

Instruction Manual

DAIKIN Oil Cooling Unit ("OILCON")

AKC9

Circulating type

Compliant with
ROHS



Models

Menu Series	Standard model	Built-in pump model (-200)	CE model (-C)	Built-in heater model (-H)
AKC359	○	○	○	○
AKC569	○	○	○	○

Thank you for purchasing DAIKIN Oil Cooling Unit ("OILCON").
This instruction manual includes instructions for using the Oil Cooling 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.

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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**

This category indicates **urgently hazardous conditions that may result in death or serious injury.**

 **WARNING**

This category indicates **potentially hazardous conditions that may result in death or serious injury.**


 **CAUTION**





This category indicates **potentially hazardous conditions that may result in injury or property damage only.**


- 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 3. JIS B8361 General Rules for Hydraulic Systems

Precautions for installation

 **DANGER**

<p>Only qualified people can handle the unit.</p> <p> Transportation, installation, piping, electric wiring, operation, maintenance and inspection of the unit must be conducted by qualified people.</p> <p>Mandatory Check the power supply (voltage, frequency and current).</p>	<p>Check the weight, and hang the unit by the specified points.</p> <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> <p>Mandatory</p>
<p>Connect the power cable according to the procedure described in this instruction manual.</p> <p> Connect the power cable according to the procedure described in "Electric Wiring" on page 9.</p> <p>Forbidden</p>	<p>Ground the unit securely.</p> <p> If the unit is not grounded, you may get an electric shock.</p> <p>Ground cable connection</p>

 **WARNING**

<p>Conduct electric wiring according to the ratings.</p> <p> Conduct electric wiring according to "Regulation on Electrical Facilities" and "Internal Wiring Regulations". Improper wiring may result in burnout or fire.</p> <p>Mandatory For overseas use, conduct electric wiring according to the local wiring standard.</p>	<p>Fasten the unit during operation.</p> <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> <p>Forbidden</p>
<p>Keep away from the unit when it is being carried with slings.</p> <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> <p>Forbidden</p>	<p>Do not install a duct</p> <p> If you install a duct at the exhaust port, the duct may fall.</p> <p>Forbidden</p>
<p>Do not climb on the OILCON (when it is packaged)</p> <p> Do not climb on the OILCON when it is transported or installed. You may become trapped under the oil controller due to the package falling.</p> <p>Forbidden</p>	

CAUTION

Prepare a circuit breaker at user's site.



Mandatory

The Oil Cooling Unit is equipped with a circuit breaker. However, to ensure safety, a 3-pole circuit breaker (*) exclusive to the Oil Cooling Unit wiring should be prepared by user. Select an inverter-compatible circuit breaker.
(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 liquid pump operation system has a fault, liquid cannot be supplied to the main machine. Normally in this case, the Oil Cooling 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 liquid flow path of the main machine to watch the liquid flow.

Check the liquid piping.



Mandatory

Before or immediately after connection of the Oil Cooling Unit, make sure that the liquid piping of the main machine is not blocked (fully closed). If the unit is operated with the liquid piping blocked (fully closed), the liquid hose may break due to an liquid temperature rise, causing liquid to flow out of the oil Cooling Unit. When the liquid temperature abnormally rises, the FH alarm is activated. In this case, stop operation of the main machine as soon as possible.

Do not tilt the unit.



Mandatory

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

Check altitude



Check

Do not use at an altitude of 2,000m or more. If installed at the altitude of 1,000m or more, following effects may be caused:
- Cooling capacity may be decreased for 20 – 30 %
- Life expectancy of electrical components may be shorten

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 Oil Cooling 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, SDS (Safety Data Sheet) for the refrigerant is attached to the product. Take an action according to the SDS.

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 OILCON. 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 liquid pollution.



Mandatory

Pollution of operating fluid causes a fault or shortened service life of the pump. Use thorough caution for operating fluid pollution control.

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 OILCON



Mandatory

Do not install the noise generator around OILCON 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 Oil Cooling Unit operation panel. If you start the main machine in the operation lock status, it cannot be supplied with liquid, causing damage to the machine.

Do not run the pump without oil.



Forbidden

Before start of operation, make sure that the liquid pipe is properly connected, and the tank is filled with liquid to an appropriate level. Running the pump without oil results in damage to the pump.

Check the unit before operation.



Check

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

CAUTION



This product must not be used in residential areas.
This product may cause interference if used in residential areas.
Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.

Mandatory

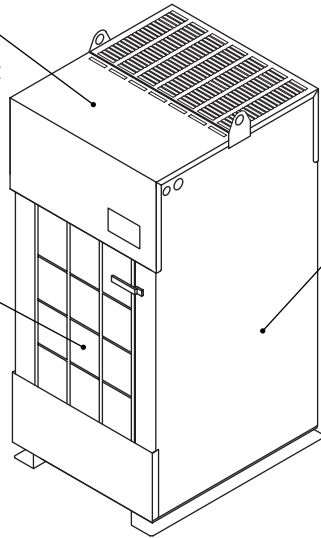
Electrical Hazard

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).

Oil Cooling Unit and Accessories

* Some models do not come with accessories.

Check the following items:

1 Oil Cooling Unit

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

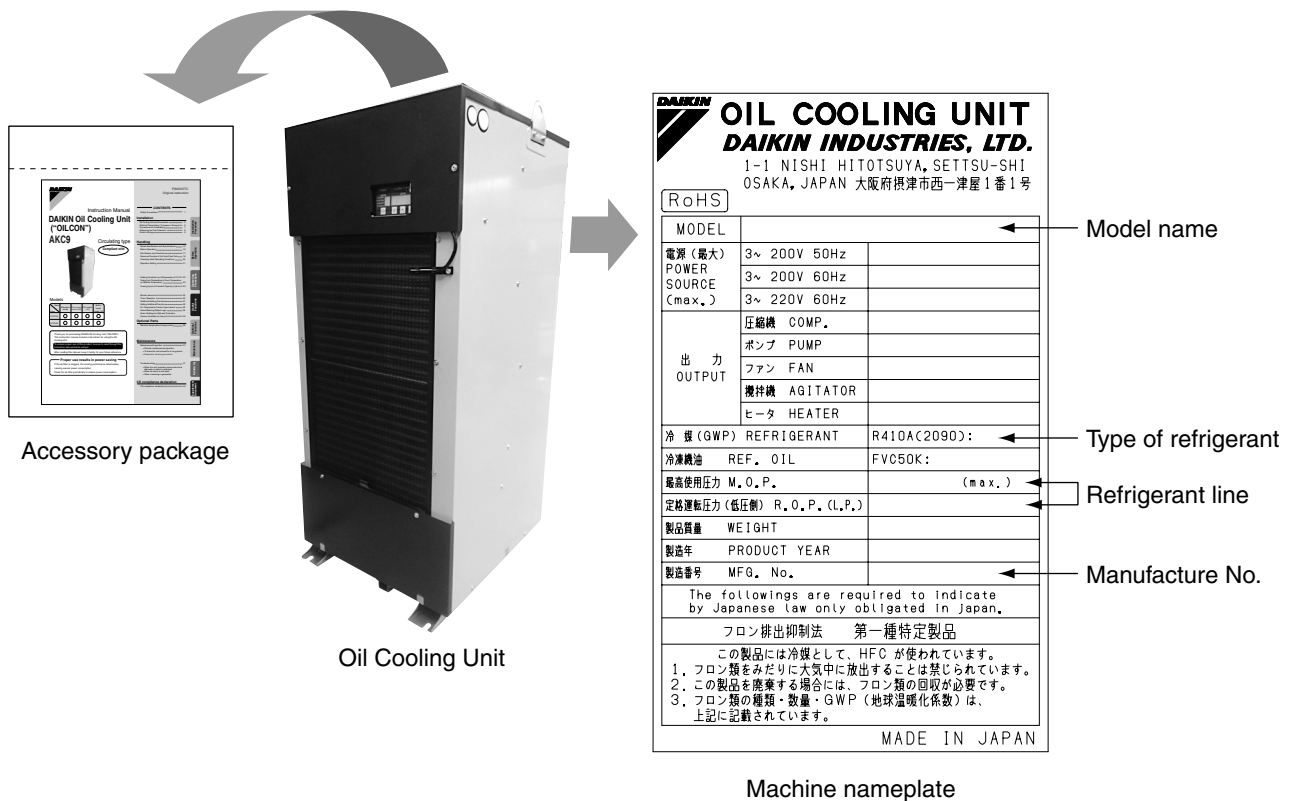
* The attachment position of the nameplate (including the machine label) may be different for some models.

2 Accessories

An accessory package*1 is attached to the top plate of the Oil Cooling Unit.

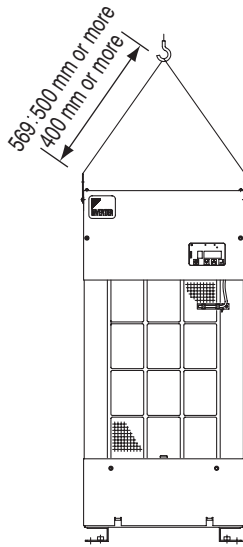
Keep this manual in place where users can read it whenever required.

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



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. Do not transport or convey the unit with liquid filled-in by hanging the eye plate. Otherwise, the unit may fall.
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%).
- Carry out the transportation or conveyance according to the following method.



Eye plate

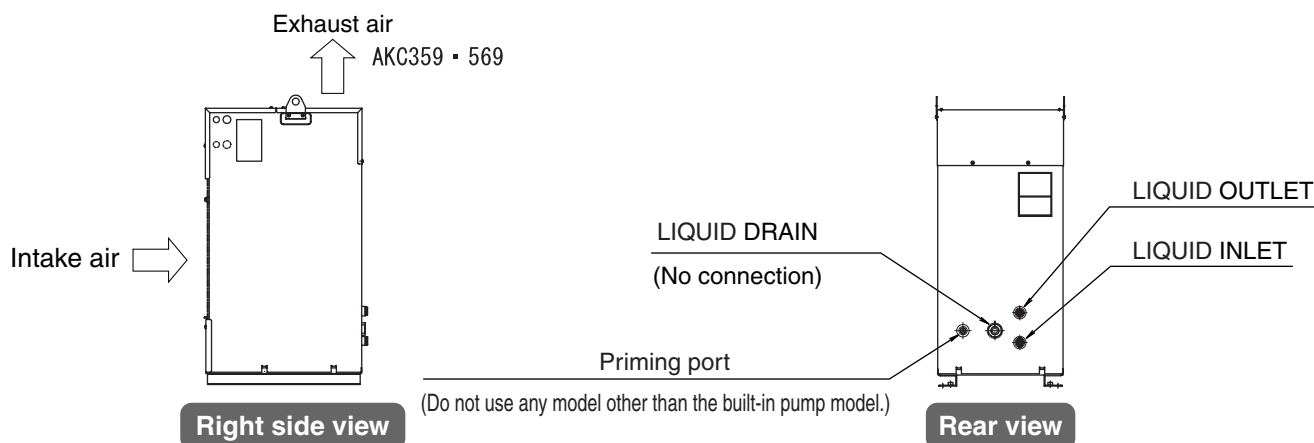
Carry out the transportation or conveyance by fixing the hanging tool to the right and left eye plates.

Stay away from the product during transportation or conveyance using the hanging tool.

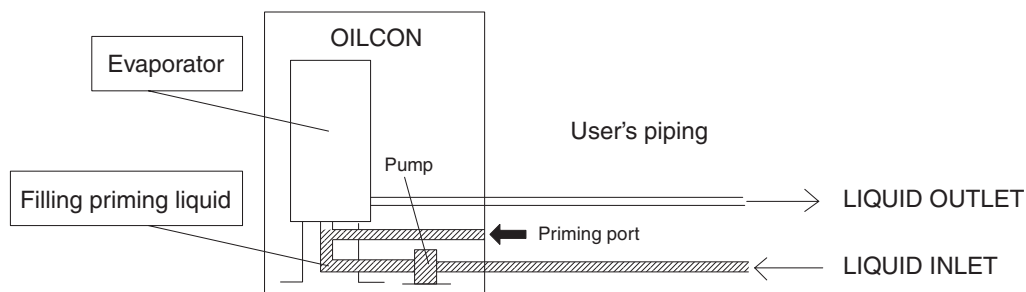
Precautions for Installation

Installation place and liquid 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. (For built-in pump model only) Do not install the unit at a place where the liquid inlet of the unit is higher than the liquid level in the tank by 0.5 m or more.
 10. Keep any noise generating devices away from the unit. If it is difficult to do so, implement appropriate measures on the noise generating devices.
 11. Leave safe, sufficient space around the unit to ensure proper, trouble-free operations of the control panel.
 12. Do not install at an altitude of 2,000m or more.
- Do not place an object that may block air flow within 500 mm from the air intake/exhaust port.
- Liquid piping: Locations of the liquid inlet, liquid outlet and drain piping are shown below.



1. Adjust the liquid circulation rate at the specified value (15 L/min) or above.
2. Use piping resistant to the operating fluid.
Avoid using a valve or elbow in the middle of the piping, if possible.
Using a valve and elbow results in large pressure loss, causing the piping to be clogged with dust (swarf, etc.).
3. Wrap the pipe joints with sealing tape to prevent air intrusion and liquid leakage.
4. Make sure that the piping for the main machine is not blocked (fully closed).
(The following instructions apply to the built-in pump model only.)
5. Self-suction lift of the pump is 0.5m. (see page 15)
However, if the atmospheric pressure drops, use thorough caution about suction pressure.
In case atmospheric pressure drops, be careful of the decrease of inlet suction pressure.
(Reference) Reduction of the pressure at altitude : -1kPa/100m
6. Do not make a trap in the liquid inlet piping. Do not make a trap in the liquid inlet piping.
7. Do not attach a filter directly to the inlet piping.
8. For initial operation of the unit, priming is required.
Execute priming from the priming port to fill the pump chamber and liquid inlet piping with cooling liquid.
It is useful to fill liquid, if an L-joint is connected to the priming port and a funnel is used.
If the pump runs for 30 seconds or longer without priming liquid or with insufficient priming liquid, it causes a fault of the pump.
Once the pump sucks up air from the suction port, self-priming is disabled. After suction of air, execute priming again. In this case, if liquid remains in the evaporator, air may not be discharged from the piping well. If liquid does not circulate even after priming, discharge liquid from the evaporator. Then, execute priming again before running the pump.
9. After filling priming liquid, wrap the plug with sealing tape before running the pump, and attach the plug to the priming port. If the pump runs without the plug on the priming port, liquid will spout out of the priming port.



