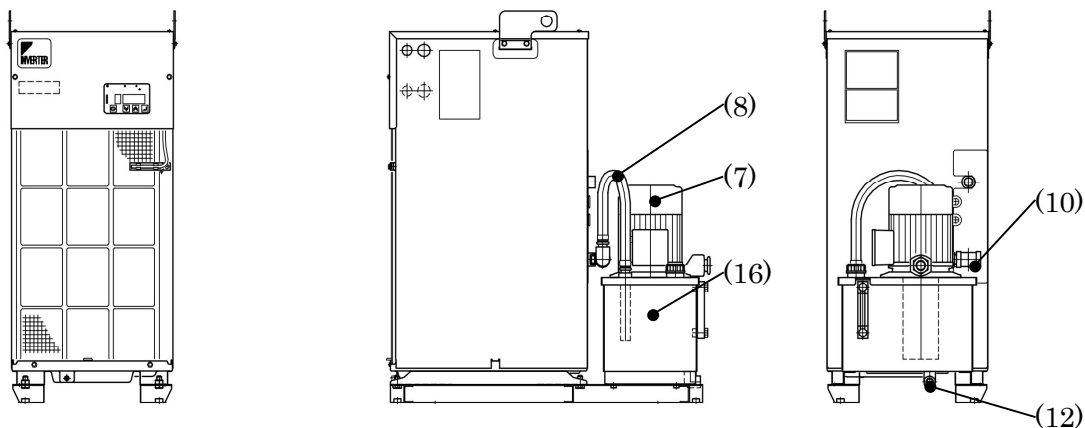
- For the pump prepared by a customer, it is recommended to observe the pump flow rate shown in the specification list on page 13 of the instruction manual.
- Connect the operation signal of the pump to the signal terminal block referencing the connection of the external output contact on page 11 of the instruction manual.
- For the power supply, be sure to observe the order of pump ON and CHILLER ON.
- Use the pump complying with the thermal relay setting the current value of the pump.

Part Names and Functions

AKW189,359,459



AKW149,329,439



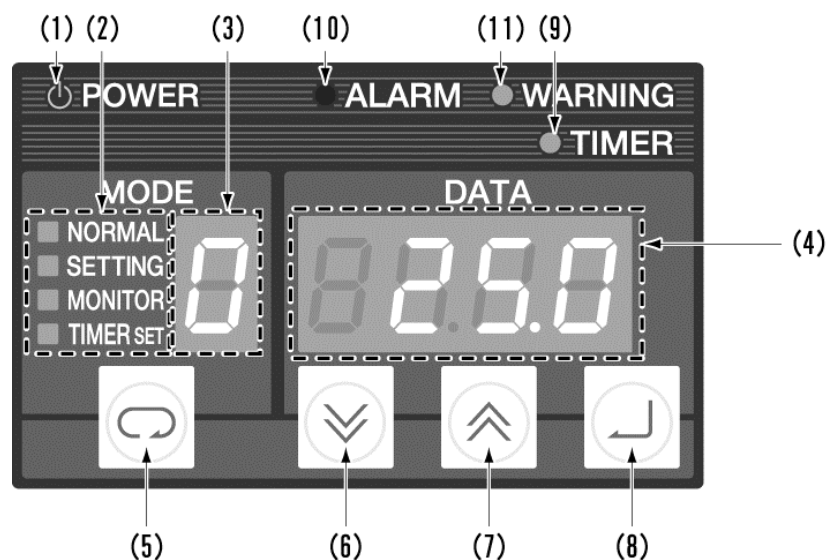
No.	Name	Function	No.	Name	Function
(1)	Compressor	Sucks and compresses the low-temperature, low-pressure gas refrigerant produced in the evaporator, to produce high-temperature, high-pressure gas.	(9)	Air filter	Located at the front of the condenser. It is intended to prevent cooling capacity deterioration by eliminating dust adhering to the condenser from the air intake.
(2)	Condenser	Conducts heat exchange between the high-temperature, high-pressure gas refrigerant produced in the compressor and the air, to produce high-temperature, high-pressure liquid refrigerant.	(10)	Water drain (Evaporator) (W/ pump, tank only)	Drains water from the evaporator when the Water Chilling Unit is re-located.
(3)	Fan (for condenser)	Forcefully blows air to accelerate heat exchange between the refrigerant in the condenser and the air.	(11)	Water drain (drain pan)	The water accumulated at the bottom of CHILLER can be discharged from here.
(4)	Electronic expansion valve	The valve mechanism reduces pressure of the high-temperature, high-pressure liquid refrigerant produced in the condenser, to produce low-temperature, low-pressure liquid/gas mixed refrigerant.	(12)	Water drain (Water tank) (W/ pump, tank only)	Drains water from the evaporator when the Water Chilling Unit is re-located.
(5)	Motor valve for hot gas	The cooling capability of low load operation is controlled by bypassing the refrigerant from the high pressure side to the low pressure side.	(13)	Circuit breaker ("B" only)	Tripped when over-current flows through the circuit. It is intended to protect the internal electric wiring.
(6)	Evaporator	Evaporates the low-temperature, low-pressure liquid refrigerant produced in the electronic expansion valve by conducting heat exchange between the refrigerant and water, to produce low-temperature, low-pressure gas refrigerant.	(14)	High-pressure pressure switch ("C" only)	Tripped when high-pressure alarm is activated. It is intended to protect the refrigerant system for the condenser etc.
(7)	Water pump	Sucks water from tank, and discharges it from the unit.	(15)	Compressor protection thermostat ("C" only)	Tripped when compressor head high-temperature alarm is activated. It is intended to protect the compressor.
(8)	Hose (W/ pump, tank only)	A part of the water piping from the evaporator to the tank.	(16)	Water tank (W/ pump, tank only)	Receives water from the main machine water piping system. The water tank can accept an increase/decrease in water quantity.

Handling

Before
Operation

Names and Functions of the Control Panel Parts








Outline of control panel



No.	Name	Description	Reference page
(1)	Power lamp (Green)	Lit while power supply is ON.	
(2)	Operation mode indicator	Indicates the control panel operation mode. NORMAL : Normal mode SETTING : Operation setting mode MONITOR : Monitor mode TIMER SET : Timer setting mode	Page
(3)	Operation mode/data number display	Display the current operation mode (NORMAL/SETTING), or the data number currently displayed on the data display.	
(4)	Data display	Displays various data. The displayed data vary depending on the operation mode and data number.	
(5)	[SELECT] (selection) key	Used to select each mode.	
(6)	[DOWN] key	Decrements the number of operation mode or data number/value by one. If you keep pressing this key, the number is decremented by ten.	
(7)	[UP] key	Increments the number of operation mode or data number/value by one. If you keep pressing this key, the number is incremented by ten.	
(8)	[ENTER] (registration) key	Registers an operation mode, data number or data changed.	
(9)	Timer mode lamp (Green)	Blinks while the unit is halted in the timer mode.	Page
(10)	Alarm lamp (Red)	When an alarm is activated: Blinks (Operation stops).....Alarm level 1 Lit (Only the compressor stops).....Alarm level 2	Page
(11)	Warning lamp (Green)	When a warning is activated: Blinks (Serious warning).....Warning level 1 Lit (Minor warning).....Warning level 2	Page


Operation mode

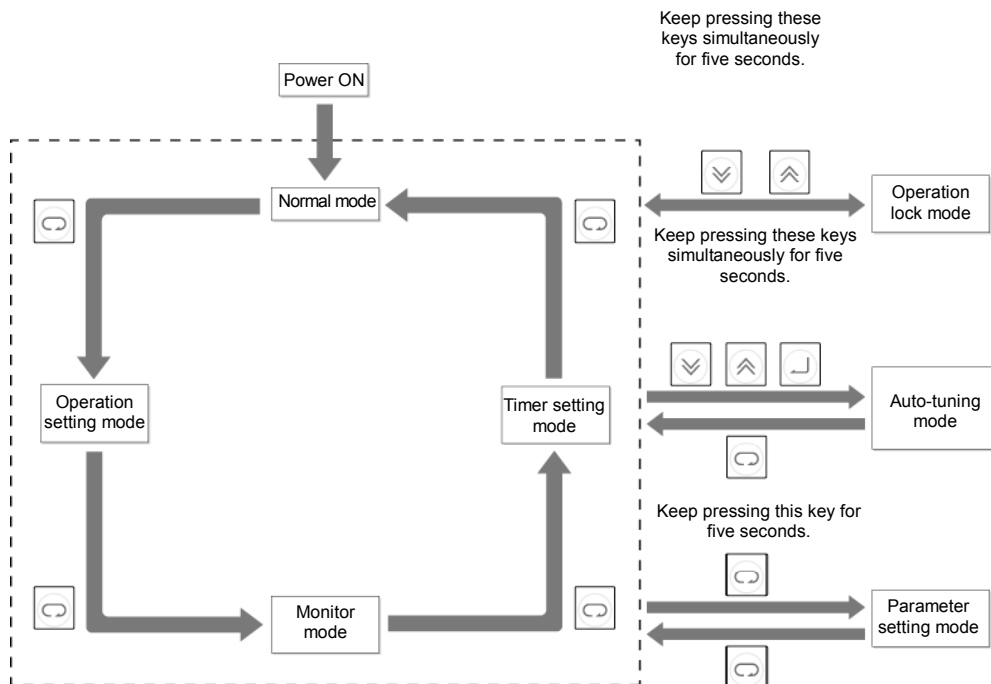
The control panel provides the following seven operation modes.
Among these seven modes, only four modes are available for normal operations.
In other modes, the Water Chilling Unit may malfunction depending on operation.
Before using each mode, please understand the description on each mode.

	Mode	Description	Operation mode indicator	Reference page
	Operation lock mode	Disables operations of the Water chilling Unit regardless of preset conditions.		page 
○ ^{*1}	Normal mode	Displays the current operation mode and control target value.	"NORMAL" lamp is lit.	page 
○ ^{*1}	Operation setting mode	Specifies an operation mode and control target value.	"SETTING" lamp is lit.	page 
○ ^{*1}	Monitor mode	Displays the current value of each thermistor etc.	"MONITOR" lamp is lit.	page 
○ ^{*1}	Timer setting mode	Used to set up time for the ON timer.	"TIMER" lamp is lit.	page 
	Parameter setting mode	Used to set up basic parameters*2 of the Water Chilling Unit.	"SETTING" lamp blinks.	page 
	Auto-tuning mode	Used to set up the function for control response improvement.	"NORMAL" lamp blinks.	page 

*1: The operation modes marked with a circle can be used for normal operation.
*2: "Parameter" means a constant to be defined for each setting.


Mode changing operation

Normally, the  key is used to shift between individual modes.
For special modes, you can change the mode by pressing several keys simultaneously for five seconds.



