

DAIKIN OIL COOLING UNIT INSTRUCTION MANUAL

MODEL NAME

- | | | |
|----------------|----------------|----------------|
| •AKZ(S)147(-C) | •AKZ(S)257(-C) | •AKZ(S)327(-C) |
| •AKZ(S)437(-C) | •AKZ(S)567(-C) | •AKZ(S)907(-C) |

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For proper use

THANK YOU FOR PURCHASED DAIKIN OIL COOLING UNIT.




Before you use the unit, please be sure to read this instruction manual for knowing how to use it correctly.

- It will also help when, with the machine in use, you have any questions or have experienced trouble of any kind about it.
- After persuading, please keep this with the spares.
This instruction manual has contained in everything you should know when you use the OIL COOLING UNIT.

1. SAFETY CONSIDERATION

Be sure to observe the following precautions.

The precautions described below are intended to prevent the users from suffering injury or damage. The matters which could occur due to erroneous handling are classified as follows.

 DANGER	 WARNING	 CAUTION
Indicates an imminently hazardous situation which may result in death or serious injury.	Indicates a potentially hazardous situation which may result in death or serious injury.	Indicates a potentially hazardous situation which may result in injury or in property damage only.

DANGER

Do by expert



Check

Transportation, installation, piping, wiring operation, maintenance and inspection should be done by experts. Check the power supply (voltage and frequency).

Don't use out of specifications



Check

Operate the unit exactly according to the specifications described in the catalog and the delivery specifications. Failure to do this may cause serious accidents such as breakage of the main unit, injury, fire, and electric shock.

Check the specification before performing power supply wiring.



Forbidden

Connect with the power cable in accordance with the wiring diagram in the specification or the operation manual. Improper connection may cause electric shock or fire.

Check the weight, Hook at the designated position



Check

Hang the unit by hooking at the position designated in the outline drawing, and make sure that its weight is within the rated load of the hoisting attachment by checking the exact weight by the machine nameplate. A failure to do this may cause injury or breakage due to dropping or toppling of the unit.

Earth the ground terminal securely



Ground wire connection

The unit contains a noise filter. A failure to connect the ground wire could lead to electric shock.

Don't operate in explosive atmosphere



Forbidden

Do not install the unit in a place where flammable gas may be generated, flow in, stay or leak, or in a place where carbon fibers are suspended.

Turn the power off when starting work



Check

Be sure to turn the power off and never keep wires alive when starting work. This may cause electric shock.

Don't attempt disassembly or repairs.



Don't disassemble

Do not perform remodeling. Disassembly or repair should be performed by our serviceman. Such actions done by customers may cause fire, electric shock or injury, and they are beyond our warranty.

Wait at least 5 minutes to start work after turning the power off.



Forbidden

Discharge of the internal high-voltage live part (capacitor) takes 5 minutes. Starting work during this time may cause electric shock.

Keep out water.



Forbidden

Do not spill or pour water on the unit, which may cause a short circuit or electric shock.

Don't operate with the covers of the equipment open.



Forbidden

Don't operate with the casing of the unit or terminal box cover of the motor and other electric parts removed, which may cause electric shock.

1. SAFETY CONSIDERATION

WARNING

Perform wiring work in accordance with the regulation



Check

The supply connection should be made in accordance with National Wiring Regulation. Failure to do this may cause burning or fire.

Ventilate a room fully in case of refrigerant gas leakage



Check

When it is filled with refrigerant gas in large quantities, there are effect on anesthesia and fear of the suffocation.

Cope in accordance with mention in case of a CE specifications machine.

Keep away from the unit while carrying it



Forbidden

Keep away from the unit while carrying it by a hoisting attachment. There is a fear of injury or damage due to dropping or turning over.

Don't insert finger through an opening



Caution

A cover or casing is provided on the rotating part for safety.

Don't insert your finger through an opening, which may cause injury.

Fix the unit securely with bolts



Forbidden

Confirm the installing position of the unit with assembly diagram, and fix it securely with bolts or foundation bolts.

Stop operation at abnormal condition



Check

Stop operation immediately in case of abnormal conditions.

Otherwise, damage, electric shock, fire or injury may be caused.

CAUTION

Don't operate in special atmospheres



Forbidden

Don't operate the unit in the special atmospheres such as high temperature or high humidity.