Suction strainer (Line filter)

Attach a strainer with a small pressure loss to the liquid piping system, or divide the liquid tank into three or more sections, and remove swarf or other foreign substances by overflowing the liquid.
 (Use liquid that can pass through a 40-mesh or finer filter. For the built-in motor model, do not attach the filter directly to the inlet piping.)

- If the evaporator (cooler) of the unit is clogged with dust or other foreign substances, it causes a fault of the compressor and the pump, as well as cooling capacity deterioration.
- During adjustment at trial run, the strainer gathers much dust from the liquid piping system. Clean or replace the strainer before starting actual operation. Check the strainer periodically.


Tank

- To receive liquid from the liquid piping system for the main machine, provide a tank that can cope with increase or decrease of liquid.
- Consider the tank structure so that inside of the tank can be easily cleaned. (For example, the tank has a cleaning hole or the tank top plate is detachable.)

Reference for Pipe Selection

Connection pipe diameter (Standard model)

Connection pipe \ Model	AKC359-569
Liquid Inlet	Rc3/4
Liquid Outlet	Rc3/4
Liquid Drain	Rc1
Filling priming liquid**	Rc1/2

* For menu models, refer to "Model Identification and Specifications" on page  15.

** Do not use any model other than the built-in pump model (-200).

Electric Wiring

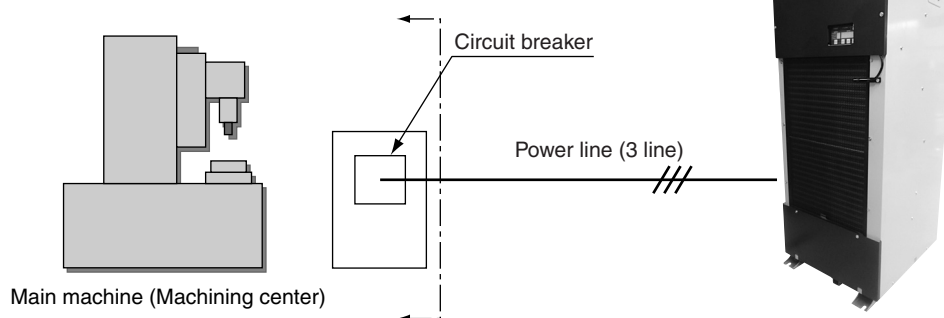
- Conduct electric wiring according to the local wiring standard.
- For the power supply, be sure to use the commercial power source. If you use the inverter power source or other power source, the product may cause burnout.
- The Oil Cooling Unit is equipped with a circuit breaker. However, to ensure safety, a circuit breaker exclusive to the Oil Cooling Unit should be connected 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 Oil Cooling Unit. Do not touch the protection devices.

Starting/stopping the Oil Cooling Unit

To turn ON the power supply for the Oil Cooling Unit, the following three methods are available:

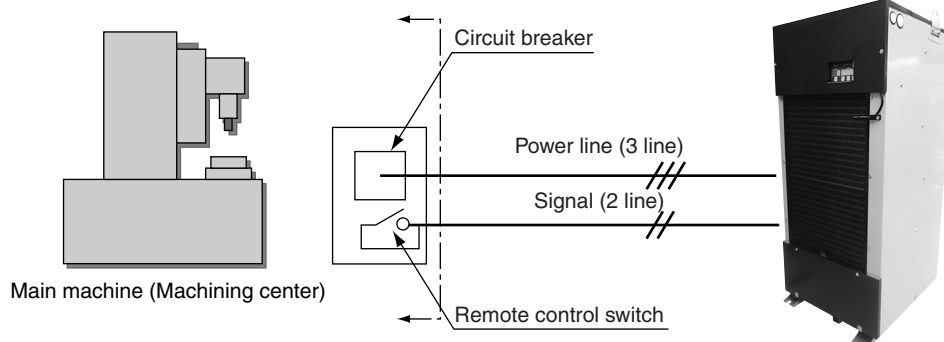
1 Directly starting/stopping the Oil Cooling Unit with the main machine power supply

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







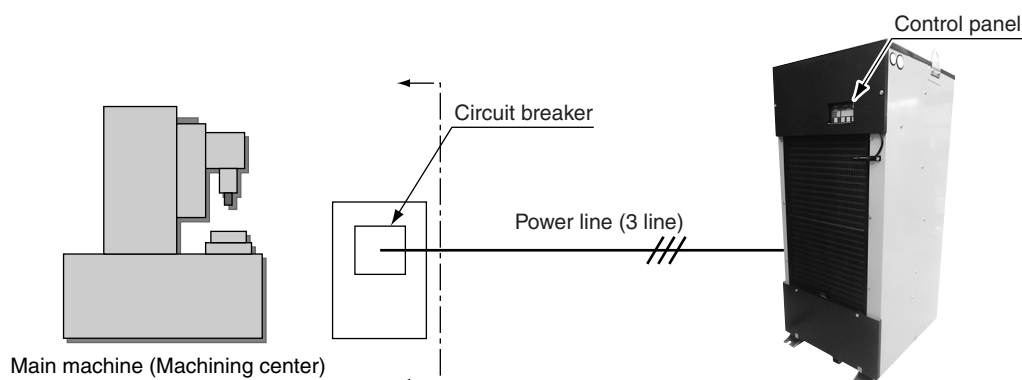
2 Stopping the Oil Cooling Unit through remote input (see page 11)

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



3 Starting/stopping the Oil Cooling Unit with the control panel

If you keep pressing the  and  keys for at least 5 seconds in the “operation lock” mode, the Oil Cooling 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 Oil Cooling Unit will be stopped (locked).



Mounting a circuit breaker

The Oil Cooling Unit is equipped with a circuit breaker. However, to ensure safety, a 3-pole circuit breaker (*) exclusive to Oil Cooling Unit should be connected to the main machine. For the breaker capacity, refer to the specifications of each model (see page 15). 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

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

2 1. Insert the power cable into the power cable insertion hole ($\phi 28$) 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 ($\phi 22$) 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.
2. Connect the power cable to the breaker.

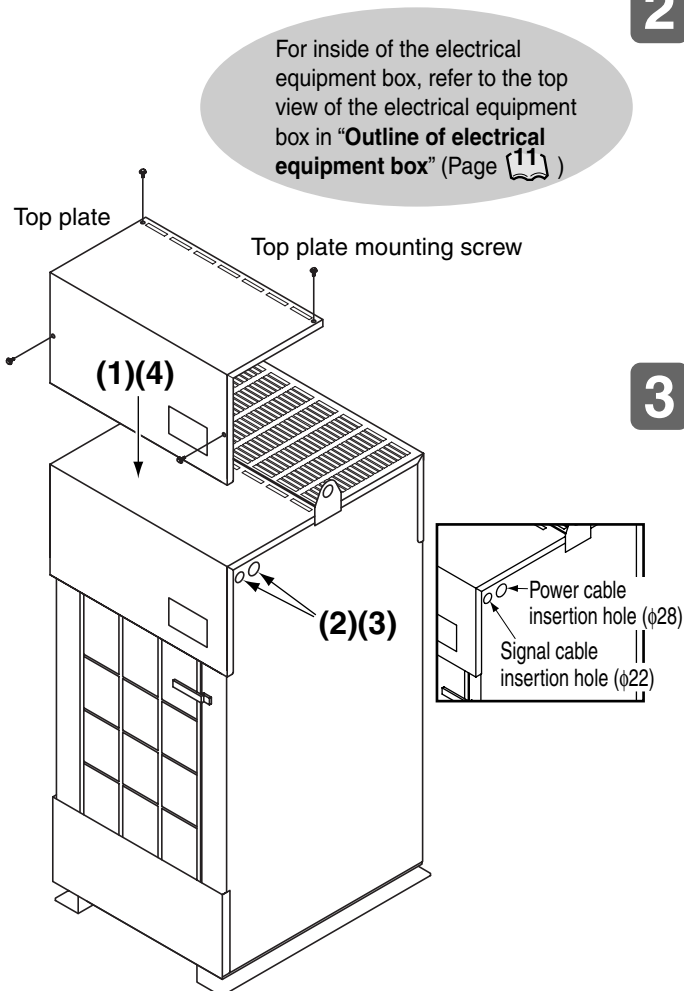
- When you remove the power cables, follow the instructions above in reverse. (Default setting is breaker OFF.)
- The cable size should conform to those listed below, or a larger size.

Cable type	AKC359 - 569 series
Model/Series name	AKC359 - 569 series
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)

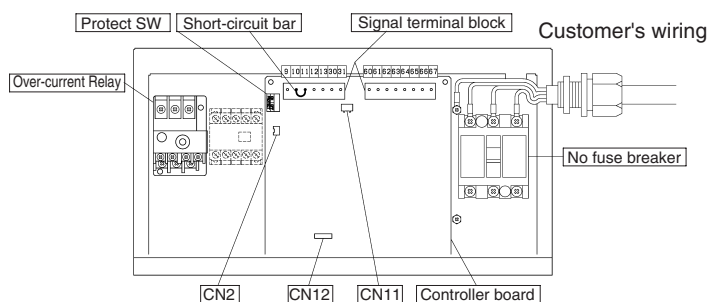
- For each wiring, use M5 coated round crimp terminals. (For the crimp tool, use the specified tool. Carry out the processing of the crimp-style terminal to prevent short-circuits between phases.)
- The tightening torque of the screw to the terminal block should be 2 to 3N·m.
- Carry out the processing 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 11)
- For **remote control input connecting** procedure, refer to page 11.
- For **external output contact connecting** procedure, refer to page 12.

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)
Breaker terminals (-B)	M5	2-3

Built - in breaker model (-B)

- 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 35).
- 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

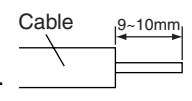
To output the Oil Cooling Unit operation status signal to the main machine, connect the required signal cable to the signal terminal block according to the procedure below. For details of alarms, refer to "Alarm list" (page 42-43). For details of warnings, refer to "Warning list" (page 44).
 To use an output contact, change the parameter setting, and make sure that the output contact normally operates. (For parameter setting changing procedure, refer to page 28.)

1. Bar-type Terminal and cable size

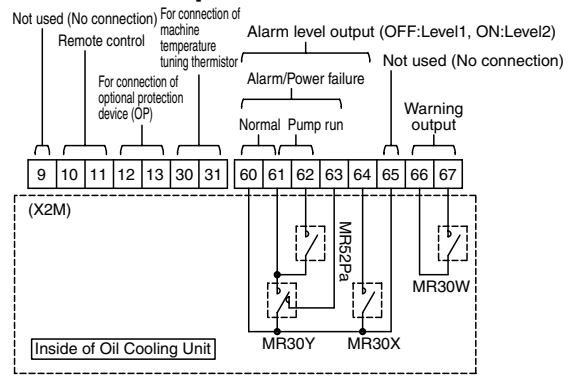
Bar-type Terminal	Cable size		
	JIS cable	IEC cable	UL cable
*	0.25 mm ² – 1.25 mm ²	0.3 mm ² – 1.5 mm ²	AWG#22 – #16

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

- Connect each cable by using a bar-type crimp terminal.
- Use a twisted cable.
- 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 42-43.)

⚠ CAUTION

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

2 Alarm and warning output logic

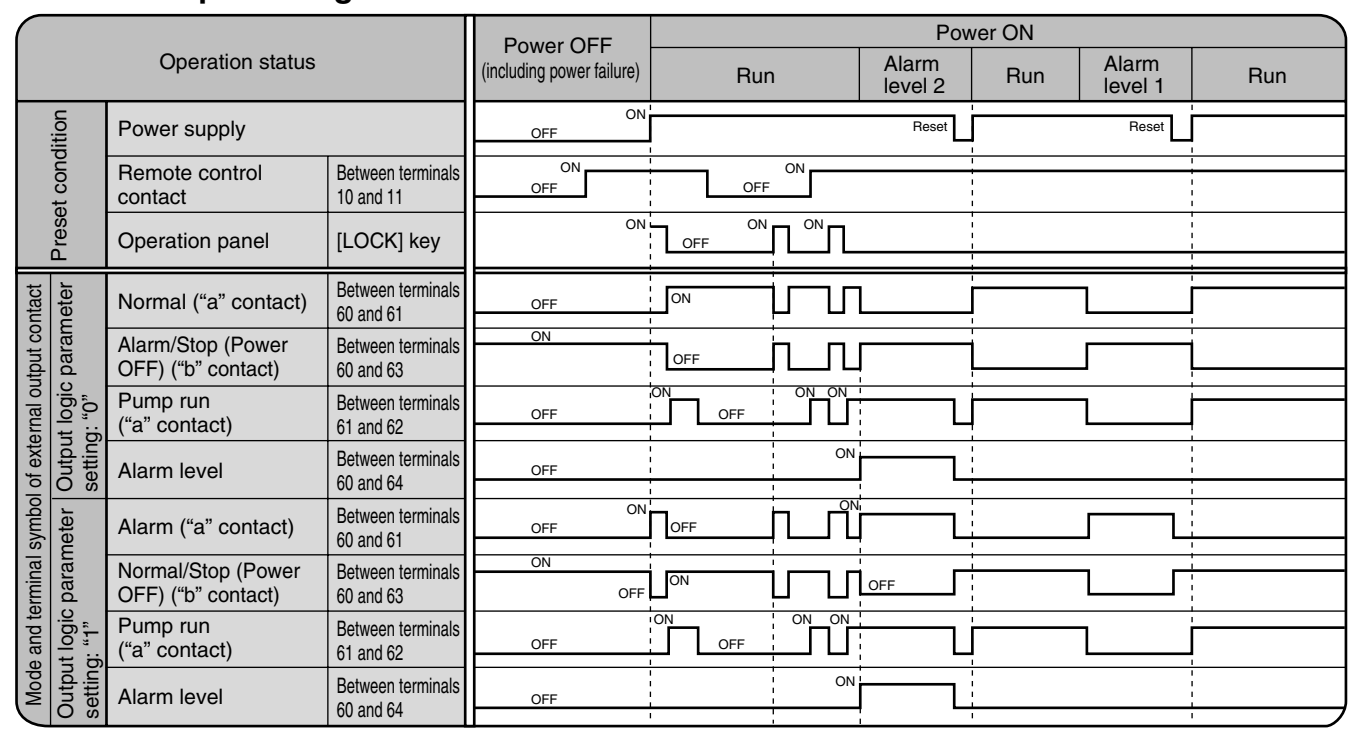
The alarm and warning output logic can be changed depending on the parameter setting. (See page 35.)