CAUTION



- The factory setting is the "Operation lock" mode.
To start operation, cancel the operation lock mode.
(See page )
- With the standard model, the initial operating conditions are as follows:
Operation mode: 3 (Room temperature tuning, Evaporator outlet water temperature control)
Without pump / tank
: 5 (Room temperature tuning, Tank water temperature control), With pump / tank
Temperature difference: 0.0 (K)

Checking Initial Operating Conditions

Turn ON the power supply for the Water Chilling Unit.

Check the indication on the control panel.

- *1: You hear tick sound after power-ON, while the electronic expansion valve is under initial setup. This does not mean a fault.
- *2: For initial setup of the electronic expansion valve and the microprocessor, the Water Chilling Unit takes 90 seconds. After the initial setup, chilling operation starts. (the compressor runs).

Is "U1" displayed on the control panel?

YES

It means reverse-phase connection. Exchange two phases out of three phases (L1, L2 and L3).



NO

Is the "Operation lock" mode selected?

The DAIKIN factory setting is the "Operation lock" mode.

YES

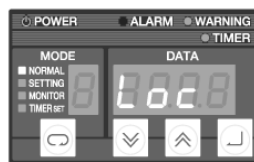
Cancel the operation lock mode.

If you keep pressing the  and  keys simultaneously for five seconds, the Water Chilling Unit starts operation.

- * The "Operation lock" mode locks the water Chilling Unit, and disables any key operation other than operation lock cancel.

NO

Operation lock mode



Keep pressing these keys simultaneously for five seconds.



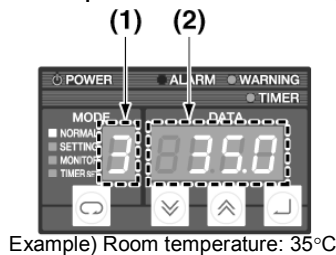
Normal mode



Check the initial operating conditions.

Check the current operation settings on the control panel display.

With the standard model, the factory setting of the operation mode is "3" (Room temperature tuning, Evaporator Outlet water temperature control / Without pump, tank) or "5" (Room temperature tuning, Tank water temperature control / With pump, tank) and the temperature difference is "0.0 (K)" (With non-standard models, the factory settings may be different from the above.)



- (1) **Operation mode display:** Displays the operation mode.
- (2) **Data display:** Displays the target temperature setting.

See page  19 

Changing operation settings

Holding constant water temperature _____

See page  20 

Tuning water temperature to room temperature (or machine temperature) _____

See page  21 

Cooling water at constant capacity (%) _____

See page  22 

Checking Initial Operating Conditions

The Water Chilling Unit operation setting provides the following modes.

	Control method	Reference temperature	Control target*1	Operation mode*3 (Reference page)	Setting range
Holding constant water temperature (Keeping a control target at a constant temperature)	Fixed temperature control		Evaporator outlet water temperature Tank water temperature Returned water temperature*2	0 (P. 20) 1 (P. 20) 1 (P. 20)	5.0 to 50.0 (°C) 5.0 to 50.0 (°C) 5.0 to 50.0 (°C)
Tuning water temperature to room temperature (or machine temperature) (Keeping a constant temperature difference between the control target and the reference temperature)	Tuning temperature control	Room temperature Machine temperature*2	Evaporator outlet water temperature Tank water temperature Returned water temperature*2 Evaporator outlet water temperature Tank water temperature Returned water temperature*2	3 (P. 21) 5 (P. 21) 5 (P. 21) 4 (P. 21) 6 (P. 21) 6 (P. 21)	-9.9 to 9.9 (K) -9.9 to 9.9 (K) -9.9 to 9.9 (K) -9.9 to 9.9 (K) -9.9 to 9.9 (K) -9.9 to 9.9 (K)
Cooling water at constant capacity (%) (Executes cooling operation according to capacity command, but disables water temperature control.)	Capacity direct designation (used for trial run etc.)	None	None	9 (P. 22)	0 to 100(%)

*1: For control target measuring points, see the figure below.

*2: Optional function using optional parts.

*3: Operation modes 2, 7 and 8 cannot be used.

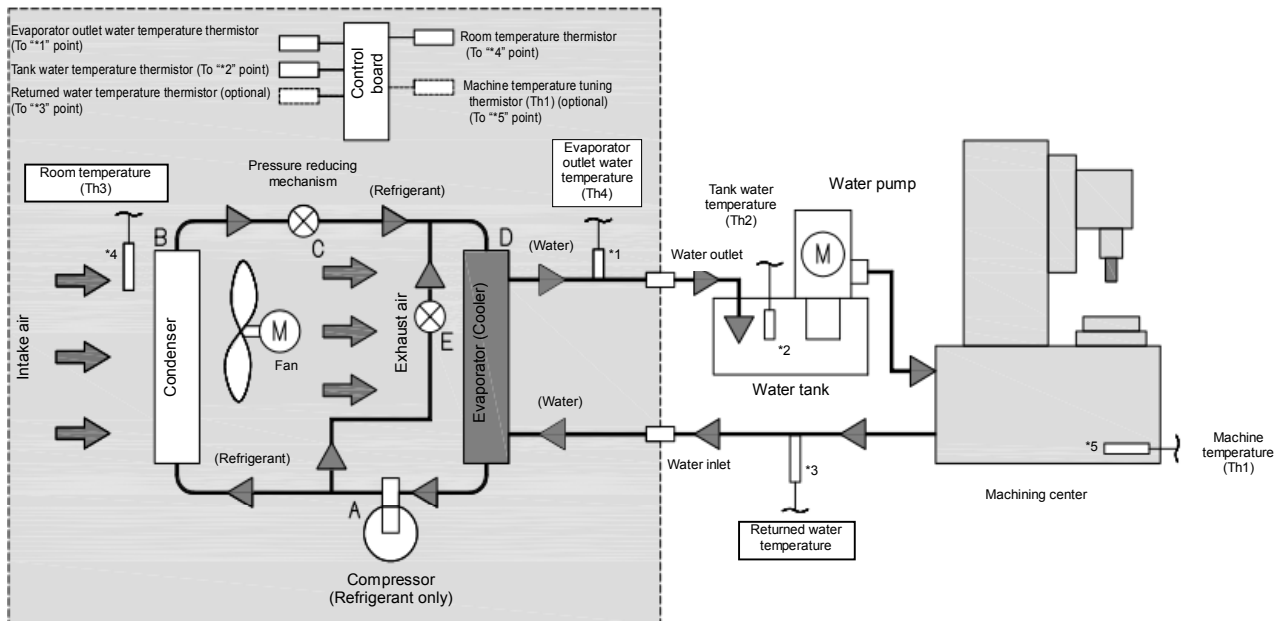
*4: K (Kelvin) is a symbol of the SI unit system that indicates a temperature difference (°C).

Handling

Before
Operation

System outline drawing

The water chilling system of the Water Chilling Unit is as shown below.



Description on the refrigerating cycle

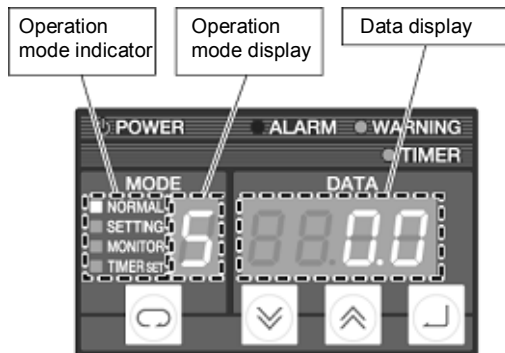
- A: The compressor produces high-temperature, high-pressure compressed gas so that the refrigerant gas can be easily cooled and liquefied in the condenser.
- B: The condenser cools and condenses the high-temperature, high-pressure gas produced in the compressor, to transform it to high-temperature, high-pressure liquid.
- C: The pressure reducing mechanism throttles the high-temperature, high-pressure liquid to reduce pressure, and transform it to low-temperature, low-pressure liquid/gas mixture so that it can be easily evaporated in the evaporator.
- D: The evaporator evaporates the low-temperature, low-pressure liquid/gas mixture produced in the pressure reducing mechanism by absorbing heat from the water (by cooling the water), and transforms it to low-temperature, low-pressure gas.
- E: Bypass mechanism controls the cooling capability under lower load by adjusting the flow rate of high temperature/high pressure gases to be distributed to the cooler.

Controlling **Evaporator outlet water temperature** at a constant temperature

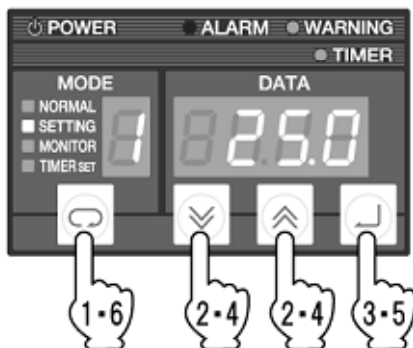
Operation mode: 0

* Optional function using optional parts. See page 35.

Setting procedure



Factory setting: With pump / tank
(With non-standard models, the settings
may be different from the above.)



Example) Tank water temperature,
Fixed temperature control
(Temperature setting: 25°C)

1. Select the operation setting mode.

- Go to the operation setting mode with the key. See "Mode changing operation" on page 17.
- The "SETTING" lamp on the operation mode indicator lights.

* The number on the operation mode display blinks.

2. Change the operation mode.

When the number on the operation mode display is blinking, change the number to "0" or "1" with the or key.

3. After changing the number, press the key to register it.

After the number is registered, the number on the data display blinks.

* The number on the operation mode display remains lit.

4. Change the temperature setting.

When the number on the data display is blinking, change the set value to a desired water temperature with the or key.

5. After changing the set value, press the key to register it.

After the temperature setting is registered, the number on the operation mode display blinks.

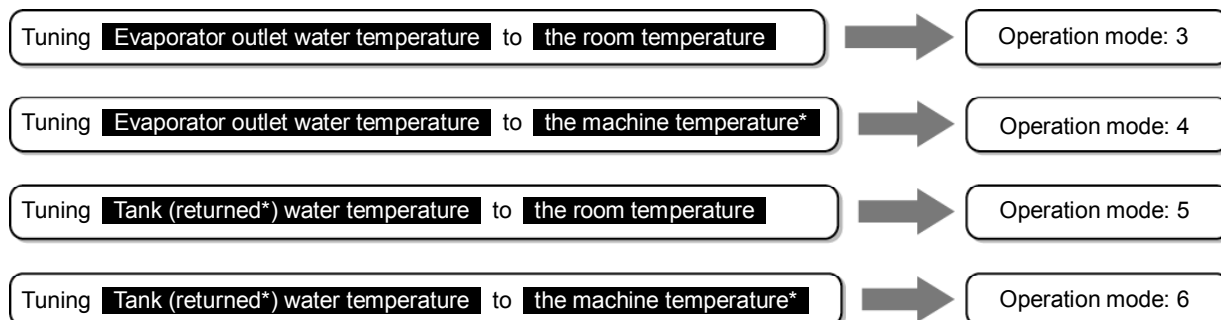
* The number on the data display remains lit.