Check main unit safety before test operation



Check

When performing test operation of the unit, check the main unit is certainly in safety. Failure to do this may cause injury or damage.

Keep the area for ventilation



Check

Don't place object within 500mm of the air inlet or outlet vents. Blocked vents could cause the cooling capacity dropping.

Clean the filter regularly



Check

Clean the air filter once a month. The dirty filter may degrade the cooling capacity, and increase the power consumption.

Prepare the power breaker on your site



Check

A power breaker is not included in the unit. It is recommended to use an earth leakage circuit breaker which is compatible with an inverter for more safety.

Wear gloves when performing maintenance, inspection, or cleaning



Check

The fin of heat exchanger is sharp, which caused injury. And, the compressor, the frame of the motor and the refrigerant pipe will get considerably hot, which may cause a burn.

1. SAFETY CONSIDERATION

CAUTION

Release operation lock before running the main unit



Check

Release the operation lock on the operation panel on the unit before starting the main unit. Running the main unit with operation lock will prevent it from cooling according to the specification and could damage the main unit.

Attach the flow switch to the main unit



Check

If the oil pump operation malfunctions, the oil supply to the main unit will stop. Normally, the oil cooling unit detects malfunctions and generates an alarm, but it may not be able to detect it depending on type of malfunction. If it becomes necessary to protect the main unit in this state, attach a flow switch to the oil route and observe the oil flow.

Don't run the pump on empty



Forbidden

Check the levels on the oil piping and tank before running. Running the unit on an empty pump will damage the unit.

Don't mount the unit



Forbidden

Don't mount the unit. Dropping from the unit may cause injury or damage.

Fix the unit firmly during transportation



Check

Fix the unit firmly to prevent movement by trembling or external force during transportation. Otherwise, the internal instruments may be damaged.

About the CE-Model (Option)



Check

The CE mode (option) of the oil cooling unit (AKZ**7-C, AKZS**7-C) is categorized to the over voltage category II, supplementary machine it is declared for conformity under the following conditions.

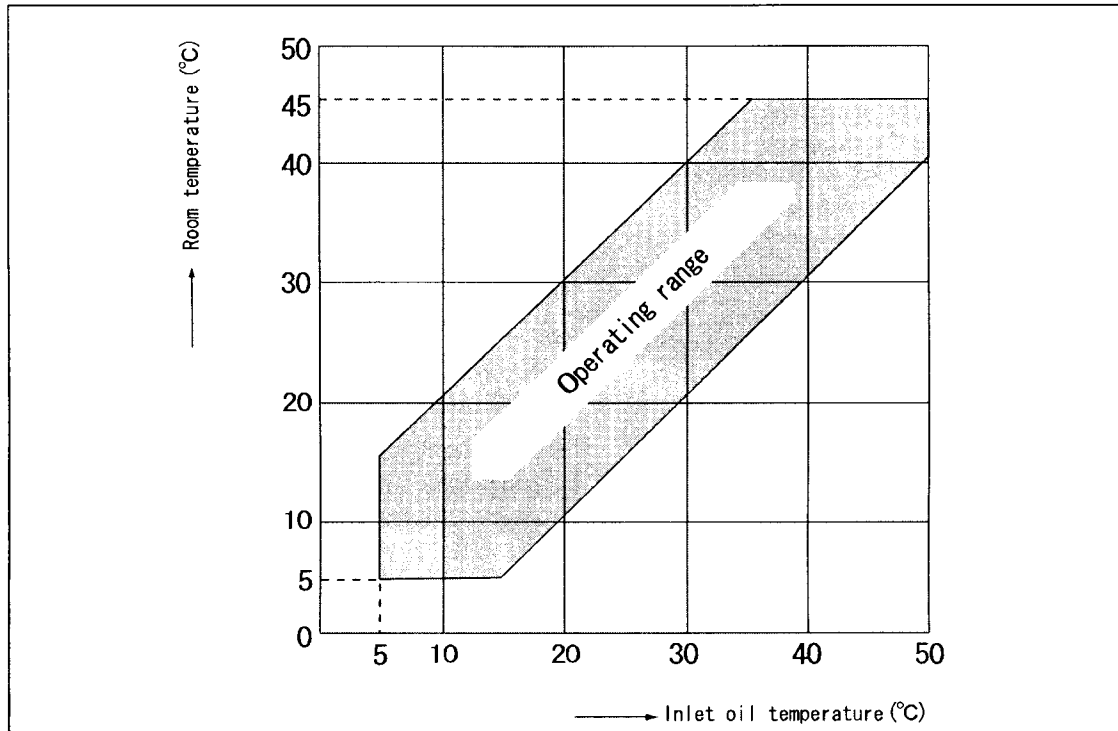
Please check the specification of the main unit.