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]

External output timing chart

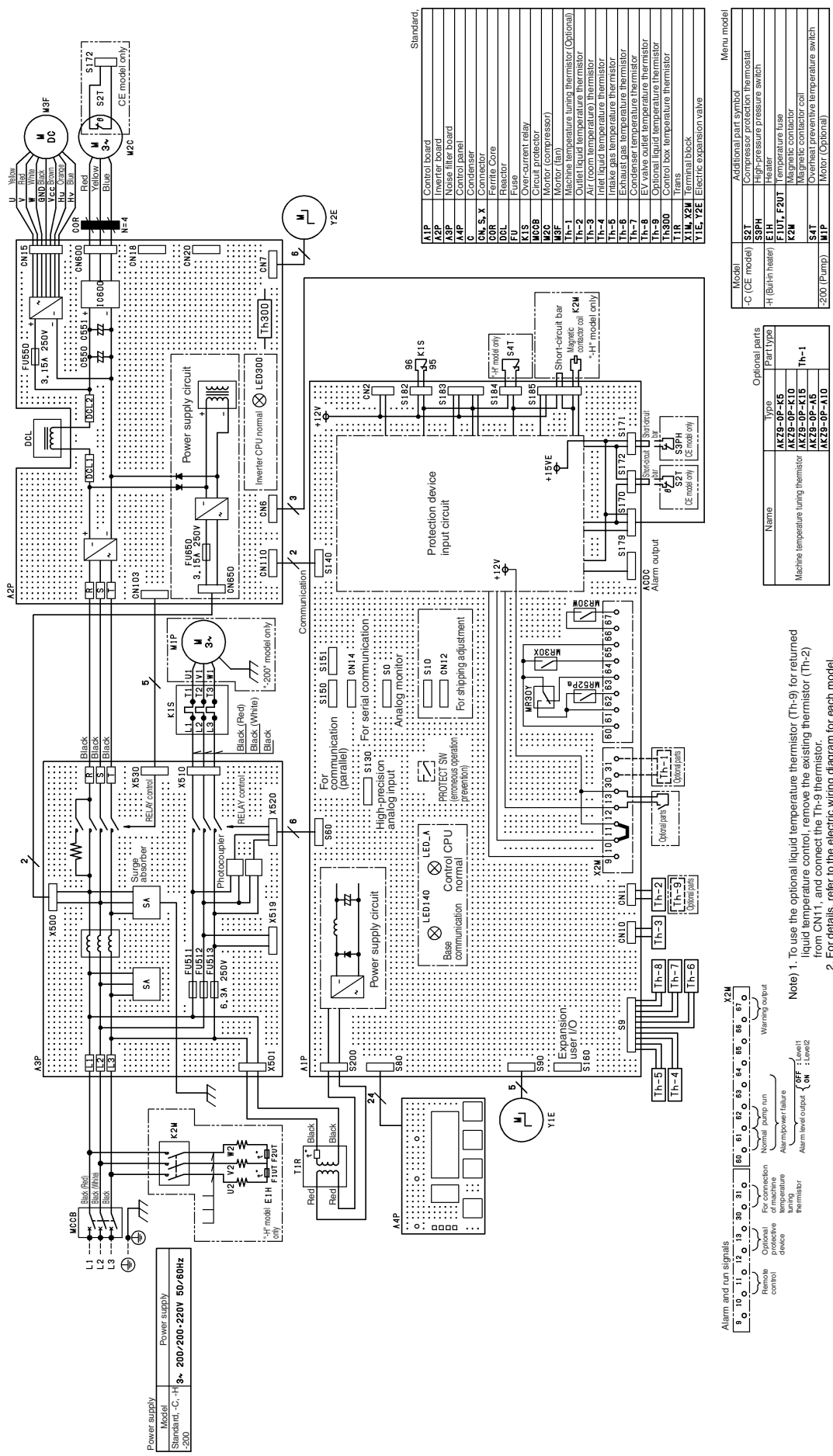


To ensure conformity to the EMC Directive

The Oil Cooling Unit complies with the EMC Directive in the following wiring specifications.
If conformity to the EMC Directive is required, use wiring with the following specifications or equivalent.

Cable List	Cable type	Shielded	Ferrite Core	Length (m)
Main power Cable	AKC359-569	No	No	4.7m
	VCT 2.0mm ²			
Machine temperature tuning thermistor	VCTF 0.3mm ²	No	No	15.0m
Remote control and external output Cable	Twisted pair cable 0.3mm ²	Yes	No	7.0m
Serial communication	Twisted pair cable 0.3mm ²	Yes	No	7.0m
Parallel communication	Twisted pair cable 0.3mm ²	Yes	No	6.6m

Electric wiring diagram (Typical: AKC359)



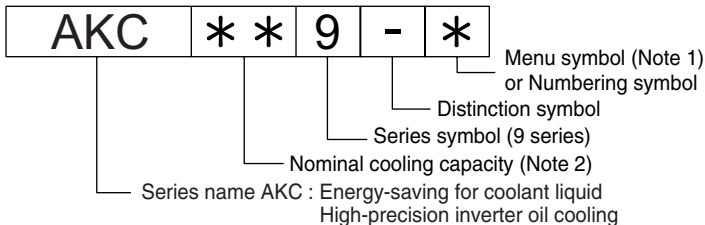
Model Identification and Specifications

Compliant with ROHS

Specifications (AKC359 - 359)

Oil Cooling Unit equivalent horsepower (HP)		1.2				2.0			
		AKC359				AKC569			
Model		Stand-ard	-C	-H	-200	Stand-ard	-C	-H	-200
Cooling capacity (50/60 Hz) ^{*1}		3.5/3.5		1		3.2/3.2		5.6/5.6	
Heater kW		-		1		-		2	
Power supply ^{*2}		3-phase 200/200 · 220 VAC 50/60 Hz							
Circuit voltage		3-phase 200/200 · 220 VAC 50/60 Hz							
Main circuit		3-phase 200/200 · 220 VAC 50/60 Hz							
Operation circuit		DC12/24V							
Max. power consumption		200V 50Hz	1.17kW/4.2A	1.19kW/3.5A	1.44kW/5.3A	1.78kW/6.2A	2.34kW/7.0A	2.10kW/7.4A	2.30kW/7.6A
Max. current consumption		200V 60Hz	1.22kW/4.3A	1.19kW/3.5A	1.60kW/5.5A	1.87kW/6.3A	2.34kW/7.0A	2.30kW/7.6A	2.30kW/7.6A
220V 60Hz		1.21kW/4.1A	1.43kW/3.9A	1.60kW/5.2A	1.86kW/6.1A	2.81kW/7.6A	2.30kW/7.3A	2.30kW/7.3A	2.30kW/7.3A
Exterior color		Ivoly White							
Outer dimensions (H × W × D) mm		995x450x560				1200×470×670			
Compressor (Fully-enclosed DC swing type)		Equivalent to 0.75 kW				Equivalent to 1.5kW			
Evaporator		Shell & coil type							
Condenser		Cross fin coil type							
Propeller fan Motor		φ300, 54W				φ400, 100W			
pump Motor		-		0.4kW×2P		-		0.4kW×2P	
Total lift (Standard point) m		-		10/15		-		10/15	
Self-suction lift m		-		0.5 ^{*3}		-		0.5 ^{*3}	
Temperature control (Selectable)		Room temperature or machine temperature ^{*4} (Factory setting: Room temperature: Mode 3)							
Tuning type		Control target Inlet liquid temperature or outlet liquid temperature (Factory-setting: Inlet liquid temperature)							
Fixed type		Control target Inlet liquid temperature or outlet liquid temperature							
Range °C		-9.9 to 9.9 relative to reference temperature (Factory-setting: "0.0")							
Refrigerant control		Inverter compressor rotation speed + Electronic expansion valve opening							
Refrigerant (New refrigerant: R410A) ^{*5} Loading weight kg		0.80				1.25			
Protection device		Overcurrent relay (for pump motor), Discharge pipe temperature thermostat, Condenser temperature thermostat, Reverse-phase protection device, Restart prevention timer, Low room temperature protection thermostat, High liquid temperature protection thermostat, Low liquid temperature protection thermostat, Coolant leak detector, Evaporator clogging detector (Suction pipe temperature thermostat) Inverter protection device (set), Circuit protector, Temperature fuse ("H" only), Overheat protection temperature switch ("H" only) High-pressure pressure switch ("C" only), Compressor protection thermostat ("C" only)							
Operating range		Room temperature °C		5-45		Inlet liquid temperature °C		5-50	
Liquid viscosity mm ² /s		Up to 200 (Water-soluble to VG32)							
Withstand pressure		0.2MPa							
Rated circulation flow rate		35 L/min							
Circulation rate		15 L/min or more							
Applicable liquid		Lubricating oil, Hydraulic oil, Cutting oil, (Water-soluble) coolant liquid (cutting fluid ^{*6}) (Use clean liquid that can pass through a 40-mesh or finer filter.)							
Connection pipe		Evaporator		Rc3/4		Filling priming liquid		Rc3/4	
Liquid drain		Rc1							
User's piping		Rc1/2 ^{*7}							
Oil pan drain		-		Rc3/8		-		Rc3/8	
Sound level (Measured at 1 m from front of unit, at 1 m height, in anechoic room) dB(A)		62 ^{*8}				65 ^{*8}			
Transportation vibration resistance ^{*9}		Vertical: 14.7 m/s ² (1.5 G) × 2.5 hr (10 to 100 Hz sweep/5 min)							
Protective structure		IP2X ^{*10}							
Weight kg		83		86		105		100	
Internal circuit breaker (Rated current) A		10				15			
Local procurement item		Feed pump				Feed pump			

Model identification



(Note 1) Menu symbol
 • C : CE-conformable
 • H : Built-in heater
 • 200 : Built-in pump model

(Note 2) Nominal cooling capacity
 Indicates cooling capacity at standard point with commercial power supply frequency of 60 Hz. (Inlet oil temperature and room temperature : 35°C , VG32-equivalent oil and 1atm)
 • 3.5: 3.5 kW • 5.6: 5.6 kW

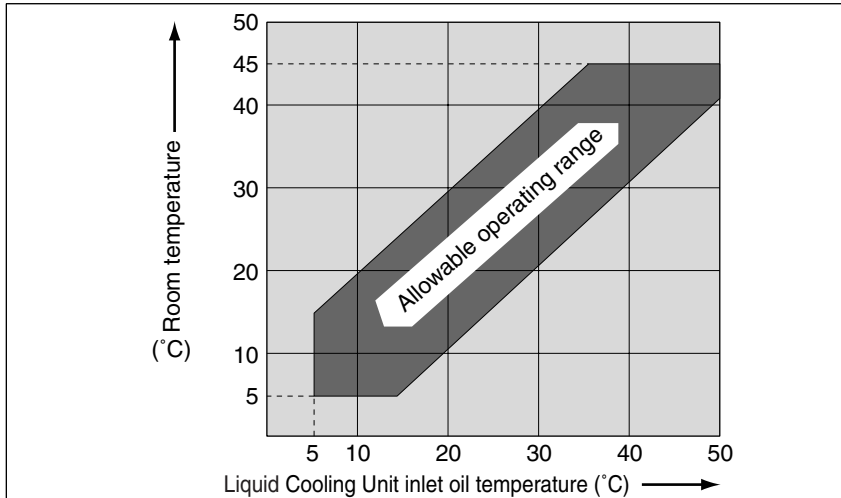
- Note) *1: Indicates cooling capacity at the standard point (inlet liquid temperature: 35°C, room temperature: 35°C, liquid: ISO VG32, flow rate: circulation rating, 1atm). Product tolerance is approx. ±5%.
- *2: Be sure to use a commercial power supply. Using an inverter power supply may result in burnout. Voltage fluctuation range should be within ±10%. If voltage fluctuation exceeds ±10%, consult DAIKIN.
- *3: Indicates the maximum value for fresh water.
- *4: The optional machine temperature tuning thermistor is required. (For details, see page 36.)
- *5: The "-C" model is supplied with SDS (Safety Data Sheet) for refrigerant R410A.
- *6: If the unit is used for a grinding machine, etc., the evaporator may be easily clogged with dust. In this case, the evaporator needs maintenance more frequently, or the pump service life may be remarkably shortened because of wear of the pump parts (particularly, mechanical seal).
- *7: Do not use any model other than the built-in pump model (-200).
- *8: 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.
- *9: Electric parts protective structure: IP54-equivalent (For the wiring port, use a cable conduit with IP54 or higher rating.)
- *10: Transportation vibration resistance indicates the standard model characteristic.