6. Return to the normal mode.

- Press the key three times, to return to the normal mode. See "Mode changing operation" on page 17.
- The "NORMAL" lamp on the operation mode indicator lights.

Tuning Water Temperature to Room Temperature (or Machine Temperature)

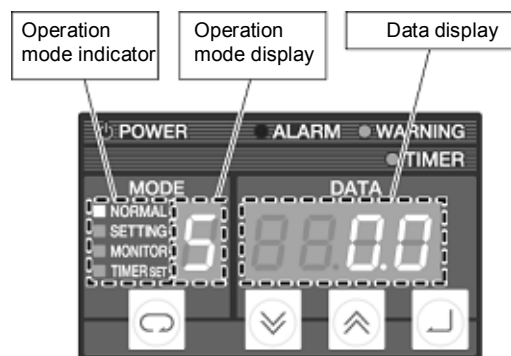
To tune the water temperature to the room temperature (or machine temperature), the following four types of operation settings are available.



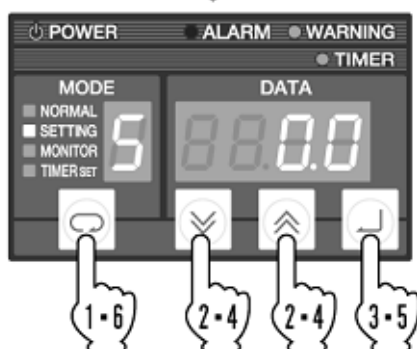
* Optional function using optional parts. See page 345.

With the above operation settings, the Water Chilling Unit controls the water temperature so as to keep the **difference** between the room or machine temperature (reference temperature) and the water temperature (control target) at a constant value as the user specified, according to a change in the room or machine temperature. The temperature difference setting range is -9.9 to +9.9 (K).

Setting procedure



Factory setting: With pump / tank
(With non-standard models, the settings may be different from the above.)



Example) Tank water temperature,
Room temperature tuning control
(Temperature difference setting: 0.0°C)

1. Select the operation setting mode.

- Go to the operation setting mode with the key. See "Mode changing operation" on page 345.
- The "SETTING" lamp on the operation mode indicator lights.

* The number on the operation mode display blinks.

2. Change the operation mode.

When the number on the operation mode display is blinking, change the number to "3" "4" "5" or "6" with the or key.

3. After changing the number, press the key to register it.

After the number is registered, the number on the data display blinks.

* The number on the operation mode display remains lit.

4. Change the set value.

When the number on the data display is blinking, change the set value to a desired temperature difference relative to the room (machine) temperature with the or key.

5. After changing the set value, press the key to register it.

After the temperature setting is registered, the number on the operation mode display blinks.

* The number on the data display remains lit.

6. Return to the normal mode.

- Press the key three times, to return to the normal mode. See "Mode changing operation" on page 345.
- The "NORMAL" lamp on the operation mode indicator lights.

Cooling Water at Constant Capacity (%)

Cooling water at a constant capacity (%)

Operation mode: 9

With the above operation setting, the water Chilling Unit executes cooling operation according to the specified capacity command (%). Water temperature control is disabled.

The capacity setting range is 0 to 100%.

* The capacity (%) is an approximate index.

* When the capacity is set to "0", the compressor stops. (The pump and fan are running.)

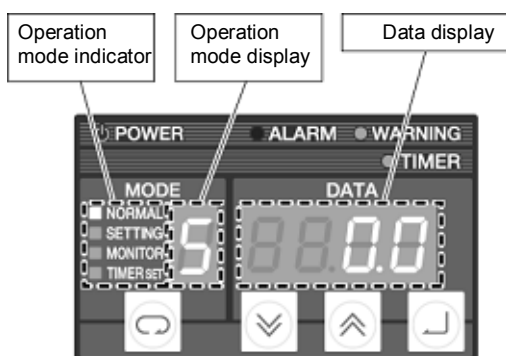
* Even if the capacity command value is same, the actual cooling capacity varies depending on the room temperature and the evaporator outlet water temperature.

Caution

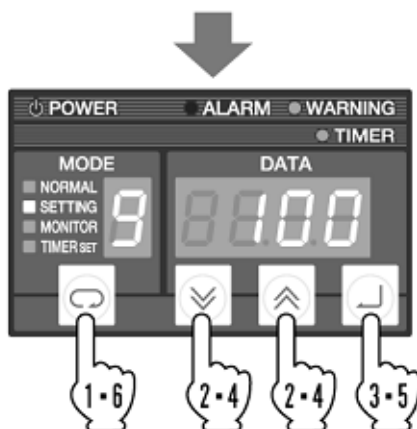
The water temperature is not controlled in the operation mode: 9 and the main unit may be seriously damaged, use the product with extra care.

For example, if the cooling capability insufficient status such as 0% operation is caused at the maximum load or the cooling capability excessive status like 100% operation is caused at low rotation, operating parts (such as the main shaft) may be damaged or burn out, or fire may be caused in the worst case.

Setting procedure



Factory setting: With pump / tank
(With non-standard models, the settings may be different from the above.)



Example) Capacity direct designation
(Capacity setting: 100%)

1. Select the operation setting mode.

- Go to the operation setting mode with the key. See "Mode changing operation" on page .
- The "SETTING" lamp on the operation mode indicator lights.

* The number on the operation mode display blinks.

2. Change the operation mode.

When the number on the operation mode display is blinking, change the number to "9" with the or key.

3. After changing the number, press the key to register it.

After the number is registered, the number on the data display blinks.

* "9" on the operation mode display remains lit.

4. Change the set value.

When the number on the data display is blinking, change the set value to a desired capacity with the or key.

5. After changing the set value, press the key to register it.

After the temperature setting is registered, the number on the operation mode display blinks.

* The number on the data display remains lit.

6. Return to the normal mode.

- Press the key three times, to return to the normal mode. See "Mode changing operation" on page .
- The "NORMAL" lamp on the operation mode indicator lights.

Monitor Items

When the “**Monitor mode**” is selected, the following items can be checked.

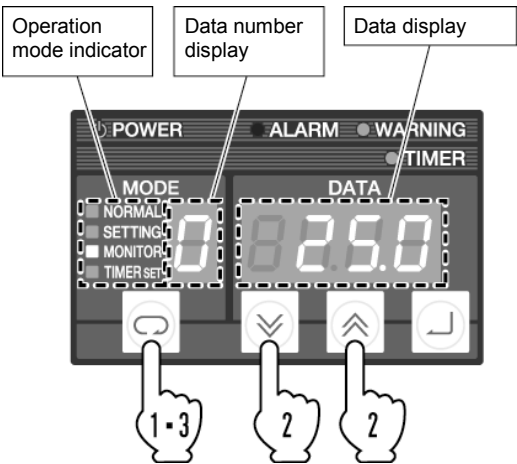
No.	Description	Note
0	Machine temperature [Th1]	*1
1	Tank water temperature [Th2]	*1
2	Room temperature [Th3]	*1
3	Evaporator outlet water temperature [Th4]	*1
4	Suction gas temperature [Th5]	*1
5	Th4-h2 (With pump/tank only)	*1
6	Capacity command value (%)	-
7	Compressor inverter rotation speed (rps)	-
8	Power consumption (kW)*	*3
9	Status of expansion DIN (third digit)/DOU (second digit)	*2

*1: Nos. 0, 1, 2, and 3 indicate a temperature detected with each thermistor. When the relevant thermistor is not connected or has a wire break, “-99.9” is displayed.

*2: With the factory setting, “0” is displayed. However, the indication will become valid when the parameter n020 is “1” or optional communication expansion board is installed.

*3: The outlined calculation value is set under the conditions; power supply voltage 200 V and pump discharge rate: 15L/min, water temperature: 25°C. (The error is approximately 20%.)

Operating procedure



1. Select the monitor mode.

- Go to the monitor mode with the key. See “**Mode changing operation**” on page .
- The “MONITOR” lamp on the operation mode indicator lights.
* The value on the data number display blinks.

2. Monitor the current status.

Change the value on the data number display to a desired value with the or key.

When the data number is changed, the temperature currently detected with the thermistor and input/output values simultaneously appear on the data display.

3. Return to the normal mode.

- Press the key two times, to return to the normal mode. See “**Mode changing operation**” on page .
- The “NORMAL” lamp on the operation mode indicator lights.

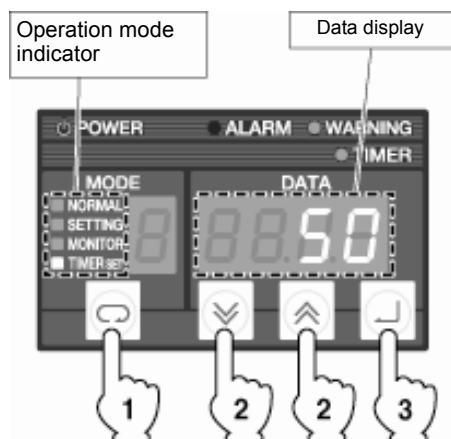
Timer Operation

With the "ON" timer, the Water Chilling Unit can be started after elapse of a desired time. This mode can be used to warm up the main machine.



The operation start time setting range is 0 to 999 hours (in one hour steps).

- * While the timer mode is selected, keep the main power supply ON.
- * The value indicated on the control panel will be decremented from a preset value at one-hour intervals.
- * To cancel the timer mode, set the timer at "0".
- * The timer setting is active only once. To use the timer again, you must set up the timer again.



Operating procedure




1. Select the timer mode.

- Go to the timer mode with the  key.
See "Mode changing operation" on page .
- The "TIMER SET" lamp on the operation mode indicator lights.
* "0" blinks on the data display.

2. Specify an operation start time.

Change the value on the data display to a desired value with the  or  key.
The unit of set value is "h" (hour).








3. Set up the timer.

- Press the  key to register the timer setting.
- When the timer is activated, the Water Chilling Unit is halted.
* The value on the data display blinks.
* The "TIMER" lamp (red LED) blinks.
Keep the main power supply ON.

Additional Setting Functions




You can additionally set up the following functions by setting the parameters of the Water chilling Unit.

1 Additional setting functions

- ☐ Auto-tuning: Automatically sets up the parameters appropriately for the system.  page  36
- ☐ Temperature range warning: Activates warning output when water temperature exceeds preset temperature range.  page  30
- ☐ Alarm/warning output logic: Outputs signal from Water Chilling Unit to main machine.  page  27
- ☐ Communication with main machine: Enables communication with main machine when optional board is mounted (see page  36). Refer to PIM00322.