- ① Supply disconnecting device according to EN60204-1 has to be provided during final installation.
- ② The main power shall be supplied via a transformer satisfying basic insulation.

2. CAUTIONS IN GENERAL

2-1 Operating range

Since Oil Cooling Unit is a refrigeration machine, the operative room and oil temperatures are limited. Use Oil Cooling Unit in the range shown below.



2-2 Acceptable oils

Lubricating oil and Hydraulic fluids (of mineral oil origin) shall be used for this unit. Therefore, the following oil (fluid) shall not be used for this unit.

- 1) Fire-resistant hydraulic oil
 - hydraulic oils of phosphoric ester,
 - Chlorinated hydrocarbon oils,
 - Water/glycol hydraulic oils,
 - W/O and O/W emulsion type hydraulic oils
- 2) Water and water soluble liquids.
- 3) Liquid chemicals and foods.
- 4) Cutting oils (fluid) and grinding oils (fluid).
- 5) Fuel such as kerosene, gasoline, etc.

CAUTION



Be sure to do.

- This unit contains refrigerant HFC (R407C). When disposing of this unit, be sure to recover R407C for global environmental conservation.

3. CAUTIONS FOR INSTALLATION

3-1 Installation location

■ Install in the following locations

- 1) On a solid and flat floor. (Inclining less than 5°)
- 2) Away from direct sunlight and heat.
- 3) Where there is good ventilation and little humidity.
- 4) Where the discharged gas will not be drawn in again.
- 5) A place convenient for piping and wiring.
- 6) Where there is little dust, dirt, powder, oil mist, etc.

■ Do not place anything in the way of ventilation within 500mm distance from intake and exhaust areas.

3-2 Oil piping

- 1) • Suction (Oil inlet) side -30.7~0kPa (Vacuum pressure)
 - Discharge (Oil outlet) side 0.29MPa or less. (AKZ(S)147,257,327,437)
 - 0.49MPa or less. (AKZ(S)567)
 - 0.59MPa or less. (AKZ(S)907)

For details, please refer to the reference.

- 2) Do not use more valves than necessary in the piping.
Valves, even if fully open, cause a considerable loss in pressure.
- 3) Use sealing tape around pipe connections to prevent air infiltration and oil leakage.

3-3 Suction strainer (Line Filter)

Dirt trapped in the refrigerator of Oil Cooling Unit causes not only reduction of cooling capacity but also trouble with the compressor and oil pump. Use a 100~150 mesh suction strainer that causes little pressure loss for keeping the clean in the oil and oil piping. And perform periodical check of the strainer.

3-4 Oil tank

When using an inverter-controlled oil-cooling unit, the capacity of the oil tank has a strong effect on the compliance and stability of the temperature of the oil.

We recommend keeping the oil tank capacity at a minimum needed for maintenance of the main unit (working machine).

4. MODEL AND SPECIFICATION

4-1. Structure of model name

AKZ * * * 7

Model code: Series 7

Typical cooling capacity (*1)

Series name AKZ : Energy saving and high accuracy inverter controlled oil cooling unit

AKZS : High energy saving inverter controlled oil cooling unit with the dual mode inverter technology.

(*1) Typical cooling capacity means the cooling capacity at below conditions.