Before Operation

Before operating the Oil Cooling 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 Liquid piping

- Check the liquid piping for leak.
- Check if the tank is filled with an appropriate volume of liquid. (Never run the pump without liquid. Running the pump without liquid causes a fault of the pump.)
- Check if the liquid piping for the main machine is not blocked (fully closed). (If the pump runs with the liquid piping blocked (fully-closed), a warning or alarm is output.)
- Check if the pressure loss is within the specified range.
- Check if the main machine liquid piping is equipped with a flow switch.
(To protect the main machine, it is recommended to mount a flow switch.)

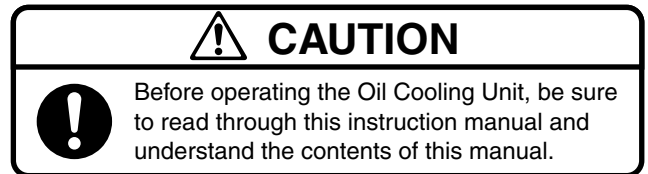
4 Applicable liquid

- The Oil Cooling Unit is intended for lubrication oil, hydraulic oil (mineral oil), (oil categorized as Class 3 and Class 4 petroleum among the Class 4 hazardous substances under the Fire Law, and corresponding to Discoloration No. 1 under "Petroleum Products Copper Plate Corrosion Test Method (JIS K2513)", cutting oil and (water-soluble) coolant liquid (cutting fluid).

The following liquid cannot be used.

Note: If the unit is used for a grinding machine, etc., the evaporator may be easily clogged with dust. In this case, the evaporator needs maintenance more frequently, or the pump service life may be remarkably shortened because of wear of the pump parts (particularly, mechanical seal).

1. Flame-resistant hydraulic oil (Phosphoric ester / chlorinated hydrocarbon / water + glycol / W/O, O/W emulsion type oils)
2. Water
3. Chemical and food liquids
4. Fuel such as kerosene and gasoline



5 Electric wiring

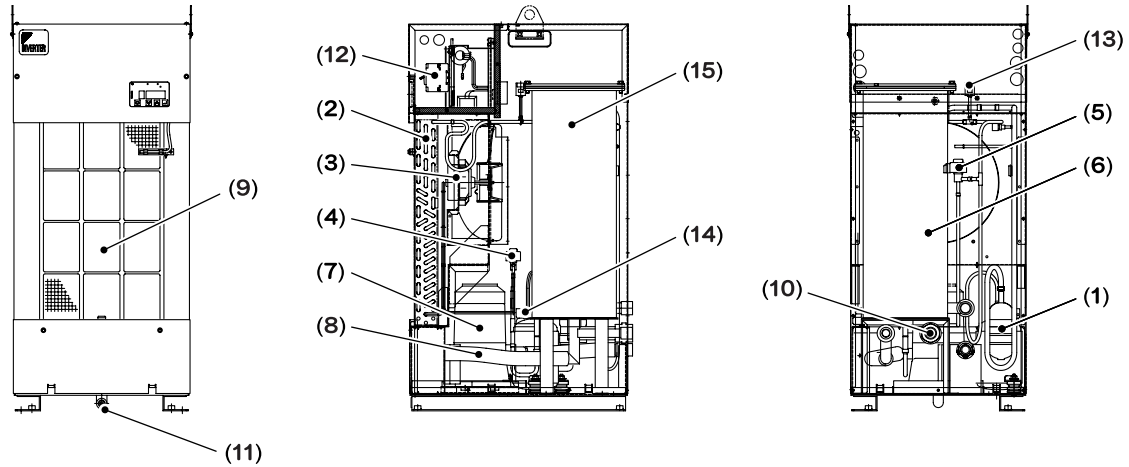
- Check if the cable size is larger than the specified size. (Refer to "Wiring procedure" on page 10.)
- Check if the ground cable is securely connected.
- Be sure to use a commercial power supply. Using an inverter power supply may result in burnout.
- Check if the power supply voltage is within the 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 Oil Cooling 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 oil pump flow rate and the external pressure loss on the discharge side and suction side shown in the specification list on page 15 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 12 of the instruction manual.
- For the power supply, be sure to observe the order of pump ON and OILCON ON.
- Use the pump complying with the thermal relay setting the current value of the pump.

Part Names and Functions

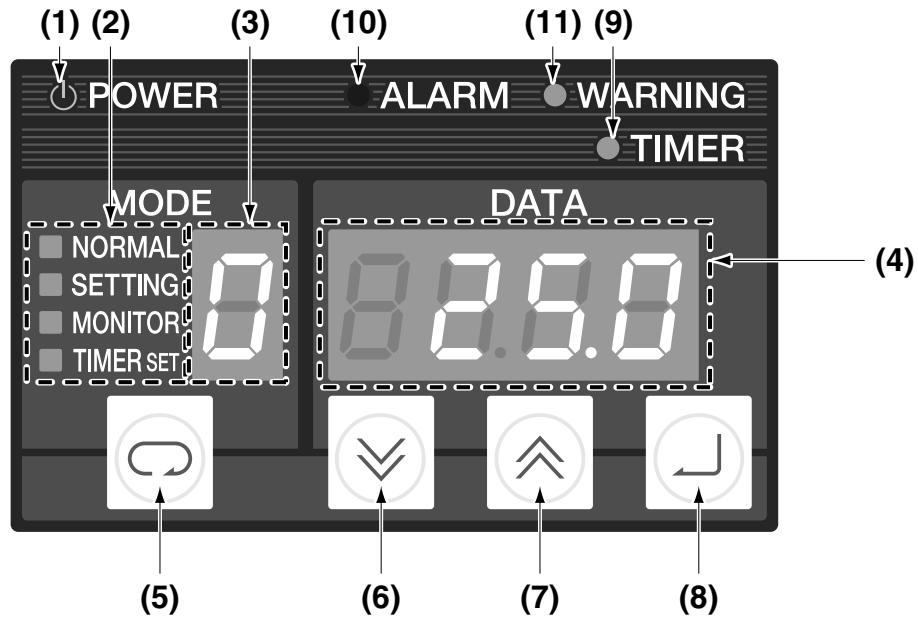
Standard (-C, -H, -200) (Representative model : AKC359)



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)	liquid drain (Evaporator)	Drains oil from the evaporator when the liquid Cooling 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)	liquid drain ("200" only) (drain pan)	The liquid accumulated at the bottom of OILCON 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)	Circuit breaker	Tripped when over-current flows through the circuit. It is intended to protect the internal electric wiring.
(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)	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.
(6)	Evaporator	Evaporates the low-temperature, low-pressure liquid refrigerant produced in the electronic expansion valve by conducting heat exchange between the refrigerant and liquid, to produce low-temperature, low-pressure gas refrigerant.	(14)	Compressor protection thermostat ("C" only)	Tripped when compressor head high-temperature alarm is activated. It is intended to protect the compressor.
(7)	Pump ("200" only)	Sucks liquid from outside of the unit, and discharges it from the unit through the evaporator.	(15)	Heater ("H" only)	During warm-up in winter, the electric heater heats up the liquid to a preset temperature. (Installed in the evaporator)
(8)	Rubber hose	A part of the liquid piping.			

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 19
(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 26
(10)	Alarm lamp (Red)	When an alarm is activated: Blinks (Operation stops).....Alarm level 1 Lit (Only the compressor stops).....Alarm level 2	page 42-43
(11)	Warning lamp (Green)	When a warning is activated: Blinks (Serious warning).....Warning level 1 Lit (Minor warning).....Warning level 2	page 44


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 Oil Cooling Unit may malfunction depending on operation.
 Before using each mode, please understand the description on each mode.

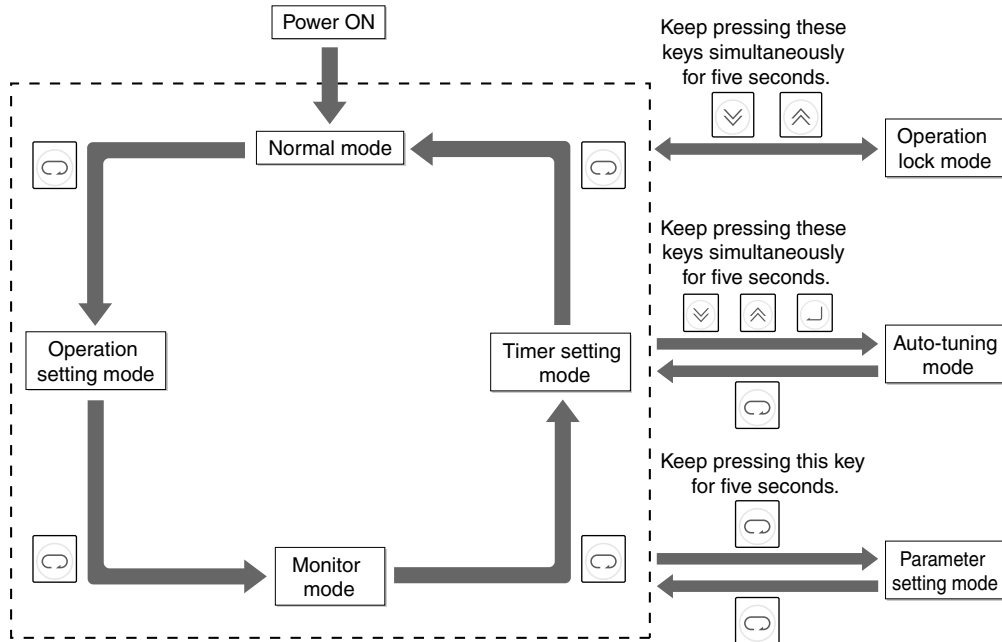
	Mode	Description	Operation mode indicator	Reference page
	Operation lock mode	Disables operations of the Oil Cooling Unit regardless of preset conditions.		page 20
○*1	Normal mode	Displays the current operation mode and control target value.	"NORMAL" lamp is lit.	page 20
○*1	Operation setting mode	Specifies an operation mode and control target value.	"SETTING" lamp is lit.	page 21-24
○*1	Monitor mode	Displays the current value of each thermistor etc.	"MONITOR" lamp is lit.	page 25
○*1	Timer setting mode	Used to set up time for the ON timer.	"TIMER" lamp is lit.	page 26
	Parameter setting mode	Used to set up basic parameters*2 of the Oil Cooling Unit.	"SETTING" lamp blinks.	page 28
	Auto-tuning mode	Used to set up the function for control response improvement.	"NORMAL" lamp blinks.	page 32

*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 20.)
- With the standard model, the initial operating conditions are as follows:
 Operation mode: 3 (Room temperature tuning, Inlet liquid temperature control)
 Temperature difference: 0.0 (K)

Checking Initial Operating Conditions

Handling
Before Operation

Turn ON the power supply for the Oil Cooling 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 Oil Cooling Unit takes 90 seconds. After the initial setup, cooling 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

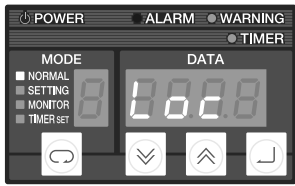
Cancel the operation lock mode.

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


* The “Operation lock” mode locks the Oil Cooling Unit, and disables any key operation other than operation lock cancel.

NO

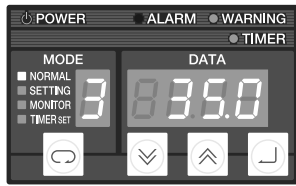
Operation lock mode



Keep pressing these keys simultaneously for five seconds.



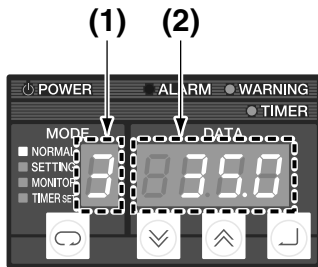
Normal mode



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, Inlet liquid temperature control), and the temperature difference is “0.0 (K)”.
(With non-standard models, the factory settings may be different from the above.)





Example) Room temperature: 35°C

(1) **Operation mode display:** Displays the operation mode.



(2) **Data display:** Displays the target temperature setting.

See page  21 

Changing operation settings

Holding constant liquid temperature _____ See page  22 

Tuning liquid temperature to room temperature (or machine temperature) _____ See page  23 

Cooling liquid at constant capacity (%) _____ See page  24 

Operation Setting

The Oil Cooling Unit operation setting provides the following modes.