2 Parameter list

The parameters that must be specified for individual additional setting functions are listed below:

Additional setting function				No.	Item	Minimum value	Maximum value	Initial value (Factory setting)	Unit	Necessity of power supply reset	Remarks
Auto-tuning	Warning	Alarm output logic	Communication with main machine								
				n000	Not used	0	0	0	-		
		○		n001	Alarm and warning output logic	0	11	0	-	○	See page  33
		○		n002	OP contact level	0	3	0	-		
		○		n003	OP2 contact level	0	2	0	-		
○				n004	Tank water temperature decrease (Auto-tuning end condition)	0.0	10.0	8.0	°C		For auto-tuning See page  30
○				n005	P/I gain calculation coefficient (Response coefficient)	0.1	10.0	2.0	-		
○				n006	Control gain P (for low deviation)	1	999	40	-		<ul style="list-style-type: none"> The initial value varies depending on the model. (Automatically set up by auto-tuning)
○				n007	Control gain I (for low deviation)	1	999	40	-		
○				n008	Control gain P (for high deviation)	1	999	40	-		
○				n009	Control gain I (for high deviation)	1	999	40	-		
	○			n010	Warning setting 1	0	565	564	-		Never attempt to change these settings. Otherwise, the unit may malfunction.
	○			n011	Warning setting data 1	0.0	60.9	0.0	-		
	○			n012	Warning setting 2	0	565	463	-		
	○			n013	Warning setting data 2	0.0	60.9	8.1	-		
	○			n014	Warning setting 3	0	565	0	-		
	○			n015	Warning setting data 3	0.0	60.9	0.0	-		See page  27
	○			n016	Warning setting 4	0	565	0	-		
	○			n017	Warning setting data 4	0.0	60.9	0.0	-		
	○			n018	Warning setting 5	0	565	0	-		
	○			n019	Warning setting data 5	0.0	60.9	0.0	-		
			○	n020	Use of parallel communication	0	1	0	-	○	
				n021 to n038		-	-	-	-		Never attempt to change these settings. Otherwise, the unit may malfunction.

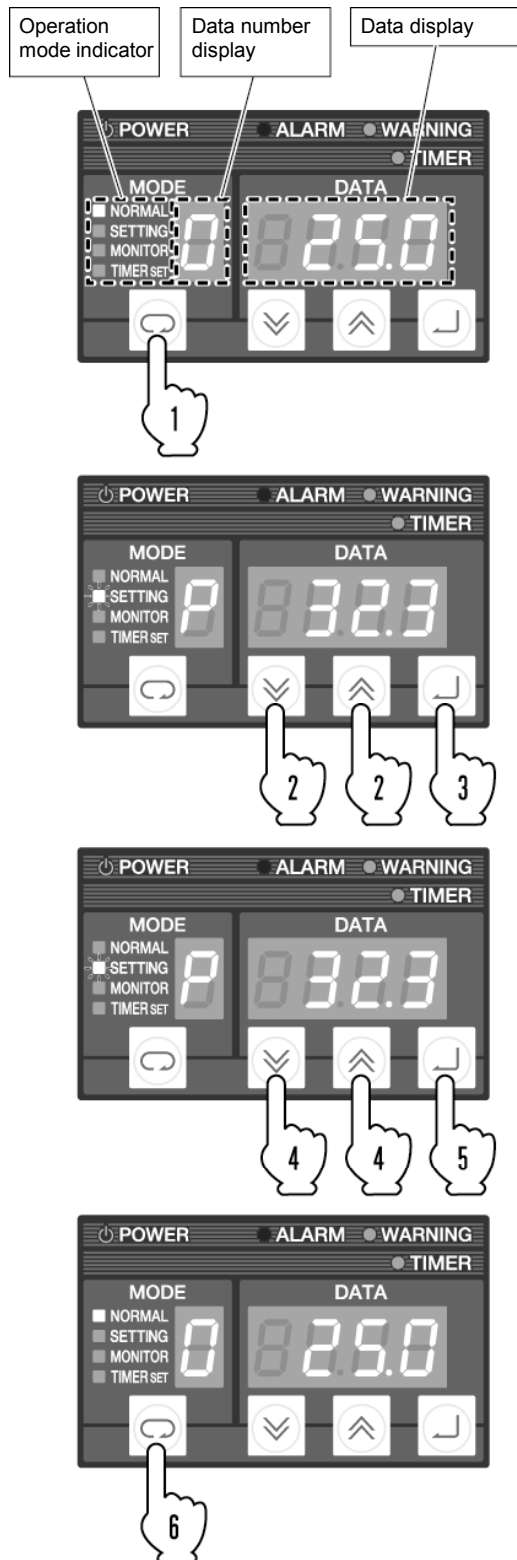
3

Parameter setting procedure

You can set the parameter that enables the additional setting functions of the Water Chilling Unit.

For description of the additional setting functions and parameter list, refer to page 25.

Setting procedure



1. Select the parameter setting mode.

- Go to the parameter setting mode by pressing the key for five seconds. See "Mode changing operation" on page 17.
- The "SETTING" lamp on the operation mode indicator lights.
* "P" blinks on the data number display.

2. Select a parameter number.

- Change the parameter number to a desired number with the or key.
- After the selected parameter number is displayed for approx. 0.5 seconds on the data display, the set value appears.

3. Register the parameter number.

- Press the key to register the parameter number.
- After the number is registered, the value on the data display blinks.
* "P" on the data number display remains lit.

4. Change the set value.

When the value on the data display is blinking, change the set value with the or key.

5. After changing the set value, press the key to register it.

After the set value is registered, the value on the data display remains lit.

* "P" blinks on the data number display.

6. Return to the normal mode.

- Press the key, to return to the normal mode. See "Mode changing operation" on page 17.
- The "NORMAL" lamp on the operation mode indicator lights.

Setting Additional Function- “Temperature range warning”

■ Outline of the function

- As an additional function of the Water Chilling Unit, you can set up the “**Temperature range warning**” function. This function allows you to specify a desired temperature range within the Water Chilling Unit operating range. When the control temperature exceeds the preset range, the unit informs you of the “Temperature range warning” condition.
- The “Temperature range warning” function provides the following settings:
 - External output (30W relay output: ON or OFF): Turns ON/OFF the contact (66, 67) of the signal terminal block. (See the output logic on page 33.)
 - Compressor forced stop - Warning: Stops the compressor. (Indication: 1E to 5E) Warning status will be automatically reset when preset warning reset temperature is reached.
 - Alarm stop – “FH” alarm: Stops the compressor. (Indication: FH) (See “Alarm and warning output logic” on page 34.) The warning reset setting is inactive. (When the power supply is turned ON again, the compressor restarts operation.)

* The above 1), 2) and 3) can be combined.

■ Parameter setting

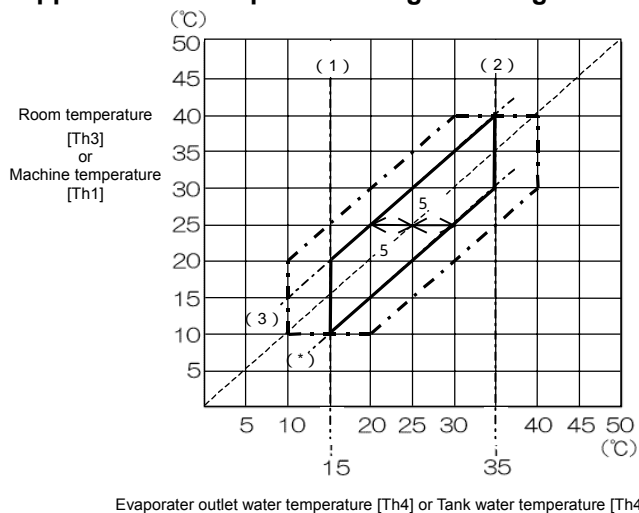
To enable this function, set the corresponding parameters. You can specify up to five warning conditions with the following five groups of parameters.

	Types of temperature range warning*	Parameter	
		Group A	Group B
(1)	Low water temperature (Fixed temperature)	n014	n015
(2)	High water temperature (Fixed temperature)	n016	n017
(3)	Low water temperature (Temperature difference)	n018	n019
(*)	High water temperature (Temperature difference)	-	-

- Group A: “Temperature range warning condition setting”
 “Temperature range warning operation setting”
 Group B: “Temperature range warning temperature setting”
 “Temperature range warning reset temperature setting”

* For temperature range warning, the above (1) to (3) types are available. Actually, however, any combinations of these types are enabled. The above (1) to (3) types can be simultaneously used.

Application of temperature range warning



Evaporator outlet water temperature [Th4] or Tank water temperature [Th2]

- : Water Chilling Unit operating range
 □ : Temperature range warning setting

- When Evaporator outlet water temperature [Th4] (or Tank water temperature [Th2]) is 15°C or lower, the compressor stops. (Warning)
- When Evaporator outlet water temperature [Th4] (or Tank water temperature [Th2]) is 35°C or higher, the compressor stops (FH alarm), and the 30W relay output turns ON or OFF.
- When Evaporator outlet water temperature [Th4] (or Tank water temperature [Th2]) is at least 5°C lower than the room temperature [Th3] (or machine temperature [Th1]), the 30W relay output turns ON or OFF.
- (*) When Evaporator outlet water temperature [Th4] (or Tank water temperature [Th2]) is at least 5°C higher than the room temperature [Th3] (or machine temperature [Th1]), the 30W relay output turns ON or OFF.

(*) Available making settings other than (1)~(3).

Description on parameter settings (Group A)

* Enter Group B (page 29) before Group A, so that the temperature range warning is not activated during setup.

In this section, set the following parameters by using three digits (first, second and third digits) of each parameter on the control panel data display.

- "Temperature range warning condition setting" (Use the second and third digits.)
- "Temperature range warning operation setting" (Use the first digit.)

		Temperature range warning condition setting		Temperature range warning operation setting			
		Third digit		Second digit	First digit		
(1)	n014	Evaporator outlet water temperature [Th4]	4	≤ Fixed value	6	External output (“Rely 30” output: ON)	1
		Tank water temperature [Th2]	2			Warning	2
						Warning + External output (“Rely 30” output: ON)	3
(2)	n016	Evaporator outlet water temperature [Th4]	4	≥ Fixed value	5	External output (“Rely 30” output: ON)	1
		Tank water temperature [Th2]	2			FH alarm	4
						FH alarm + External output (“Rely 30” output: ON)	5
(3)	n018	Room temperature [Th3]	3	-Evaporator outlet water temperature [Th4]	4	External output (“Rely 30” output: ON)	1
		Machine temperature [Th1]	1	-Tank water temperature [Th2]	2	Warning	2
						Warning + External output (“Rely 30” output: ON)	3
(4)	other	Evaporator outlet water temperature [Th4]	4	-Room temperature [Th3]	3	External output (“Rely 30” output: ON)	1
		Tank water temperature [Th2]	2	-Machine temperature [Th1]	1	FH alarm	4
						FH alarm + External output (“Rely 30●output: ON)	5



* Example of parameter settings

Example of parameter settings (for temperature range warning: See page 27.)

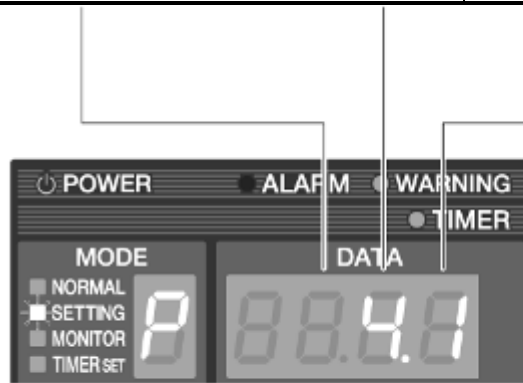
(1)	When Evaporator outlet water temperature [Th4] (or Tank water temperature [Th2]) is 15°C or lower, the compressor stops. (Warning)	n014	462 (262)
(2)	When Evaporator outlet water temperature [Th4] (or Tank water temperature [Th2]) is 35°C or higher, the compressor stops (FH alarm), and the 30W relay output turns ON or OFF.	n016	455 (255)
(3)	When Evaporator outlet water temperature [Th4] (or Tank water temperature [Th2]) is at least 5°C lower than the room temperature [Th3] (or machine temperature [Th1]), the 30W relay output turns ON or OFF.	n018	341 (142)
(4)	When Evaporator outlet water temperature [Th4] (or Tank water temperature [Th2]) is at least 5°C higher than the room temperature [Th3] (or machine temperature [Th1]), the 30W relay output turns ON or OFF.	other	431 (211)

Description on parameter settings (Group B)

In this section, set the following parameters by using three digits (first and second digits, and first decimal place) of each parameter on the control panel data display.

- “Temperature range warning temperature setting” (Use the first and second digits.)
- “Temperature range warning reset temperature setting” (Use the first decimal place. Active only when “Warning” has been set.)

		Temperature range warning temperature		Temperature range warning reset temperature (Temperature difference for automatic reset) ^{*1}
		Second digit	First digit	First decimal place
(1)	n015	0 to 60 (°C)		1 to 9 (°C)
(2)	n017			
(3)	n019			
(4)	other			



*Example of parameter settings

*1: When the first digit of the “temperature range warning operation setting” parameter of **Group A** is “4” or “5” this parameter is inactive because the warning status will not be automatically reset. (Enter any number from 0 to 9.)

Example of parameter settings (for temperature range warning: See page 27.)

(1)	When Evaporator outlet water temperature [Th4] (or Tank water temperature [Th2]) is 15°C or lower, the compressor stops. (Warning) When Evaporator outlet water temperature [Th4] becomes 17°C, the warning status will be automatically reset.	n015	15.2 ^{*2}
(2)	When Evaporator outlet water temperature [Th4] (or Tank water temperature [Th2]) is 35°C or higher, the compressor stops (FH alarm), and the 30W relay output turns ON or OFF.	n017	35.0
(3)	When Evaporator outlet water temperature [Th4] (or Tank water temperature [Th2]) is at least 5°C lower than the room temperature [Th3] (or machine temperature [Th1]), the 30W relay output turns ON or OFF. When the difference between room temperature [Th3] and Evaporator outlet water temperature [Th4] becomes 4°C or less, the warning status will be automatically reset.	n019	5.1 ^{*3}
(4)	When Evaporator outlet water temperature [Th4] (or Tank water temperature [Th2]) is at least 5°C higher than the room temperature [Th3] (or machine temperature [Th1]), the 30W relay output turns ON or OFF. When the difference between room temperature [Th3] and Evaporator outlet water temperature [Th4] becomes 3°C or less, the warning status will be automatically reset.	other	5.2 ^{*4}

*2: 17 (Temperature range warning reset temperature) -15 (Temperature range warning temperature) = 2

*3: 5 (Temperature range warning temperature) -4 (Temperature range warning reset temperature) = 1

*4: 5 (Temperature range warning temperature) -3 (Temperature range warning reset temperature) = 2

For Temperature Control Improvement - “Auto-tuning mode”

* To use the Water Chilling Unit in normal conditions, this function is not required.

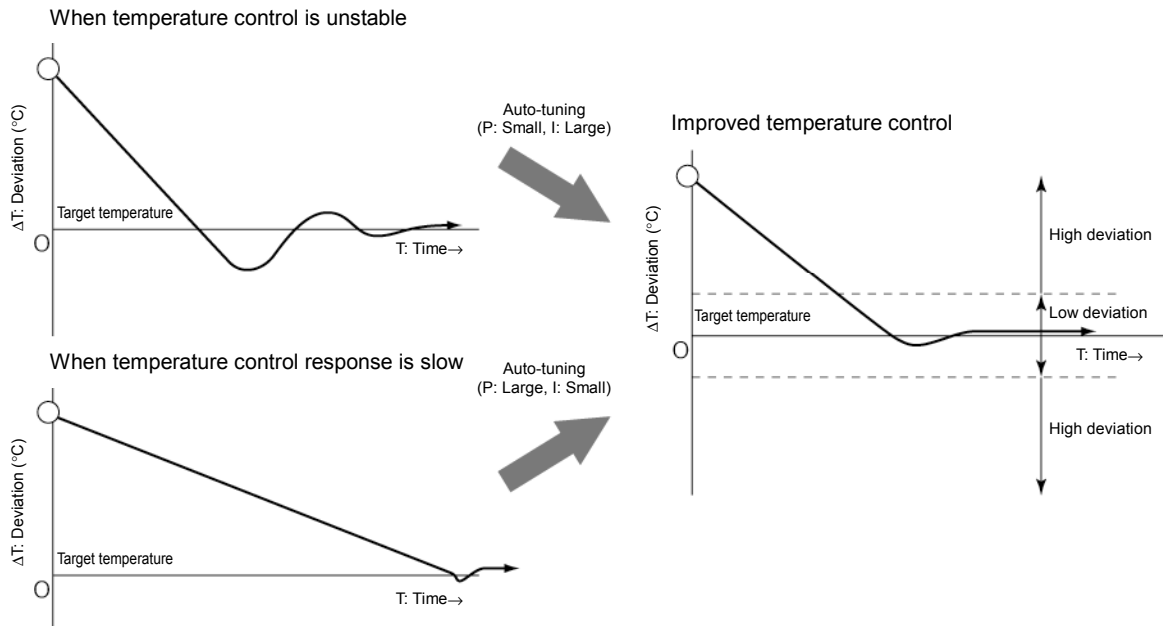
■ Outline of the function

Depending on the system of the main machine, problems of “**unstable temperature control**” or “**slow response in temperature control**” may be raised. In such cases, it is possible that the temperature control gain* P or I setting is not suitable for the system.

* Temperature control gain: Coefficient to determine a control value according to deviation (temperature difference)
P: Proportional gain
I: Integral gain

In such cases, you can improve the temperature control performance by using the “Auto-tuning mode” that provides more suitable gain settings.

Auto-tuning (Conceptual drawing)



Parameter No.	Item	
n005	P/I gain calculation coefficient (Response coefficient)	Initial value: 2.0
n006	Temperature control gain P (for low deviation)	Calculated temperature control gain P
n007	Temperature control gain I (for low deviation)	Calculated temperature control gain I
n008	Temperature control gain P (for high deviation)	Factory settings of the standard model P: 40 I: 40
n009	Temperature control gain I (for high deviation)	

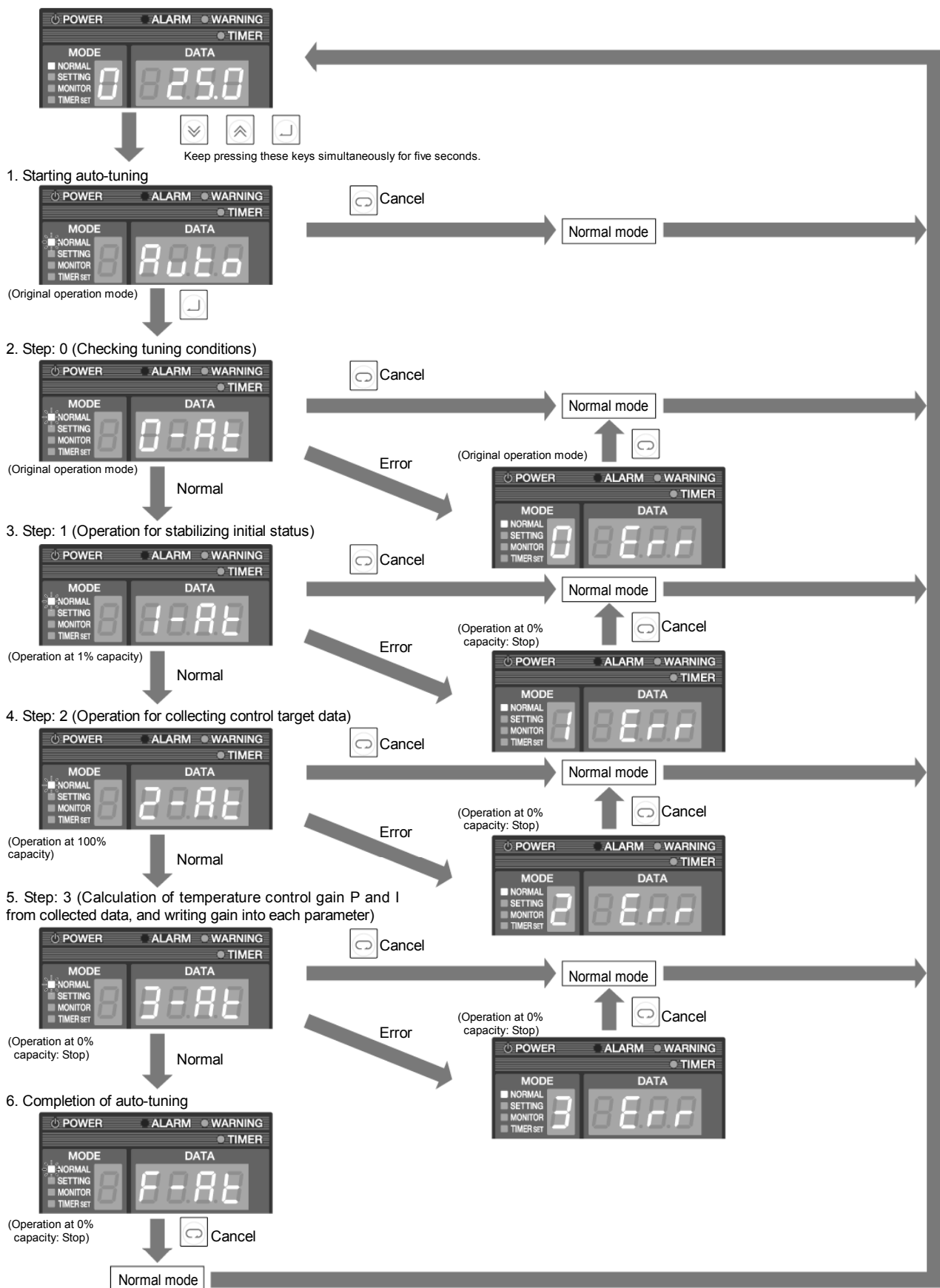
The auto-tuning mode automatically writes calculated values of temperature control gain (P and I) into specified parameters.