	Control method	Reference temperature	Control target ^{*1}	Operation mode ^{*3} (Reference page)	Setting range
Holding constant liquid temperature (Keeping a control target at a constant temperature)	Fixed temperature control		Inlet liquid temperature Outlet liquid temperature	0 (p. 22) 1 (p. 22)	5.0–50.0 (°C) 5.0–50.0 (°C)
Tuning liquid 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}	Inlet liquid temperature Outlet liquid temperature Inlet liquid temperature Outlet liquid temperature	3 (p. 23) 5 (p. 23) 4 (p. 23) 6 (p. 23)	–9.9–9.9 (K) –9.9–9.9 (K) –9.9–9.9 (K) –9.9–9.9 (K) ^{*4}
Cooling liquid at constant capacity (%) (Executes cooling operation according to capacity command, but disables liquid temperature control.)	Capacity direct designation (used for trial run etc.)	None	None	9 (p. 24)	0–100 (%)

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

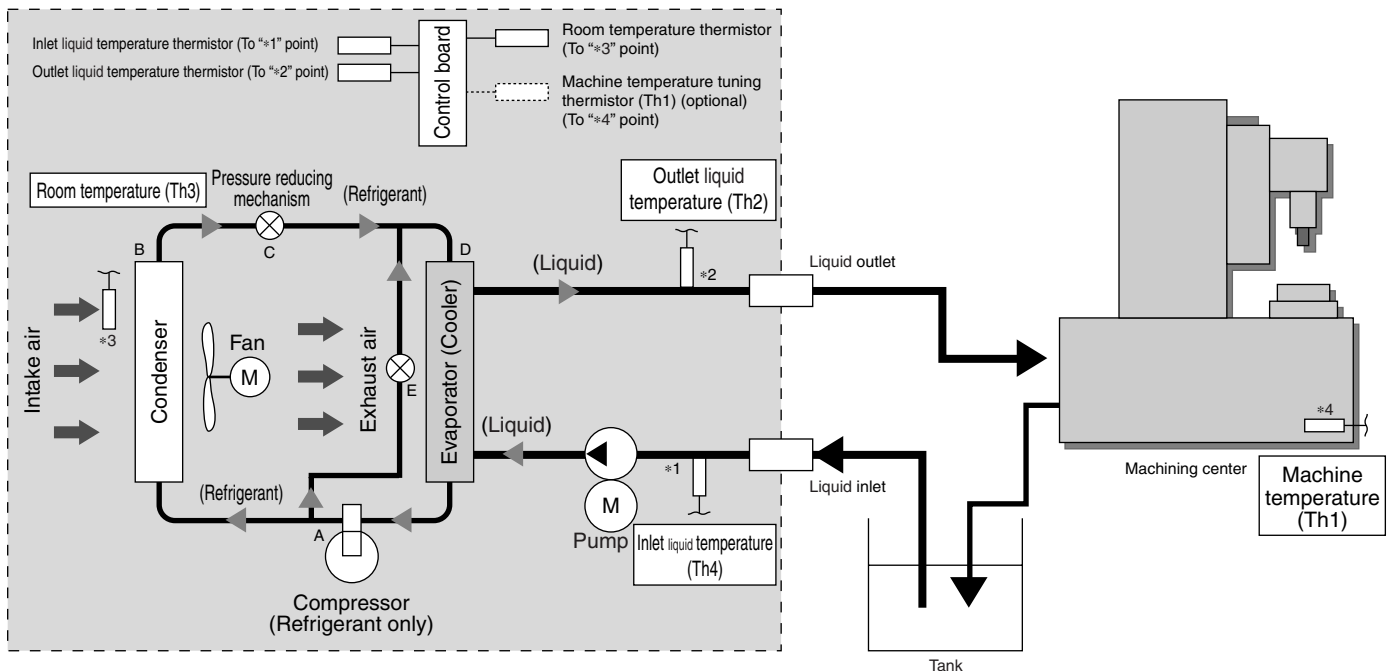
*2: Optional function using optional parts

*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).

System outline drawing

The oil cooling system of the Oil Cooling Unit is as shown below.

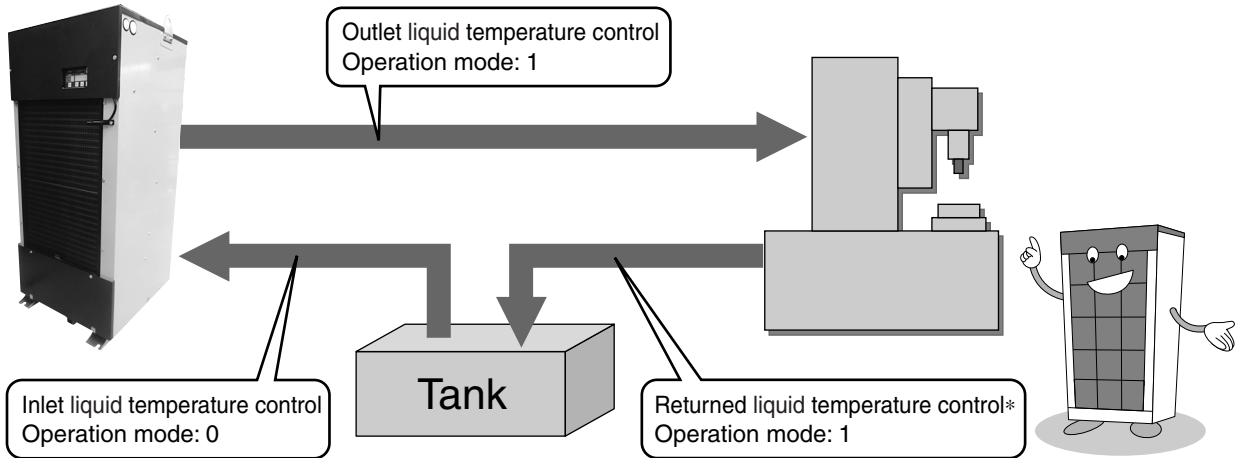
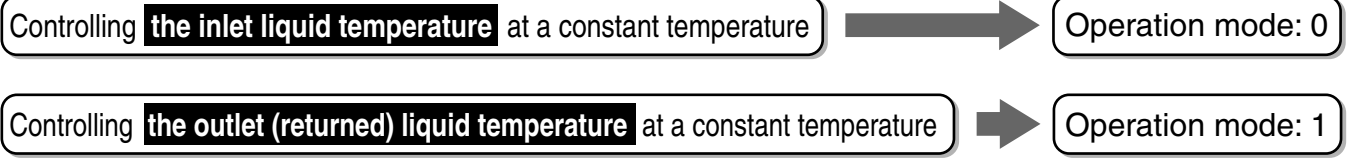


Description on the refrigerating cycle

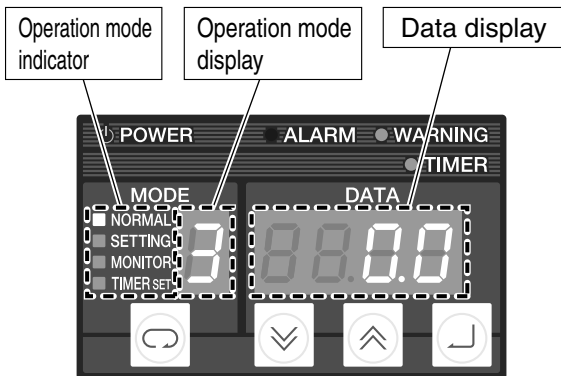
- The compressor produces high-temperature, high-pressure compressed gas so that the refrigerant gas can be easily cooled and liquefied in the condenser.
- The condenser cools and condenses the high-temperature, high-pressure gas produced in the compressor, to transform it to high-temperature, high-pressure liquid.
- 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.
- The evaporator evaporates the low-temperature, low-pressure liquid/gas mixture produced in the pressure reducing mechanism by absorbing heat from the liquid (by cooling the liquid), and transforms it to low-temperature, low-pressure gas.
- 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.

Holding Constant Liquid Temperature

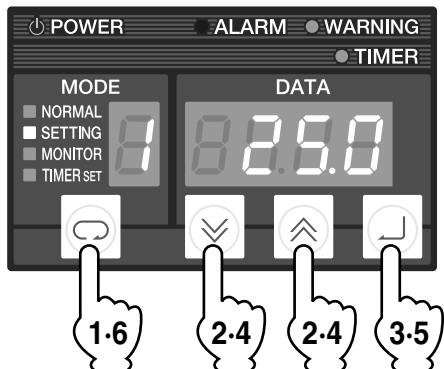
To hold a constant liquid temperature, the following two types of operation settings are available.



Setting procedure



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



Example) Outlet liquid 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 19.
- 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 oil temperature with the or key.

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

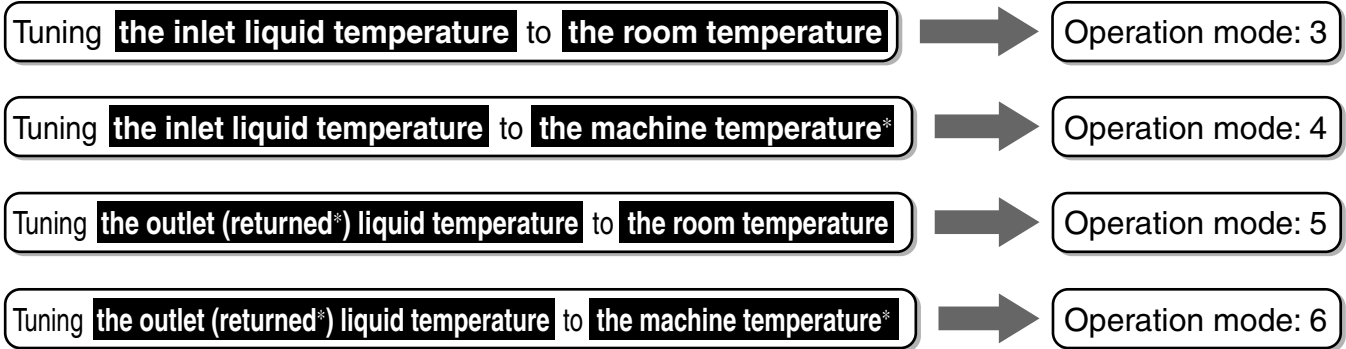
- After the temperature setting is registered, the number on the operation mode display blinks.
* The number on the data display remains lit.

6. Return to the normal mode.

- Press the key three times, to return to the normal mode.
See "Mode changing operation" on page 19.
- The "NORMAL" lamp on the operation mode indicator lights.

Tuning Liquid Temperature to Room Temperature (or Machine Temperature)

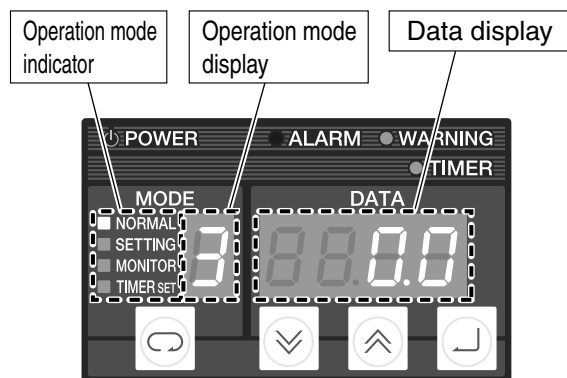
To tune the liquid temperature to the room temperature (or machine temperature), the following four types of operation settings are



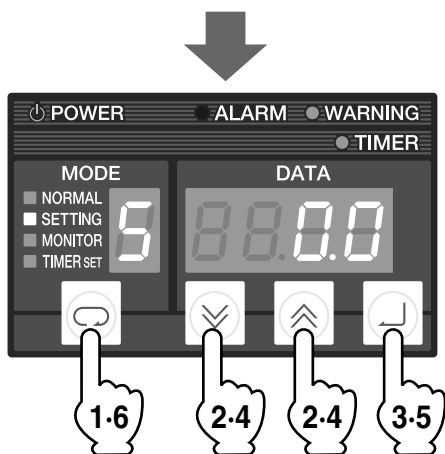
* Optional function using optional parts. See page 36.

With the above operation settings, the Oil Cooling Unit controls the liquid temperature so as to keep the **difference** between the room or machine temperature (reference temperature) and the liquid 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 non-standard models, the settings may be different from the above.)



Example) Outlet liquid 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 19.
- 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 19.
- The "NORMAL" lamp on the operation mode indicator lights.

Cooling Liquid at Constant Capacity (%)

Cooling liquid at a constant capacity (%)

Operation mode: 9

With the above operation setting, the Oil Cooling Unit executes cooling operation according to the specified capacity command (%). Liquid temperature control is disabled.

The capacity setting range is 0 to 100%.

* The capacity (%) is an approximate index.

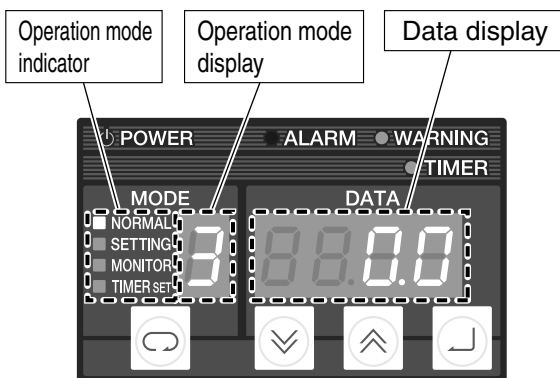
* When the capacity is set to "0", the compressor stops. (The pump and fan are running.)

* Even if the capacity command value is same, the actual cooling capacity varies depending on the room temperature and the inlet liquid temperature.

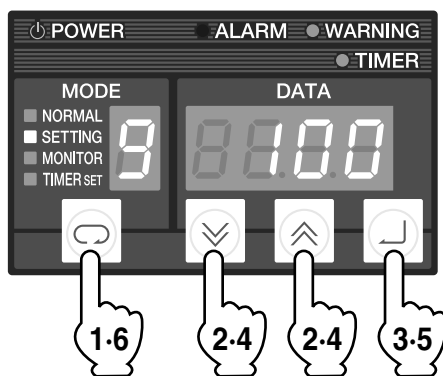
Caution

The liquid 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 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 19.
- 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 19.
- 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	Outlet liquid temperature [Th2]	*1
2	Room temperature [Th3]	*1
3	Inlet liquid temperature [Th4]	*1
4	Suction gas temperature [Th5]	*1
5	ΔT (Th4–Th2)	*1
6	Capacity command value (%)	–
7	Compressor inverter rotation speed (rps)	–
8	Power consumption (kW)*	*3
9	Status of expansion DIN (third digit)/DOUT (second digit)	*2

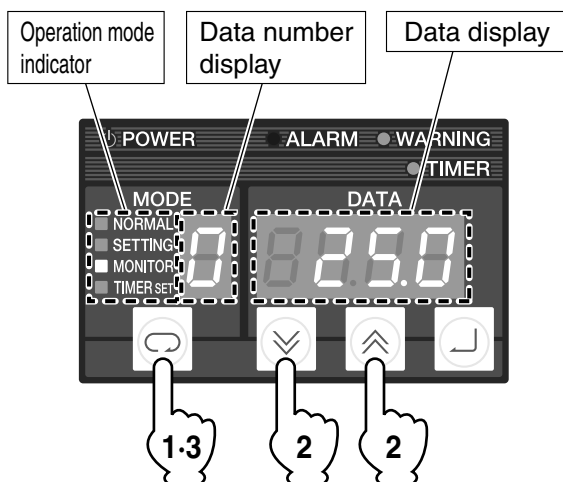
*1: Nos. 0, 1, 2, and 3 indicate a temperature detected with each thermistor.

When the relevant thermistor is not connected or has a wire break, “–99.9” is displayed.

*2: With the factory setting, “O” 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 pressure: 0.2 MPa (VG32: liquid temperature 25°C). (The error is approximately 20%.)
For a machine without a pump, contact us separately.

Operating procedure



1. Select the monitor mode.

- Go to the monitor mode with the key.
See “**Mode changing operation**” on page [19](#).
- 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 [19](#).
- The “NORMAL” lamp on the operation mode indicator lights.

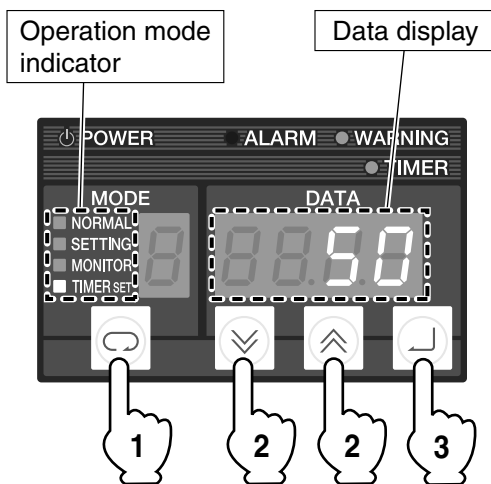
Timer Operation

With the “ON” timer, the Oil Cooling 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 [19](#).
- 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 Oil Cooling Unit is halted.
 - * The value on the data display blinks.
 - * The “TIMER” lamp (red LED) blinks.Keep the main power supply ON.

Main machine warm-up

With the built-in heater model (–H), the electric heater heats up liquid to a preset temperature during main machine warm-up in winter. Combining this function with timer operation enables more effective warm-up.

Heater ON: When inlet liquid temperature is at least 0.5°C lower than preset temperature

Heater OFF: When inlet liquid temperature is equal to, or higher than preset temperature

Regardless of the operation mode, the Oil Cooling Unit turns ON/OFF the heater by detecting the inlet liquid temperature.







(* Only when the compressor is not in operation)

Note that the heater cannot perform high-precision liquid temperature control.

Additional Setting Functions




You can additionally set up the following functions by setting the parameters of the Oil Cooling Unit.

1 Additional setting functions

- Auto-tuning: Automatically sets up the parameters appropriately for the system.  page  32
- Temperature range warning: Activates warning output when liquid temperature exceeds preset temperature range.  page  29
- Alarm/warning output logic: Outputs signal from Oil Cooling Unit to main machine.  page  35

2 Parameter list

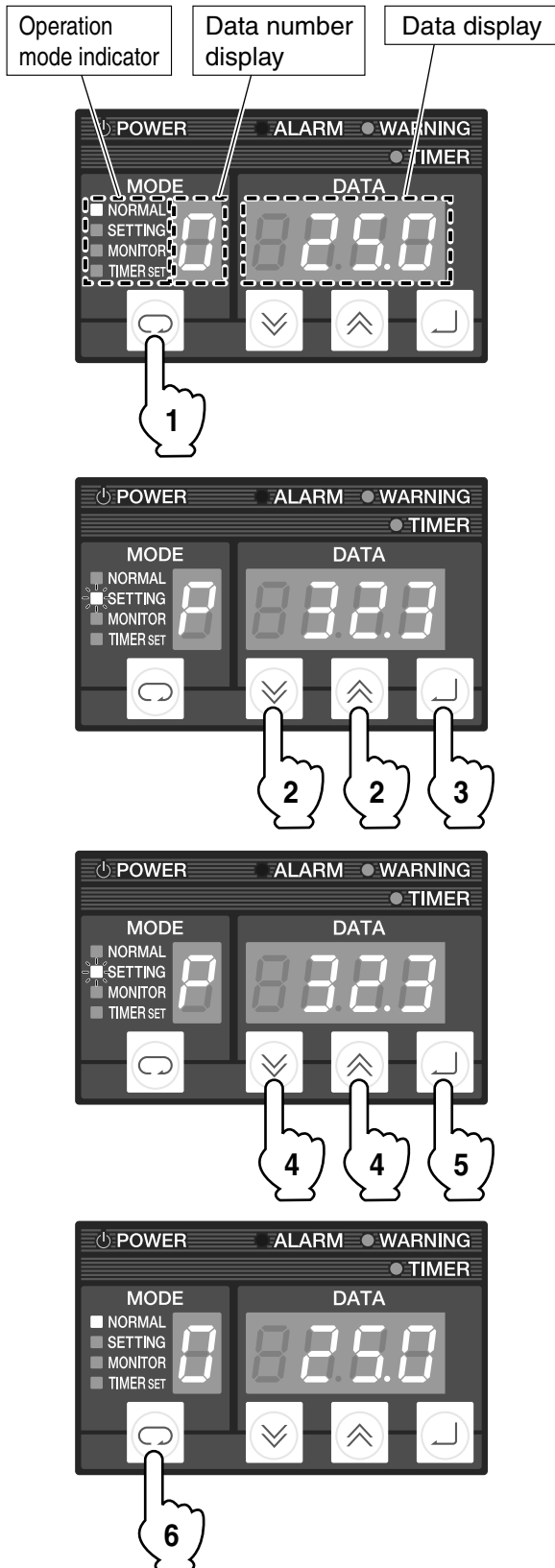
The parameters that must be specified for individual additional setting functions are listed below:

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  35.
		○		n002	OP contact level	0	3	0	—		
		○		n003	OP2 contact level	0	2	0	—		
○				n004	Outlet liquid temperature decrease (Auto-tuning end condition)	0.0	10.0	8.0	°C		For auto-tuning See page  32.
○				n005	P/I gain calculation coefficient (Response coefficient)	0.1	10.0	7.0	—		<ul style="list-style-type: none"> • The initial value varies depending on the model. (Automatically set up) by auto-tuning
○				n006	Control gain P (for low deviation)	1	999	120	—		
○				n007	Control gain I (for low deviation)	1	999	120	—		
○				n008	Control gain P (for high deviation)	1	999	120	—		
○				n009	Control gain I (for high deviation)	1	999	120	—		
	○			n010	Warning setting 1	0	465	0	—		See page  29.
	○			n011	Warning setting data 1	0.0	60.9	0.0	—		
	○			n012	Warning setting 2	0	465	0	—		
	○			n013	Warning setting data 2	0.0	60.9	0.0	—		
	○			n014	Warning setting 3	0	465	0	—		
	○			n015	Warning setting data 3	0.0	60.9	0.0	—		
	○			n016	Warning setting 4	0	465	0	—		
	○			n017	Warning setting data 4	0.0	60.9	0.0	—		
	○			n018	Warning setting 5	0	465	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 Oil Cooling Unit.
For description of the additional setting functions and parameter list, refer to page 27.

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 19.


- 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 19.
- 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 Oil Cooling Unit, you can set up the “**Temperature range warning**” function. This function allows you to specify a desired temperature range within the Oil Cooling 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 [35](#).)
 - 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 [12](#).)
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

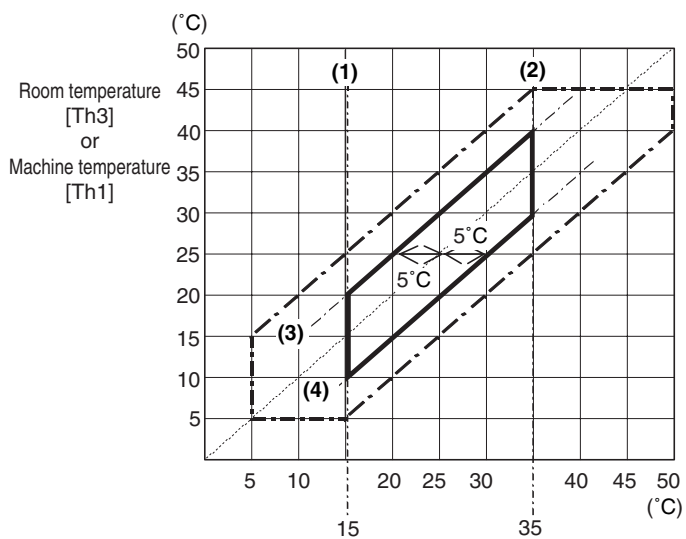
To enable this function, set the corresponding parameters. You can specify up to five warning conditions with the following five groups of parameters.

	Types of temperature range warning*	Parameter	
		Group A	Group B
(1)	Low liquid temperature (Fixed temperature)	n010	n011
(2)	High liquid temperature (Fixed temperature)	n012	n013
(3)	Low liquid temperature (Temperature difference)	n014	n015
(4)	High liquid temperature (Temperature difference)	n016	n017
(5)	Reserve	n018	n019

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 (5) types are available. Actually, however, any combinations of these types are enabled. The above (1) to (5) types can be simultaneously used.

Application of temperature range warning



Outlet liquid temperature [Th2] or Inlet liquid temperature [Th4]

: Oil Cooling Unit operating range
 : Temperature range warning setting

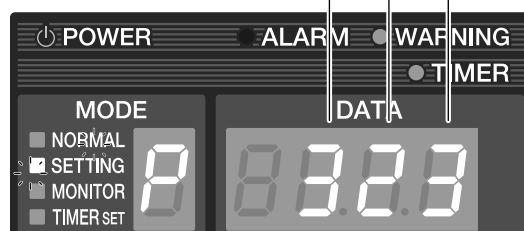
- When the outlet liquid temperature [Th2] (or inlet liquid temperature [Th4]) is 15°C or lower, the compressor stops. (Warning)
- When the outlet liquid temperature [Th2] (or inlet liquid temperature [Th4]) is 35°C or higher, the compressor stops (FH alarm), and the 30W relay output turns ON or OFF.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

Description on parameter settings (Group A) * Enter Group B (page 31) 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)	n010	Outlet liquid temperature [Th2]	2	≤ Fixed value	6	External output (“Rely 30” output: ON)	1
		Inlet liquid temperature [Th4]	4			Warning	2
(2)	n012	Outlet liquid temperature [Th2]	2	≥ Fixed value	5	Warning + External output (“Rely 30” output: ON)	3
		Inlet liquid temperature [Th4]	4			External output (“Rely 30” output: ON)	1
(3)	n014	Room temperature [Th3]	3	– Outlet liquid temperature [Th2]	2	FH alarm	4
		Machine temperature [Th1]	1	– Inlet liquid temperature [Th4]	4	FH alarm + External output (“Rely 30” output: ON)	5
(4)	n016	Outlet liquid temperature [Th2]	2	– Room temperature [Th3]	3	External output (“Rely 30” output: ON)	1
		Inlet liquid temperature [Th4]	4	– 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 29.)

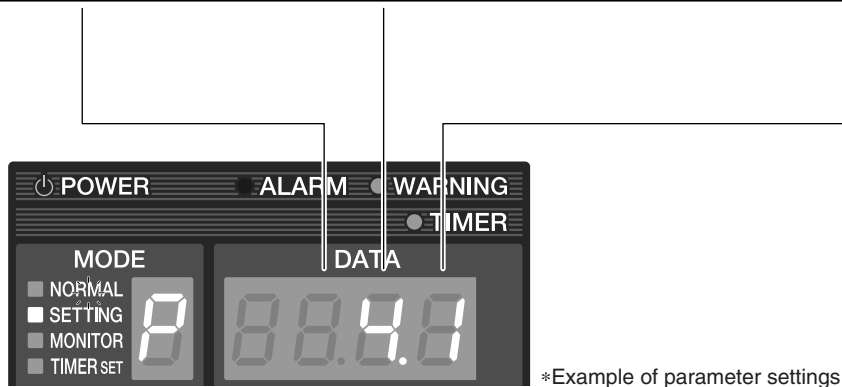
(1)	When the outlet liquid temperature [Th2] (or inlet liquid temperature [Th4]) is 15°C or lower, the compressor stops. (Warning)	n010	262 (462)
(2)	When the outlet liquid temperature [Th2] (or inlet liquid temperature [Th4]) is 35°C or higher, the compressor stops (FH alarm), and the 30W relay output turns ON or OFF.	n012	255 (455)
(3)	When the outlet liquid temperature [Th2] (or inlet liquid temperature [Th4]) is at least 5°C lower than the room temperature [Th3] (or machine temperature [Th1]), the 30W relay output turns ON or OFF.	n014	321 (141)
(4)	When the outlet liquid temperature [Th2] (or inlet liquid temperature [Th4]) is at least 5°C higher than the room temperature [Th3] (or machine temperature [Th1]), the 30W relay output turns ON or OFF.	n016	231 (411)

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)	n011	0 to 60 (°C)		1 to 9 (°C)
(2)	n013			
(3)	n015			
(4)	n017			



*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 29.)

(1)	When the outlet liquid temperature [Th2] (or inlet liquid temperature [Th4]) is 15°C or lower, the compressor stops. (Warning) [When outlet liquid temperature [Th2] becomes 17°C, the warning status will be automatically reset.]	n011	15.2 ^{*2}
(2)	When the outlet liquid temperature [Th2] (or inlet liquid temperature [Th4]) is 35°C or higher, the compressor stops (FH alarm), and the 30W relay output turns ON or OFF.	n013	35.0
(3)	When the outlet liquid temperature [Th2] (or inlet liquid temperature [Th4]) 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 outlet liquid temperature [Th2] becomes 4°C or less, the warning status will be automatically reset.]	n015	5.1 ^{*3}
(4)	When the outlet liquid temperature [Th2] (or inlet liquid temperature [Th4]) 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 outlet liquid temperature [Th2] becomes 3°C or less, the warning status will be automatically reset.]	n017	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 Oil Cooling 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.