■ Outline of operation


The auto-tuning mode executes the following steps.
Check the Water chilling Unit status in each step.

Step	Operation	Unit status	Remarks
Before start	-	Operation status (Operation mode: Other than 9)	Select a desired operation mode. *[Note] 1., 3.
Step 0	Checking tuning conditions	Operation status (Operation mode: Other than 9: Same as before start)	
Step 1	Operation for stabilizing initial status	Operation status (Automatic operation for 2 minutes at 1% capacity)	
Step 2	Operation for collecting control target data	Operation status (Automatic operation for 10 minutes at 100% capacity)	*[Note] 4.
Step 3	Calculation of temperature control gain P and I from collected data, and writing gain into each parameter	Stop	*[Note] 5..
After completion	-	Stop	*[Note] 6.

Operation flow



[Note]

1. When starting auto-tuning, make sure that **the water temperature is nearly equal to the room temperature (in stable condition)**.
Leave the main machine under no load (stopped).
To complete the auto tuning correctly, start the auto tuning after the power supply to CHILLER is turned ON more than 5 minutes.
2. **If the remote signal turns OFF or an alarm is activated** during execution of auto-tuning, an error occurs (auto-tuning cannot be executed), and the corresponding error message appears.
To cancel the error, press the  key. (The unit returns to the normal mode.)
Check the remote signal, or examine the cause of the alarm. After taking a corrective action, execute auto-tuning again.
3. Before starting auto-tuning, select an operation mode to determine the control target thermistor. (Select any operation mode other than "9".)
Operation mode 0, 3 or 4 \Rightarrow Evaporator outlet water temperature thermistor
Operation mode 1, 5 or 6 \Rightarrow Tank water temperature thermistor
Then, set Parameter [n004] by referring to [Note] 4. below. (With pump/tank)
4. In Step 2, the machine may be over-cooled. To suppress machine over-cooling, specify an auto-tuning end condition in Parameter [n004].

Parameter [n004] Tank water temperature decrease (Auto-tuning end condition)

Setting range: 0.0 to 10.0°C, Initial value: 8.0°C

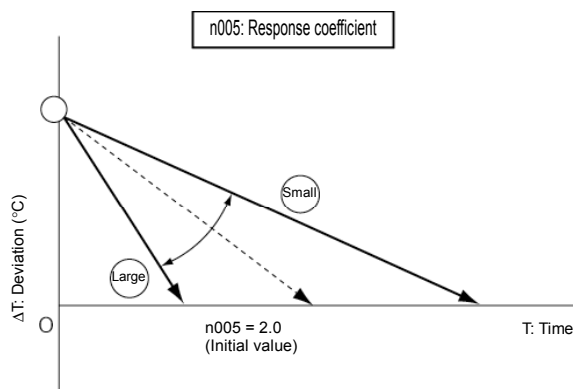
When the Tank water temperature decreases by the temperature specified in this parameter, auto-tuning (data collection) ends. If the specified temperature range is too small, temperature control gain may not be correctly calculated. You should set this parameter to the maximum value in the range where it does not cause damage to the machine.

5. To calculate more suitable temperature control gain based on the data collected in Step 3, you must specify a response coefficient in Parameter [n005]. (Through response coefficient adjustment, you can select whether to place importance on stability or response speed.)

Parameter [n005] P and I gain calculation coefficient (Response coefficient)

Setting range: 0.1 to 10.0, Initial value: 2.0


Setting a smaller value improves stability. Setting a larger value improves response speed.



6. Depending on the condition of the control target (machine), the unit may not calculate suitable temperature control gain in a single auto-tuning operation. You should **execute auto-tuning two or three times to average the calculated values, or use the value that most frequently appears (except for an extreme value)**.
To calculate a more suitable temperature control gain, you may change Parameter [n005] (see [Note] 5. above).
7. The temperature control will not be stabilized when the load changes abruptly (transient period).

Alarm/Warning Output Logic

The WaterChilling Unit can output an operation status signal to the main machine through wiring to the signal terminal block and parameter setup.

1. Connect the required signal cable to the signal terminal block.
(For the connecting method, refer to "Connection of external output contact" on page - 2. Set Parameter [n001].
n001: Alarm/warning output logic (First digit).

Setting		0			1 (2 to 9: Same operation as with 1)		
	Contact	Normal	Power failure	Alarm	Normal	Power failure	Alarm
Alarm output	60-61	ON	OFF	OFF	OFF	OFF	ON
	60-63	OFF	ON	ON	ON	ON	OFF
Warning output	66-67	ON	OFF	OFF	OFF	OFF	ON


First digit: Specifies alarm output logic (60-61, 60-63) and warning output logic (66-67) of the signal terminal block.

Second digit: Specifies DOUT signal output logic. (Optional communication expansion board is required.)

Alarm Settings for Optional Protection Devices (Installed by User)


The Water Chilling Unit can activate an alarm by receiving an output signal from optional protection devices (e.g. flow switch, level switch).

When using OP terminals [12] and [13]:

1. Connect the signal cable of the optional protection device to terminals [12] and [13] on the Water Chilling Unit signal terminal block.
(See "Outline of electrical equipment box" on page - 2. Set Parameter [n002].
 - "0" OP terminal is not used. (Factory setting)
 - "1" When OP contact turns OFF, Alarm Level 1 is activated.
 - "2" When OP contact turns OFF, Alarm Level 2 is activated.
 - "3" When OP contact is not ON after 30 seconds from pump operation start, Alarm Level 1 is activated. (When flow switch is used)

[CAUTION] The protection function cannot be activated simply by connecting the protection device to the OP terminals. Be sure to set this parameter.

When using OP 2 terminal [CN2]:

1. Connect the signal cable of the optional protection device to [CN2] on the Water Chilling Unit control board.
(See "Outline of electrical equipment box" on page - 2. Set Parameter [n003].
 - "0" OP2 terminal is not used. (Factory setting)
 - "1" When OP2 contact turns OFF, Alarm Level 1 is activated.
 - "2" When OP2 contact turns OFF, Alarm Level 2 is activated.

[CAUTION] The protection function cannot be activated simply by connecting the protection device to the OP terminals. Be sure to set this parameter.

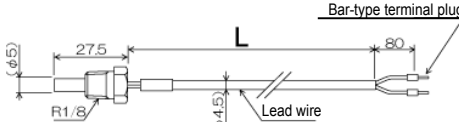
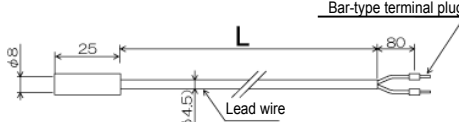
Optional Parts

Machine temperature tuning control

See page 19

When the following optional parts are mounted to the main machine, the Water Chilling Unit can perform control by detecting the machine temperature.

Optional Parts

Name	Type	Lead wire length L (m)	Dimensions	Application (Installed by user)	Compatible model
Machine temperature tuning thermistor	AKZ9-OP-K5	(5 m)		For machine temperature tuning control (embedded in machine body)	AKZ9 series
	AKZ9-OP-K10	(10 m)			
	AKZ9-OP-K15	(15 m)			
	AKZ9-OP-A5	(5 m)		For machine temperature tuning control (attached to machine body surface)	
	AKZ9-OP-A10	(10 m)			

Characteristics of thermistor: Resistance R25 (resistance at 25°C) = 20 kW, Tolerance: ±3% (Temperature equivalent: ±0.4°C)

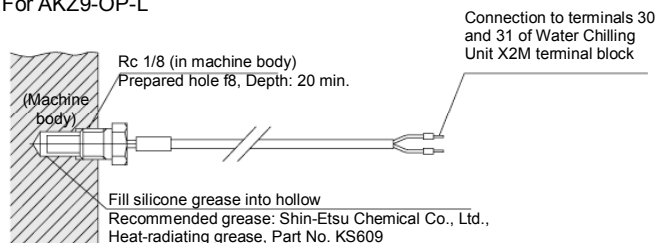
Mounting procedure

Water Chilling Unit

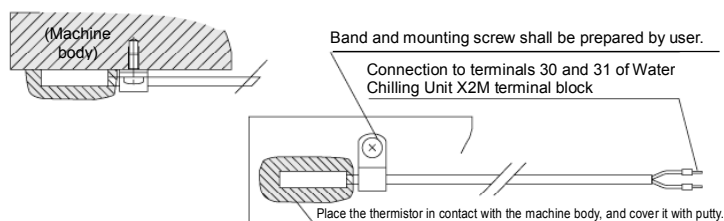
Connect the bar-type terminal plug [30] and [31] of the X2M terminal block in the electrical equipment box. (No polarity)
(See "Outline of electrical equipment box" on page 10.)

Main machine

For AKZ9-OP-L



For AKZ9-OP-A



CAUTION

- If the sensor is directly exposed to wind, detected temperature may fluctuate. Be sure to take heat-insulation measures by applying putty.
- When using a sensor of screw-mounting type, screw the sensor all the way into the body of the detection target.

Optional Parts

Returned Water temperature control

See page 19.

When the following optional parts are mounted to the water piping (return water piping) of the main machine, the Water Chilling Unit can perform control by detecting the returned water temperature.

Optional parts

Name	Type	Lead wire length L (m)	Dimensions	Application (Installed by user)	Compatible model
Oil temperature control thermistor	AKZ9-OP-Y5	(5 m)		For returned water temperature control (Mounted to main machine water piping)	AKZ9 series
	AKZ9-OP-Y10	(10 m)			

Characteristics of thermistor: Resistance R25 (resistance at 25°C) = 20 kW, Tolerance: ±3% (Temperature equivalent: ±0.4°C)

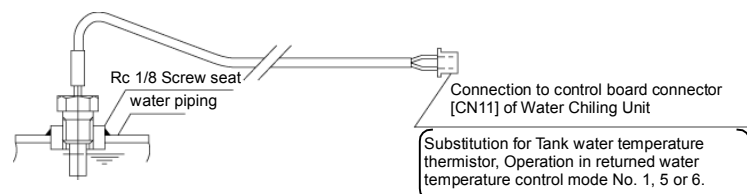
Mounting procedure

Water Chilling Unit

Substitute the blue connector (XHP-3) of the above part for the blue connector [CN11] of the tank water temperature thermistor in the electrical equipment box. (See "Outline of electrical equipment box" on page 19.)