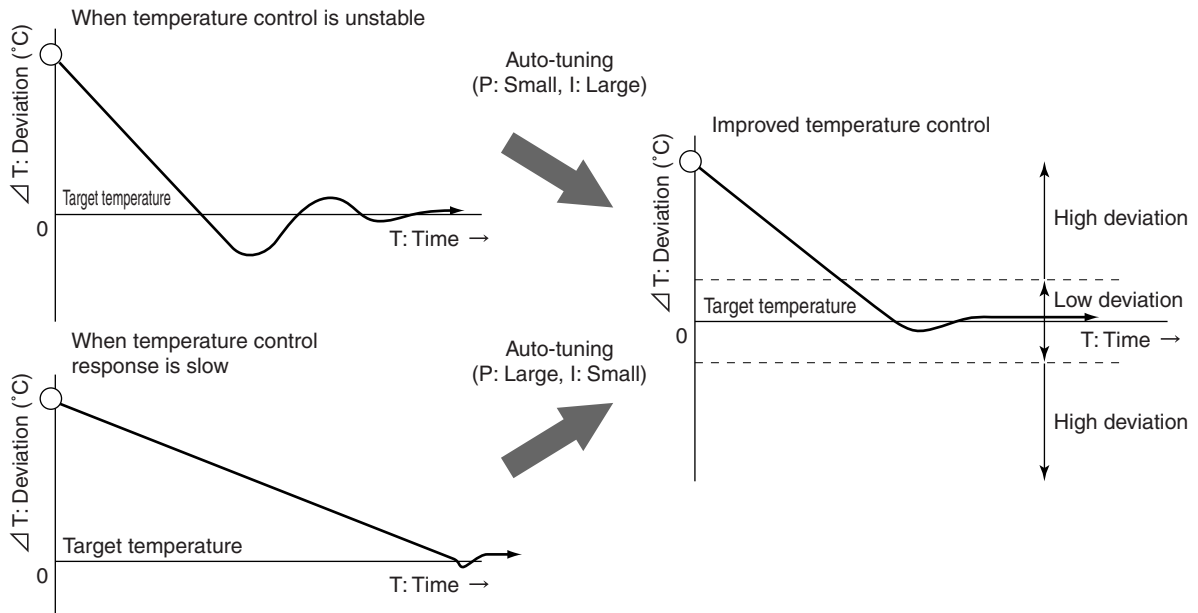
* Temperature control gain: Coefficient to determine a control value according to deviation (temperature difference)

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)
n006	Temperature control gain P (for low deviation)
n007	Temperature control gain I (for low deviation)
n008	Temperature control gain P (for high deviation)
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.

Initial value: 7.0
 Calculated temperature control gain P
 Calculated temperature control gain I


■ Factory settings of the standard model
 P: 120
 I: 120

■ Outline of operation

The auto-tuning mode executes the following steps.
 Check the Oil Cooling 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.

[Note]

1. When starting auto-tuning, make sure that **the liquid 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 OILCON 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 Inlet liquid temperature thermistor
Operation mode 1, 5 or 6 \Rightarrow Outlet liquid temperature thermistor
Then, set Parameter [n004] by referring to [Note] 4. below.
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] Outlet liquid temperature decrease (Auto-tuning end condition)

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

When the outlet liquid 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.)

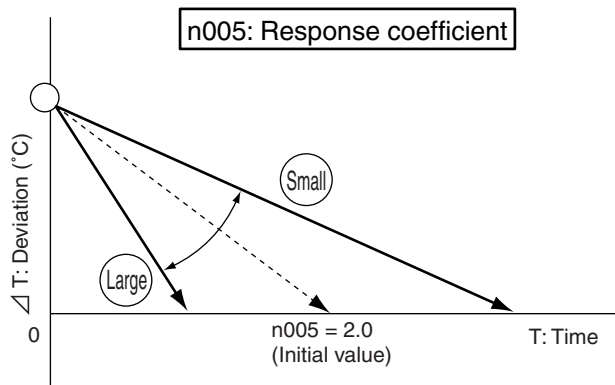
Parameter [n005] P and I gain calculation coefficient (Response coefficient)

Setting range: 0.1 to 10.0, Initial value: 7.0

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

If an extremely large or small value is set, it may not work well.


First, execute temperature control with the initial value (7.0).



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 Oil Cooling 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 Oil Cooling 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 Oil Cooling 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 Oil Cooling 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 21.

When the following optional parts are mounted to the main machine, the Oil Cooling 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)	AKC9 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 kΩ, Tolerance: ±3% (Temperature equivalent: ±0.4°C)

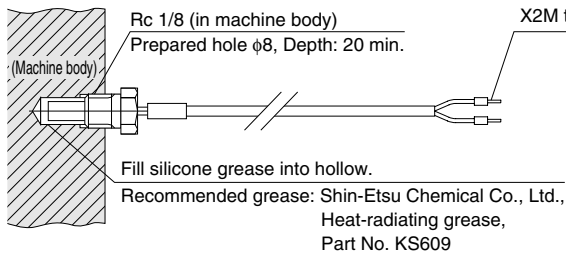
Mounting procedure

Oil Cooling Unit

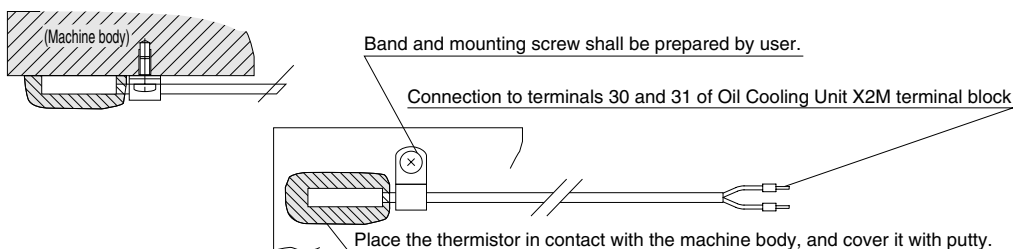
Connect the bar-type terminal plug [30] and [31] of the X2M terminal block in the electrical equipment box. (No polarity) (See "Outline of electrical equipment box" on page 11.)

Main machine

For AKZ9-OP-K



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.

Maintenance/Inspection

Daily maintenance/inspection

- Pollution of operating fluid causes a fault or shortened service life of the pump. Use thorough caution for operating fluid pollution control, and supply fluid that can pass through a strainer with a mesh size of 40.
- Keep the liquid in the tank at the normal level. Do not allow the pump to suck up air.
- Clean inside of the tank periodically.
- Make sure that the main machine liquid piping is not blocked (fully closed).
- Make sure that the liquid piping has no oil 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 oil pump do not abnormally sound during operation.
- Check for abnormal vibration of the unit body during operation.
- Check whether the sheath of the OILCON power lead is not broken.

Periodic maintenance/inspection

Suction strainer

- Clean the suction strainer every six months to prevent the pump flow rate from being reduced by dust clogging, and to prevent abnormal sound caused by cavitation.

Air filter (See page 17.)

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 17.)

- 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 17.)

- If the liquid cooling coil is clogged with dust, the liquid piping is nearly in the blocked (fully closed) condition, causing faults of the pump and the compressor.
Conduct inspection and cleaning periodically.
- 1) Clean the evaporator at least once a year. (If the evaporator is remarkably clogged with dust, conduct cleaning frequently.)
 - 2) For the evaporator cleaning procedure, refer to "Evaporator cleaning procedure" on pages 38 to 40.

Liquid drain (For built-in pump model only See page 17.)

- Inspect the bottom of OILCON (drain pan) every six months and if the liquid is accumulated, discharge it from the liquid

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

- Mount a cover to the Oil Cooling 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 Oil Cooling Unit.

Evaporator cleaning procedure

- 1 To ensure safety, be sure to turn OFF the power supply before conducting the following work.

DANGER



Before conducting the work, be sure to turn OFF the power supply. If you conduct work with the evaporator in live status, you may get electric shock.

- 2 If the liquid level in the user's tank is higher than the drain port, shut off the inlet and output piping so that liquid does not flow into the OILCON.

CAUTION



If the liquid level in the user's tank is higher than the drain port, shut off the inlet and output piping so that liquid does not flow into the OILCON. Otherwise, the liquid may leak during cleaning work.

- 3 Prepare required tools.

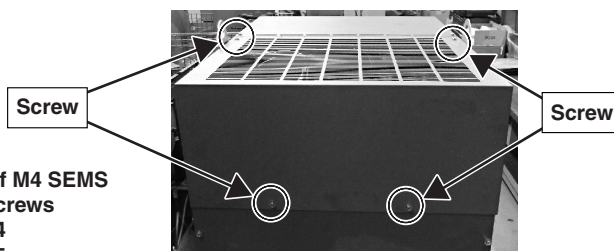
Required tools: Phillips screwdriver, Box wrench (7 mm, 12 mm), Torque wrench (12 mm), Hexagon wrench (5 mm, 17 mm), Sealing tape, Liquid receiving tank (AKC359: 19L or larger volume, AKC569: 25L or larger volume), Work gloves (Kevlar is recommended), Protective goggles, New packing, Rag, etc.

- 4 Wear work gloves and protective goggles (until the work is completed).

- 5 Remove the top plate.

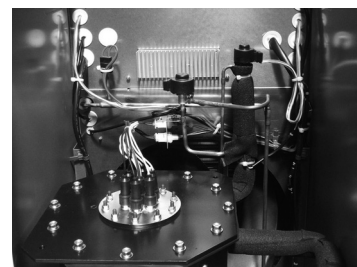
(M4 SEMS tapping screws) : + Screwdriver or box wrench (7 mm)

<<Before removal>>



Number of M4 SEMS tapping screws
AKC359: 4
AKC569: 5

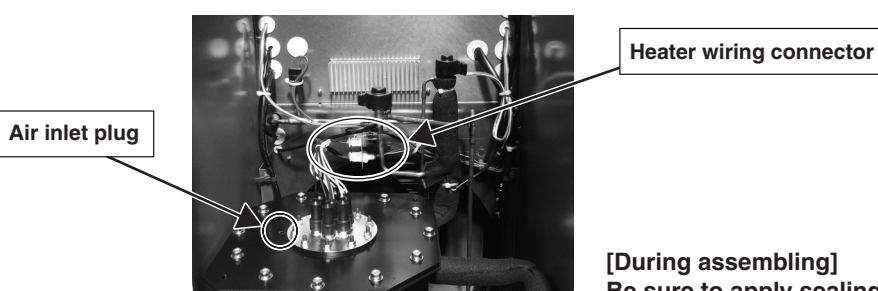
<<After removal>> Built-in heater model



- 6 <<Built-in heater model>> Disconnect the heater wiring connectors (at 2 places).



- 7 Remove the air inlet plug at the top of the evaporator.
: Hexagon wrench (5 mm)



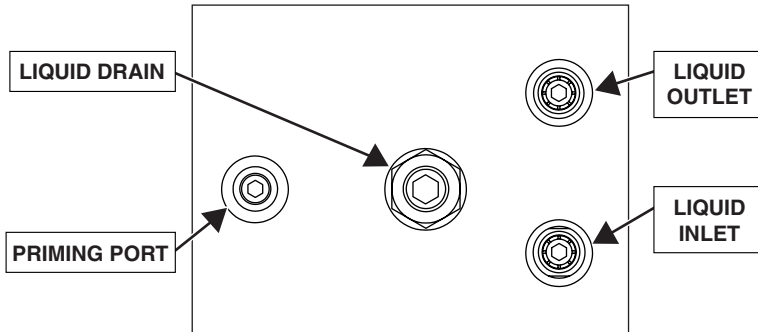
[During assembling]
Be sure to apply sealing tape to the plug.

8 Remove the plug from the drain port, and drain liquid from the evaporator.

: Hexagon wrench (17 mm), Liquid receiving tank (AKC359:19L or larger volume, AKC569:25L or larger volume), Rag

《If liquid cannot be drained through the drain port》

Remove foreign substances in the drain piping by inserting a metal rod through the drain port.



[During assembling]

To attach the plug to the drain port, be sure to apply sealing tape.

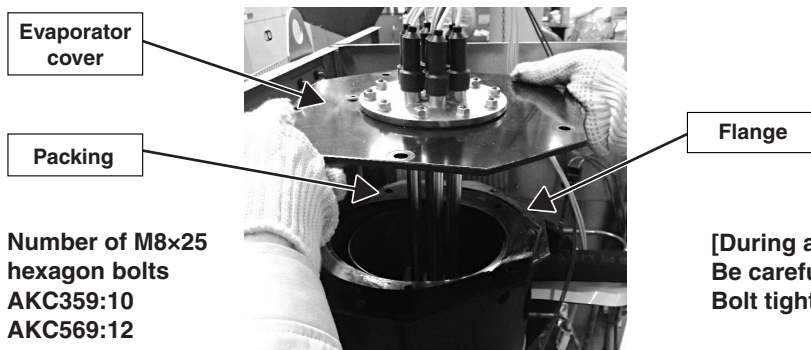
CAUTION



When the drain port is opened, a large volume of liquid is discharged. Prepare a tank at the front of the drain port in order to contain the liquid.
(Liquid volume AKC359: approx. 19L)
(Liquid volume AKC569: approx. 25L)

9 Remove the evaporator cover and packing.

(M8 × 25 hexagon bolts): Box wrench (12 mm), Rag



Number of M8×25
hexagon bolts
AKC359:10
AKC569:12

[During assembling]

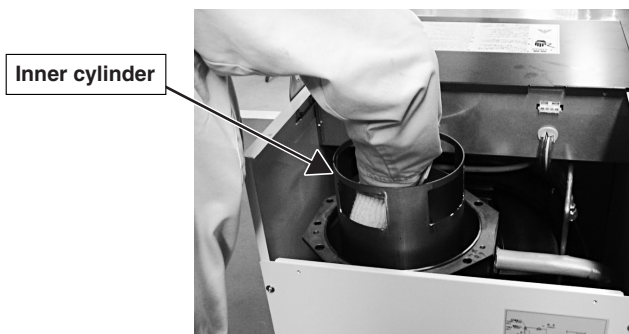
Be careful not to forget to attach the packing.
Bolt tightening torque: 12.5 ± 0.5 N·m

CAUTION

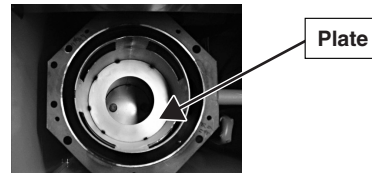


To tighten the bolts of the evaporator cover, be sure to use a torque wrench. Tighten the bolts at the above specified torque. If the bolts are tightened too tight or too loose, it causes liquid leakage.

10 Raise the inner cylinder in the evaporator.



<Plate on the inner cylinder>



[During assembling]

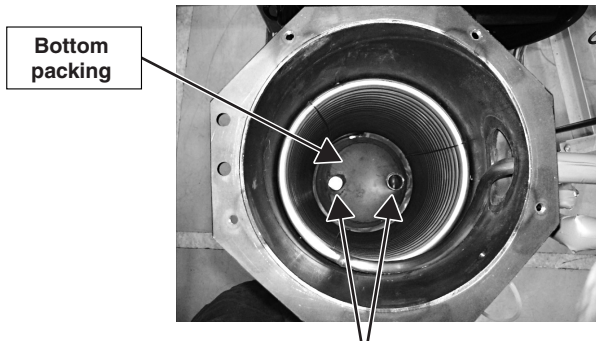
Align two pipes protruding from the evaporator body with two holes at the bottom of the inner cylinder.

WARNING

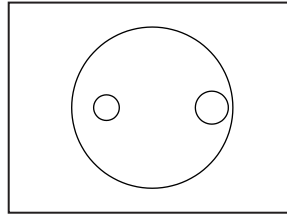


When raising and assembling the inner cylinder, hold the plate in the inner cylinder by hand. If you hold other parts of the cylinder, you may pinch your finger. Raising the cylinder while rotating it may result in damage to the cooling coil, causing coolant leakage.

11 Remove the evaporator bottom packing.



<Bottom packing>



[During assembling]

Align two pipes protruding from the evaporator body with two holes of the bottom packing.

⚠ CAUTION



When attaching and removing the packing, use caution not to damage the packing. Damage to the packing causes cooling capacity deterioration and a fault of the compressor.

12 After conducting the above steps, you can clean the inside of the evaporator. Pour cleaning liquid (clean liquid for cooling, etc.) by using a watering can or pump. If dust is extremely persistent, use an air blower, nylon brush, etc. for cleaning.

⚠ WARNING



During cleaning, use caution not to damage the cooling coil and fixing wire. Failure to observe this instruction causes coolant leakage.

(Remarks) About cleaning liquid

This evaporator uses the following materials. To use cleaning liquid, select liquid that does not cause damage to the evaporator.

<input type="checkbox"/> Cooling coil	: SUS304
<input type="checkbox"/> Fixing wire	: SUS304
<input type="checkbox"/> Evaporator body	: SPHC
<input type="checkbox"/> Evaporator inner cylinder	: SPCC, SPHC
<input type="checkbox"/> Upper and lower end plates	: SS400
<input type="checkbox"/> Liquid piping	: SGP
<input type="checkbox"/> Packing	: NBR

13 The following is the procedure for re-assembling the evaporator after cleaning.

Conduct the above steps in the reverse sequence **11** → **1**, while using caution about the following points :

- Check the packing and the bottom packing for a break, crack or flaw. If such a defect is found, replace the packing with a new one.
(Even if a defect is not found, it is recommended that you should replace the packing with a new one every time you conduct evaporator cleaning.)
- Make sure that the packing and the bottom packing contact surface are cleared of a foreign substance (e.g. swarf). If a foreign substance is left, the packing may be damaged.
- Before re-assembling the evaporator, thoroughly wipe liquid off the flange, the evaporator cover and the packing contact surface by using rag. If the evaporator is assembled with residual liquid, the packing slips, causing liquid leakage due to incomplete contact.
- Tighten the bolts of the evaporator cover diagonally and gradually (in about three steps) to prevent the bolts from being unevenly tightened.
(Bolt tightening torque: 12.5 ± 0.5 N·m)

⚠ CAUTION



During assembling work, use caution not to forget to attach the packing and plug (particularly at the steps **11**, **9** and **7**). If the packing and plug are not attached, it causes liquid leakage and insufficient cooling capacity.

Troubleshooting

1 When the Oil Cooling 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 Oil Cooling Unit (as closely as possible)

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. 2) The connector for the transformer disconnected, or the thermal fuse of the transformer melted.	Check if the power cable is connected to the power supply terminal. Check the wire connection of the transformer. If the fuse was melted, consult DAIKIN center.
2	The pump does not run. (For built-in pump model only)	1) The remote control input ([10]–[11]) is OFF. 2) The unit has been set to the operation lock mode. (With the factory setting, the operation Lock mode is selected.)	Check the connection of the remote control input. Cancel the Lock mode on the control panel. (See page 19.)
3	Liquid does not flow, although the pump is running. Because the liquid circulation quantity is insufficient, the pump sound level is large. (For built-in pump model only)	1) The pump suction pipe connection is loose. 2) The suction strainer is clogged. 3) The liquid level in the tank is low. 4) The liquid discharge piping pressure loss is large. 5) Because of a large pressure loss in the liquid suction pipe, cavitation has occurred with the pump. 6) The liquid piping is clogged with dust (swarf, etc.). 7) The evaporator is clogged with dust (swarf, etc.). 8) There is a trap in the liquid inlet piping. 9) (For built-in pump model only) Priming is not executed.	Check the packing of the pipe, and re-tighten it securely. Clean the suction strainer. If the liquid in the tank is contaminated, replace the liquid. (See page 37.) Refill liquid into the tank. Increase the liquid pipe diameter, and shorten the pipe length. Remove dust from the liquid piping. Clean the evaporator. (See page 38.) Correct the trap shape. During initial operation of the pump and at restart of the pump after it sucks up air, priming is required. Fill priming liquid into the pump. (See page 7.)
4	The compressor does not run.	1) The compressor is stopped under temperature control. 2) The compressor restart prevention timer has been activated. 3) The low liquid temperature protection device has been activated. (Inlet liquid temperature is 2°C or lower.) 4) The low ambient temperature protection device has been activated. (Room temperature is -2°C or lower.) 5) The capacity setting is 0% (Mode 9).	--- Check if the compressor starts after elapse of the timer preset time. Check if the compressor normally operates at 5°C or higher liquid temperature. Check if the compressor normally operates at 0°C or higher room temperature. Change the operation mode to an appropriate setting.
5	The compressor is running, but liquid cannot be cooled.	1) There is an obstacle near the air intake/exhaust port. 2) The air filter is clogged. 3) The unit is running under capacity suppressing control, because the room temperature is high. 4) Heat load is large. 5) The temperature setting is high. 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. 7) The liquid piping is clogged with dust (swarf, etc.). 8) The evaporator is clogged with dust (swarf, etc.). 9) (For built-in pump model only) The pump is running, but liquid does not flow.	Remove the obstacle. Clean the air filter. Check the capacity in the operating temperature range with the catalog, and select a model with appropriate capacity. Change the temperature setting to an appropriate temperature. Re-fill refrigerant. Remove dust from the liquid piping. Clean the evaporator. (See page 38.) Make sure that the liquid circuit connection is correct and the pump is running normally. (See page 7.)
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. 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.	Connect the corresponding temperature sensor. 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 OILCON.
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
AA	2	Heater overheat (S4B1:S184) (-H model only)	1) No liquid flow	Check if the liquid circuit is properly connected and the pump normally operates. (on page )
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 liquid 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 )
			4) Any factor other than the above	Contact DAIKIN Contact Center.
E5	2	Compressor high temperature error	1) The liquid 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 )
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. AKC359, 569: 2.5A	1) The pump is overloaded by high-viscosity liquid.	Use liquid that provides 200 mm ² /s viscosity in the specified operating 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	High liquid temperature error	1) The pump outlet liquid temperature is higher than 65°C.	Check if the liquid piping system is not blocked (fully closed).
FH	2	The inlet liquid temperature is higher than 60°C (when the flow rate is insufficient**: 53°C).	1) The heating value of the main machine has exceeded the cooling capacity of the Oil Cooling 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: 35°C, liquid temperature: 35°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 Oil Cooling 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.)

* Alarm level 1: Compressor, pump and fan stop.

Alarm level 2: Only compressor stops.

** When the difference between the EV valve outlet temperature and the suction pipe gas temperature is less than 5.0°C.

Alarm code	Alarm level	Description	Cause	Corrective action
FH	2	The inlet liquid temperature is higher than 60°C (when the flow rate is insufficient**: 53°C).	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.
			6) The liquid piping is clogged with dust (swarf, etc.).	Remove dust from the liquid piping.
			7) The evaporator is clogged with dust (swarf, etc.).	Clean the evaporator. (on page 38-40.)
			8) (For built-in pump model only) The pump is running, but liquid does not flow.	Make sure that the liquid circuit connection is correct and the pump is running normally. (on page 7.)
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 22-24) to change the operation mode.)
JH	2	Th4: Inlet liquid temperature thermistor Th2: Outlet liquid temperature thermistor	1) The liquid 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 inlet liquid temperature thermistor: Emergency operation is available when the operation mode is 1, 5, 6, or 9. 2) Malfunction of outlet liquid temperature thermistor: Emergency operation is available when the operation mode is 0, 3, 4 or 9. (See page 22-24) to change the operation mode.)
L0	2	Inverter/compressor error	1) The compressor or inverter has a fault.	Replace the control board or compressor.
L4	2	Radiator fin temperature thermistor error	1) The liquid temperature or room temperature is higher than the specified operating range.	Check the wiring of the relevant thermistor.
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 OILCON. 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.
J6	2	Condenser temperature thermistor error	1) The condenser temperature thermistor is disconnected or short-circuited.	Check the wiring of the relevant thermistor.



* When the difference between the EV valve outlet temperature and the suction pipe gas temperature is less than 5.0°C.

When a warning is activated

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

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


Warning list

Warning code	Description	Cause	Corrective action
A4	Flow rate low error	1) The liquid pipe pressure loss is large.	Increase the liquid pipe diameter, and reduce the pipe length.
		2) The liquid level in the tank is low.	Refill liquid into the tank.
		3) The liquid piping is clogged with dust (swarf, etc.).	Remove dust from the liquid piping.
		4) The evaporator is clogged with dust (swarf, etc.).	Clean the evaporator. (on page  .)
		5) (For built-in pump model only) There is a trap in the liquid inlet piping.	Correct the trap shape.
		6) (For built-in pump model only) Priming is not executed.	During initial operation of the pump and at restart of the pump after it sucks up air, priming is required. Fill priming liquid into the pump. (on page  .)
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	Inlet liquid temperature thermistor error	1) Inlet liquid 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 OILCON 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 OILCON by upgrading the state to an alarm after operation for 150 hours.	Check the wiring of the relevant thermistor.
J5	Suction pipe gas temperature thermistor error	1) The suction pipe gas temperature thermistor is disconnected or short-circuited. To protect the unit, the warning shifts to an alarm to stop operation 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 OILCON by upgrading the state to an alarm after operation for 150 hours.	Check the wiring of the relevant thermistor.
P4	Radiator fin temperature thermistor error	1) The radiator fin temperature thermistor is disconnected or short-circuited.	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.
1E	Temperature range warning 1	1) The monitor temperature has exceeded the preset temperature. (It does not mean a fault of the Oil Cooling Unit.)	Check the preset warning condition.
2E	Temperature range warning 2		
3E	Temperature range warning 3		
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).

P1/2

Declaration of incorporation (No. PE-01731)		
1.	Product(Apparatus) model / Product (product, type, batch or serial number):	Product name: OILCON Model name: Listed in page2
2.	Name and address of the manufacturer:	DAIKIN INDUSTRIES,LTD. Oil Hydraulics Div. 1-1 Nishi-hitotsuya, Settsu-shi, Osaka, 566-8585, Japan
3.	This declaration of incorporation of partly completed machinery is issued under the sole responsibility of the manufacturer. The partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of this Directive, where appropriate.	
4.	Object of the declaration (identification of apparatus allowing traceability):	OIL COOLING UNIT Model name: Listed in page2
5.	The object of the declaration described above is in conformity with the relevant Union harmonisation legislation listed in section 6 :	
6.	Applied Union harmonised legislation and reference to the relevant harmonisation standards used (,including to the date of the standard,) or references the other technical specifications (,including the date of the specification,) in relation to which conformity is declared.	
	Document No	Title
	2006/42/EC EU Harmonised standards	EU Machinery Directive (May 2006) EN 378-2:2008+A2:2012 (Refrigerating systems and heat pumps - Safety and environmental requirements -)
	2014/30/EU EU Harmonised standards	EU EMC Directive (March 2014) EN 61000-6-4:2007+A1:2011 (Electromagnetic compatibility (EMC)) EN 55011:2009+A1:2010,(group 1,class A) (Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement) EN 61000-6-2:2005/AC:2005 (Electromagnetic compatibility (EMC))
7.	Additional information	Instruction manual : PIM00377
8.	Signed for and on behalf of:	
	(place and date of issue): (name, function) (signature):	Osaka, Japan, 4. JULY. 2016  Masashi Ichikawa, Quality Assurance Department Manager DAIKIN INDUSTRIES,LTD. Oil Hydraulics Div.

Product(Apparatus) model / Product (product, type, batch or serial number)

AKC359-C (H) (200)

AKC569-C (H) (200)



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