Main machine

For AKZ9-OP-Y



Optional Parts

Communication with main machine

When this optional board is mounted to the Water Chilling Unit to connect this unit to the main machine:

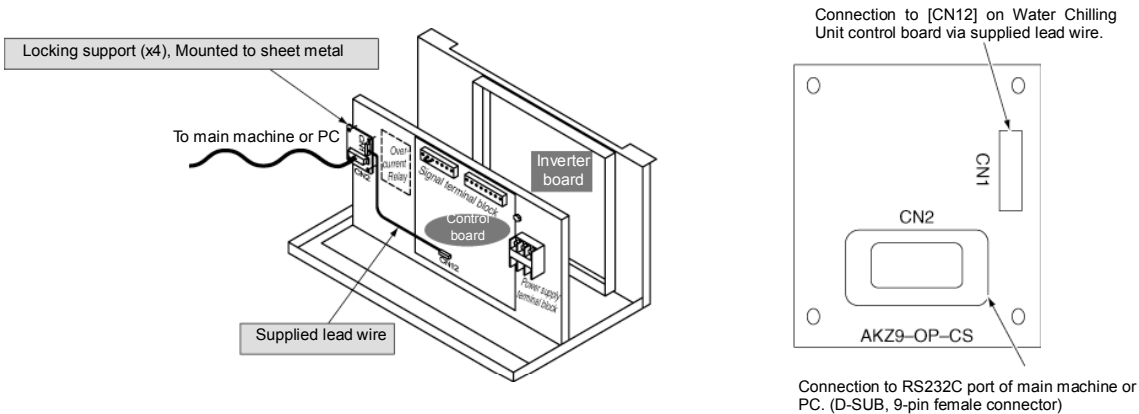
- You can change the operation mode and operation setting from the main machine.**
- You can read **the Water Chilling Unit alarm code and temperature data (machine temperature, room temperature, evaporator outlet water temperature, Tank water temperature, temperature difference between inlet and outlet, and inverter frequency data)** from the main machine.

Optional parts

Communication Method	Type	Mounting position	Compatible model	Specification No.
Serial omunication only	AKZ9-OP-CS	Sheet Metal	AKW149, AKW329, AKW439 AKW189, AKW359, AKW459	PSP04664

Mounting procedure

AKZ9-OP-CS



Maintenance/Inspection

Daily maintenance/inspection

- Water pollution causes a fault or shortened service life of the pump. Use thorough caution about water pollution to maintain the Water Quality Standard.
- Keep a normal water level in the water tank (Between the yellow line and red line of the water level gauge). Make sure that the water does not contain air bubbles.
- Clean inside of the water tank periodically.
- Make sure that the main machine water piping is not blocked (fully closed).
- Make sure that the water piping has no water leak.
- Make sure that the power supply voltage is within the following range:
50 Hz.....200 V \pm 10%
60 Hz.....200/220 V \pm 10%
- Make sure that the compressor, fan and pump do not abnormally sound during operation.
- Check whether the sheath of the CHILLER power lead is not broken.

Periodic maintenance/inspection

Line Filter

- Clean the line filter every six months to prevent the pump flow rate from being reduced by dust clogging.

Air filter (See page 15.)

NOTE: Wear gloves when working as the fins of the condenser may cause injury while replacing the air filter.

- Be sure to wash the air filter with water at 40°C or lower temperature every two weeks.
If the air filter is clogged with dust, the wind volume reduces, resulting in capacity deterioration. Also, the compressor's protection device is activated, hindering smooth operation. Furthermore, it causes power consumption increase.
- Operating the unit without the air filter causes a fault.
- To remove the air filter, hold the bottom of the filter with both hands, and push it up while warping it forward.

If the air filter is clogged, the cooling capacity deteriorates, resulting in excess power consumption. Clean the air filter periodically to save power consumption.

Condenser (See page 15.)

- Check whether there are any substances in the condenser by removing the air filter (You do not need to remove the external plate).
- If the condenser becomes extremely dirty, clean it with a brush, air blower, etc.
(When cleaning the condenser fins, wear gloves. Otherwise, you may be injured by the sharp edges.)
- However, do not use water or cleaning agents for cleaning. The fan motor or pump motor may cause an earth leakage.

Exterior

- Wipe the exterior surface with a dry cloth.
Never splash water over it.
- To clean the exterior, do not use a brush, polish powder, acid, solvent (benzine etc.) or hot water. Using such substances causes the paint to peel off.

Evaporator (See page 15.)

- Perform periodical inspection as the water piping becomes blocked (fully closed) because the brazing plate is clogged with dirt. The inside of the evaporator cannot be checked as it is sealed. Check the water level at the customer's piping from the CHILLER output (You do not need to remove the external plate).

Water drain (See page 15.)

- Inspect the bottom of CHILLER (drain pan) every six months and if the water is accumulated, discharge it from the water drain port. The tightening torque of the hexagonal bolt for the drain is 2N·m.
If it is tightened with excessive torque, the bottom frame may be damaged.

Packing of the electric component box

- If the packing of the electric component box is seriously damaged, consult DAIKIN contact center. If you use the product without a change, the protection structure of IP54 cannot be maintained and the electric component may break down.

To leave the unit unused for a long period

- Drains water from the tank and the evaporator drain port.
- Mount a cover to the Water Chilling Unit to prevent dust or water from entering inside of the unit.
- Be sure to turn OFF the main power supply.
- Be careful to keep oily dust off the condenser surface of the Water Chilling Unit.

Troubleshooting

1

When the Water Chilling Unit does not work well, first check the following points.

2

If the problem persists, contact DAIKIN Contact Center with information on the following 1), 2) and 3) items.

(For phone/fax number and address of DAIKIN Contact Center, see the back cover.)

- 1) Machine name (Full Model No.)
- 2) Manufacture No. (MFG. No.)
- 3) Condition of the Water chilling Unit (as closely as possible)

See page 4

NOTE: Customers should not perform any repairs as it is dangerous. Our service person will make repairs.

When the unit operation seems abnormal although no alarm is activated

Item	Condition	Cause	Corrective action
1	The unit does not run at all. (The POWER lamp on the control panel is unlit.)	1) The main power supply is OFF, or the power cable (L1, L2) is disconnected.	Check if the power cable is connected to the power supply terminal.
		2) The connector for the transformer disconnected, or the thermal fuse of the transformer melted.	Check the wire connection of the transformer. If the fuse was melted, consult DAIKIN center.
2	The pump does not run.	1) The remote control input ([10]-[11]) is OFF.	Check the connection of the remote control input.
		2) The unit has been set to the operation lock mode. (With the factory setting, the operation Lock mode is selected.)	Cancel the Lock mode on the control panel. (See page 17.)
3	Water does not flow, although the pump is running. Because the water circulation quantity is insufficient, the pump sound level is large.	1) The pump suction pipe connection is loose.	Check the packing of the pipe, and re-tighten it securely.
		2) The line filter is clogged.	Clean the line filter. If the water in the tank is dirty, replace the water. (See page 37.)
		3) The water level in the water tank has decreased.	Refill water into the water tank.
		4) Because of a large pressure loss in the water discharge pipe	Increase the water pipe diameter, and shorten the pipe length.
4	The compressor does not run, although the pump is running.	1) The compressor is stopped under temperature control.	---
		2) The compressor restart prevention timer has been activated.	Check if the compressor starts after elapse of the timer preset time.
		3) The low water temperature protection device has been activated. (Evaporator outlet water temperature is 2°C or lower.)	Check if the compressor normally operates at 5°C or higher evaporator outlet water temperature.
		4) The low ambient temperature protection device has been activated. (Room temperature is -2°C or lower.)	Check if the compressor normally operates at 0°C or higher room temperature.
		5) The capacity setting is 0% (Mode 9).	Change the operation mode to an appropriate setting.
5	Although both pump and compressor are running, water cannot be cooled.	1) There is an obstacle near the air intake/exhaust port.	Remove the obstacle.
		2) The air filter is clogged.	Clean the air filter.
		3) The unit is running under capacity suppressing control, because the room temperature is high.	Check the capacity in the operating temperature range with the catalog, and select a model with appropriate capacity.
		4) Heat load is large.	
		5) The temperature setting is high.	Change the temperature setting to an appropriate temperature.
		6) If the exhaust air temperature is almost equal to the room temperature although the compressor is in operation, the refrigerant gas is running short.	Re-fill refrigerant.
6	Operation setting cannot be performed.	1) If "—" appears on the data display, the temperature sensor corresponding to the selected operation mode is not connected.	Connect the corresponding temperature sensor.
		2) If "—" instantaneously appears when the [ENT] key (at the right end of the control panel) is pressed, the protect switch is set to ON.	Turn OFF the protect switch (SW1) on the control board.
7	Alarm output operation ([64] or [65]) is different from that of conventional signal output.	1) The alarm output signal connection has been partially changed.	The [60] to [63] outputs are compatible with conventional models (AKS5 and AKZ6 series). With the AKZ8 and AKZ9 series, however, signal operations and connections of the [64] and [65] outputs have been changed.

When an alarm is activated

An alarm is generated when a defect that disables the continuance of operation is generated in CHILLER.

To cancel the alarm, turn OFF the power supply, and then turn it ON again.

Alarm list

Alarm code	Alarm* level	Description	Cause	Corrective action
A6	2	DC fan motor lock error	1) Rotation speed of fan motor is insufficient because of drop of DC voltage by breaking wire or looseness of connector.	Check the insertion and breaking of the signal wire and engine wire between the filter board and the inverter board.
			2) Fan motor-control board communication error	Check the connector insertion and wire break. Replace the control board.
			3) Fault of the DC fan motor	Replace the DC fan motor.
E1	1	System error	1) Internal parameter setting is invalid.	Replace the control board.
E3	2	High pressure error	1) The water temperature or room temperature is higher than the specified range.	Use the unit within the specified operating range.
			2) There is an obstacle near the air intake/exhaust port.	Do not place any object that blocks ventilation at 500 mm or shorter distance from the air intake/exhaust port.
			3) The air filter is clogged, or the condenser is dirty.	Clean the air filter. (See "Maintenance/Inspection" on page 37.)
			4) Any factor other than the above	Contact DAIKIN Contact Center.
E5	2	Compressor high temperature error	1) The water temperature or room temperature is higher than the specified range.	Use the unit within the specified operating range.
			2) There is an obstacle near the air intake/exhaust port.	Do not place any object that blocks ventilation at 500 mm or shorter distance from the air intake/exhaust port.
			3) The air filter is clogged, or the condenser is dirty.	Clean the air filter. (See "Maintenance/Inspection" on page 37.)
E6	2	Compressor (M2C) lock	1) Fault of the compressor (Replace the compressor.)	Replace the compressor.
EH	1	Pump over-current relay (K1S:S182) is activated. AKW149, 329, 439: 3.6A	1) The pump is overloaded with high-viscosity water.	Use water that satisfies the water quality standard in the specified water temperature range.
			2) Because the power supply voltage falls below the operating range, the pump current has increased.	Check if the power supply voltage is not lower than the specified operating range. Check for an instantaneous power supply voltage drop at startup of peripheral equipment.
			3) The pump motor wiring has a break. (Open-phase)	Replace the pump motor.
			4) A foreign object is caught in the pump, or the pump motor has a fault.	Replace the pump motor.
EJ	1 or 2	Optional protection device is activated. (OP.)	1) The optionally-connected protection device (or factory-connected device, if it is incorporated in the unit) has been activated.	Check the condition detected with the relevant protection device.
FE	1	Water temperature error	1) The water temperature is higher than 65°C.	Use the unit within the specified operating range.
FH	2	Evaporator outlet water temperature is higher than 60°C.	1) The heating value of the main machine has exceeded the cooling capacity of the Water Chilling Unit. (Improper model selection)	If the unit is properly installed and the compressor runs at 100% capacity (capacity setting can be checked in the monitor mode), select a model that provides larger cooling capacity.
			2) There is an obstacle near the air intake/exhaust port, resulting in cooling capacity deterioration.	Do not place any object that blocks ventilation at 500 mm or shorter distance from the air intake/exhaust port.
			3) The unit is running under capacity suppressing control, because the standard temperature (room temperature: 25°C, water temperature: 25°C) has been exceeded.	If the standard temperature is exceeded, the cooling capacity becomes smaller than the nominal capacity, because the unit runs under capacity suppressing control. Make sure that the cooling capacity of the Water Chilling Unit is larger than the main machine heating value throughout the operating temperature range.
			4) Temperature control is disabled because the unit is operated in Mode 9 (capacity direct designation mode).	Select an appropriate operation mode. (The capacity direct designation mode does not execute temperature feedback control.)
			5) The refrigerant gas has leaked.	If the exhaust air temperature is almost equal to the room temperature regardless of the compressor operation, it is possible that the refrigerant gas has leaked. Contact DAIKIN Contact Center.
		Falling suction gas temperature. Freeze water.	1) Refrigerant suction gas temperature is less than 0 °C.	Check if the water piping system is not blocked (fully closed).

Alarm code	Alarm level	Description	Cause	Corrective action
H1	2	Air temperature thermistor error (Th5: Machine temperature tuning thermistor) (Th3: Room temperature thermistor)	1) The air temperature thermistor required for control is disconnected or short-circuited.	Identify the thermistor that indicates the error in the monitor mode on the operation panel ("~99.9" is displayed), and check the thermistor wiring. <Emergency Operation> 1) Malfunction of machine temperature tuning thermistor: Emergency operation is available when the operation mode is 0, 1, 3, 5, or 9. 2) Malfunction of room temperature tuning thermistor: Emergency operation is available when the operation mode is 0, 1, 4, 6, or 9. (See page 124 to change the operation mode.)
JH	2	Th4: Evaporator outlet water temperature thermistor Th2: Tank water temperature thermistor	1) The water temperature thermistor required for control is disconnected or short-circuited.	Identify the thermistor that indicates the error in the monitor mode on the operation panel ("~99.9" is displayed), and check the sensor wiring. <Emergency Operation> 1) Malfunction of Evaporator outlet water temperature thermistor: Emergency operation is available when the operation mode is 1, 5, 6, or 9. 2) Malfunction of tank water temperature thermistor: Emergency operation is available when the operation mode is 0, 3, 4 or 9. (See page 124 to change the operation mode.)
L0	2	Inverter/compressor error	1) The compressor or inverter has a fault.	Replace the control board or compressor.
LC	2	INV-temperature control CPU communication error	1) Communication failure between the temperature control microprocessor and the inverter microprocessor.	Replace the control board, or improve the power supply environment. (Take noise suppressing measures.)
U0	2	Gas shortage	1) The refrigerant piping is damaged by excess vibration during transportation, resulting in refrigerant gas leak.	Repair the refrigerant pipe, and refill refrigerant.
U1	1	Power supply reverse-phase connection Low voltage (Power voltage)	1) The power supply is connected in reverse phase.	Exchange any phase of the power supply wiring.
			2) Open phase	Make sure that any phase is properly connected to the power supply terminal block.
			3) The fuse in the noise filter board has blown.	Contact DAIKIN Contact Center.
			4) The power voltage is under about 130V.	Make sure that the power voltage is rated voltage.
U2	2	Low voltage (DC voltage on main Inverter circuit)	1) Circuit protection for surge current restriction is activated because of excess ON/OFF switching of power supply.	Turn OFF the power supply, and turn it ON again after two minutes or more. Frequent turning ON/OFF of the power supply may cause failure of CHILLER. Ensure the power ON time and OFF time is for two minutes or more separately.
			2) Unconnection of DCL	Check the connection between DCL and connections parts (DCL1, DCL2) on Inverter board.
			3) Decrease of the DC voltage of the main circuit due to breaking of wiring or disconnection of connector	Check the insertion and breaking of the signal wire and engine wire between the filter board and the inverter board.
			4) Power voltage sag (interrupt) often occurs.	Make sure that the power supply voltage conforms to the rating. Check for instantaneous voltage drop at startup of peripheral equipment.
U9	2	Other system communication error (Slave communication error)	1) An error occurred in communication with a slave.	Make sure that the slave communication line is properly connected. (This error occurs only when the slave does not make response in master-slave communication.)
UH	2	System failure (EEPROM error)	1) The parameter stored in the control board is invalid.	Replace the control board.
UJ	1 or 2	Optional protection device is activated. (OP2)	1) The optionally-connected protection device (or factory-connected device, if it is incorporated in the unit) has been activated.	Check the condition detected with the relevant protection device.
J3	2	Discharge pipe temperature thermistor error	1) The discharge pipe temperature thermistor is disconnected or short-circuited.	Check the wiring of the relevant thermistor.
J4	2	EV valve outlet temperature thermistor error	1) The EV valve outlet temperature thermistor is disconnected or short-circuited.	Check the wiring of the relevant thermistor.
J5	2	Suction gas temperature thermistor error	1) The suction gas temperature thermistor is disconnected or short-circuited.	Check the wiring of the relevant thermistor
J6	2	Condenser temperature thermistor error	1) The condenser temperature thermistor is disconnected or short-circuited.	Check the wiring of the relevant thermistor.

When a warning is activated

A warning is generated when the status of CHILLER is not normal or the water temperature to be monitored exceeds the setting temperature range.

If you continue operation without a change, CHILLER may break down. Be sure to take measures.

Warning list

Warning code	Description	Cause	Corrective action
H1	Room temperature thermistor error	1) Room temperature thermistor is disconnected or short-circuited. (Only if it is not used for control)	Check the wiring of the relevant thermistor.
JH	Evaporator outlet water temperature thermistor error	1) Evaporator outlet water temperature thermistor is disconnected or short-circuited. (When it is not used for control)	Check the wiring of the relevant thermistor.
J3	Discharge pipe temperature thermistor error	1) The discharge pipe temperature thermistor is disconnected or short-circuited. The system will be stopped to protect CHILLER by upgrading the state to an alarm after operation for 150 hours.	Check the wiring of the relevant thermistor.
J4	EV valve outlet temperature thermistor error	1) The EV valve outlet temperature thermistor is disconnected or short-circuited. The system will be stopped to protect CHILLER by upgrading the state to an alarm after operation for 150 hours.	Check the wiring of the relevant thermistor.
J5	Suction temperature thermistor error	1) The suction gas temperature thermistor is disconnected or short-circuited. The system will be stopped to protect CHILLER by upgrading the state to an alarm after operation for 150 hours.	Check the wiring of the relevant thermistor.
J6	Condenser temperature thermistor error	1) The condenser temperature thermistor is disconnected or short-circuited. The system will be stopped to protect CHILLER by upgrading the state to an alarm after operation for 150 hours.	Check the wiring of the relevant thermistor.
F6	High pressure error	1) There is an obstacle near the air intake/exhaust port.	<ul style="list-style-type: none"> • Clean the air filter and condenser. • Do not place any object that blocks ventilation at 500 mm or shorter distance from the air intake/exhaust port.
		2) Operation outside the high temperature range.	Use the unit within the specified operating range.
3E	Temperature range warning 3	1) The monitor temperature has exceeded the preset temperature. (It does not mean a fault of the Water Chilling Unit.)	Check the preset warning condition.
4E	Temperature range warning 4		
5E	Temperature range warning 5		

CE compliance declaration

See the declaration of conformity below for a CE model (menu symbol: C).

EC DECLARATION OF INCORPORATION OF PARTLY COMPLETED MACHINERY

[01] DAIKIN INDUSTRIES,LTD.

1-1 Nishi-hitotsuya, Settsu-shi, Osaka, 566-8585, Japan

[02] Technical Documentation is obtained by the following authorized.

Authorized representative **Sauer Bibus GmbH**

Address

Lise-Meitner-Ring 13, D-89231 Neu-Ulm, Germany

[03] Hereby declares that the machinery described below:

Water Chilling Unit AKW 9 Series

Models: AKW149-(B)C, AKW149C171, AKW149D171

AKW329- (B)C, AKW329C171, AKW329D171

AKW439- (B)C, AKW439C171, AKW439D171

AKW189 -(B)C

AKW359 -(B)C

AKW459 -(B)C

Instruction Manual NO. : PIM00364

[04] This declaration complies with the provisions of the machinery directive and the regulations transposing it into national law, but the machinery described in this certificate must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of the Machinery and their amendments.

Note) This declaration becomes invalid if technical or operational modifications are introduced without the manufacturer's consent

[05] Also complies with the provisions of the following European Directives:

- **EMC Directive 2004/108/EC**

Relevant information that should be transmitted in response to a reasoned request by the national authorities, by the electronic method or other according to the request.

[06] Complies with the provisions of the following harmonized standard:

- **Machinery Directive: EN 378-2:2008**

- **EMC Directive: EN 61000-6-4:2007**

EN 55011:2007+ A2:2007, (group 1, class A)

EN 61000-6-2:2005

[07] 1-1 Nishi-hitotsuya, Settsu-shi, Osaka, 566-8585, Japan On 2. December. 2011

[08] **Takashi Nishizawa**

Quality Assurance Department Manager, Oil-hydraulic Division, Yodogawa Plant

Takashi Nishizawa

Name and Signature as well as position of declarant :

PE01500

(Document No.)



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