- Power frequency : 60Hz
- Oil inlet temp. : 35°C
- Air temp. : 35°C
- Brand of Oil : VG32

and number indicates

- 14: 1.4kW • 43: 4.3kW
- 25: 2.5kW • 56: 5.6kW
- 32: 3.2kW • 90: 9.0kW

4-2. Specification

Model	AKZ(S)147-C	AKZ(S)257-C	AKZ(S)327-C	AKZ(S)437-C	AKZ(S)567-C	AKZ(S)907-C
Cooling Capacity (50/60Hz) *note1	1.3/1.4kW	2.3/2.5 kW	2.8/3.2 kW	3.8/4.3 kW	5.0/5.6 kW	8.0/9.0 kW
Power Source	Main Circuit 3~ 200/200-220V 50/60Hz					
Operation Circuit	DC24V/12V					
Capacity(200V 50Hz)	1.4kVA/3.9A	2.1kVA / 6.4A	2.5kVA/7.1A	2.6kVA / 7.7A	3.8kVA / 10.5A	6.0kVA-17.2A
(200V 60Hz)	1.2kVA/3.5A	2.0kVA / 6.3A	2.5kVA/7.2A	2.7kVA / 7.8A	3.8kVA / 11.0A	6.1kVA-17.6A
(220V 60Hz)	1.3kVA/3.3A	2.1kVA / 6.4A	2.6kVA/6.8A	2.6kVA / 7.6A	4.0kVA / 9.7A	6.1kVA-16.2A
External Painting	White-gray (Mancel N7.5)					
External Dimension(H×W×D)	640-360-440	790-360-440	1020×360×440		1110-470-500	1220-560-620
Compressor (Hermetic DC Swing Type)	0.6kW,2P		0.75kW,2P	1.1kW,2P	1.5kW,2P	2.2kW,2P
Evaporator	Shell and Coil Type					
Condenser	Cross-Fin-Coil Type					
Fan	Propeller Fan					
Motor	Oil Pump 0.4kW, 4P			0.75kW, 4P		
Fan	use Oil Pump in common				90W,4P	150W,4P
Oil Pump Displacement(50/60Hz)	12.1/14.4L/min	24 / 29 L/min		30 / 36 L/min		
Temp. Control	Synchronized	Based Object	Oil Inlet Temp ,Room Temp (Machine Temp. *note2 ,Oil Outlet Temp. *note3)			
Type	Target Object	Oil Inlet Temp (,Machine Temp. *note2 ,Oil Outlet Temp. *note3)				
		Synchronized Range : -9.9~+9.9°C (Target Temp. is limited to 5~50°C)				
	Fixed Type	Target Object	Oil Inlet Temp (,Machine Temp. *note2 ,Oil Outlet Temp. *note3) 5~50°C			
Refrigerant Control	Inverter (for compressor) , Electric Expansion Valve					
Protectors	Over Current Relay (For Pump Motor) ,Phase-Reversal Detection Compressor Restart Guard Timer ,Low Room Temp. Thermo ,High Oil Temp. Thermo. Relief Valve (for Pump) ,High Pressure Switch *note4 ,Compressor Head Temp. Thermo.					
	Inverter Protection Devices					
Refrigerant	Type	R407C				
	Weight	490g	500g	810g	810g	1390g 1620g
Acceptable Range	Room Temp.	5~45°C				
	Oil Inlet Temp.	5~50°C				
	Oil Viscosity	4~200m ² /s			2~200m ² /s	
	Pressure Loss	Suction Side -30.7~0kPa				
		Discharge Side 0.29MPa or Less			0.49MPa	0.59MPa
Connection	Oil inlet	Rc3/4	Rc1		Rc1 1/4	
	Oil outlet	Rc3/4	Rc1		Rc1 1/4	
Piping Size	Oil drain	UNF7/16-20 (male)				
	Oilpan drain	Rc 3/8 (female)				
Acceptable Oils	Lubricating Oil , Hydraulic Oil (See 2-2)					
Acoustic Noise Level (at un-echo chamber)	64dB(A)	65dB(A)	68dB(A)	68dB(A)	68dB(A)	70dB(A)
Weight	53kg	50kg	65kg	65kg	85kg	120kg
Anti Shpping Vibration Performance	14.7m/s ² ×2.5Hr , 10~100Hz Sweep/5min. Up and Down Vibration					
Circuit Breaker (*note5)	10A	10A	10A	10A	15A	20A

Note1) Conditions : Room temp. 35°C, Oil Inlet temp. 35°C
(At brand of oil : VG32 , Suction pressure:-20.0kPa ,Discharge Pressure:0.2MPa)
This unit has tolerance of about 5%.

Note2) Machine temp. thermister option (AKS5-OP21or AKS5-OP22) is needed

Note3) Oil outlet temp. thermister(option) is needed . (Only AKZ type is allowed to use this option.)

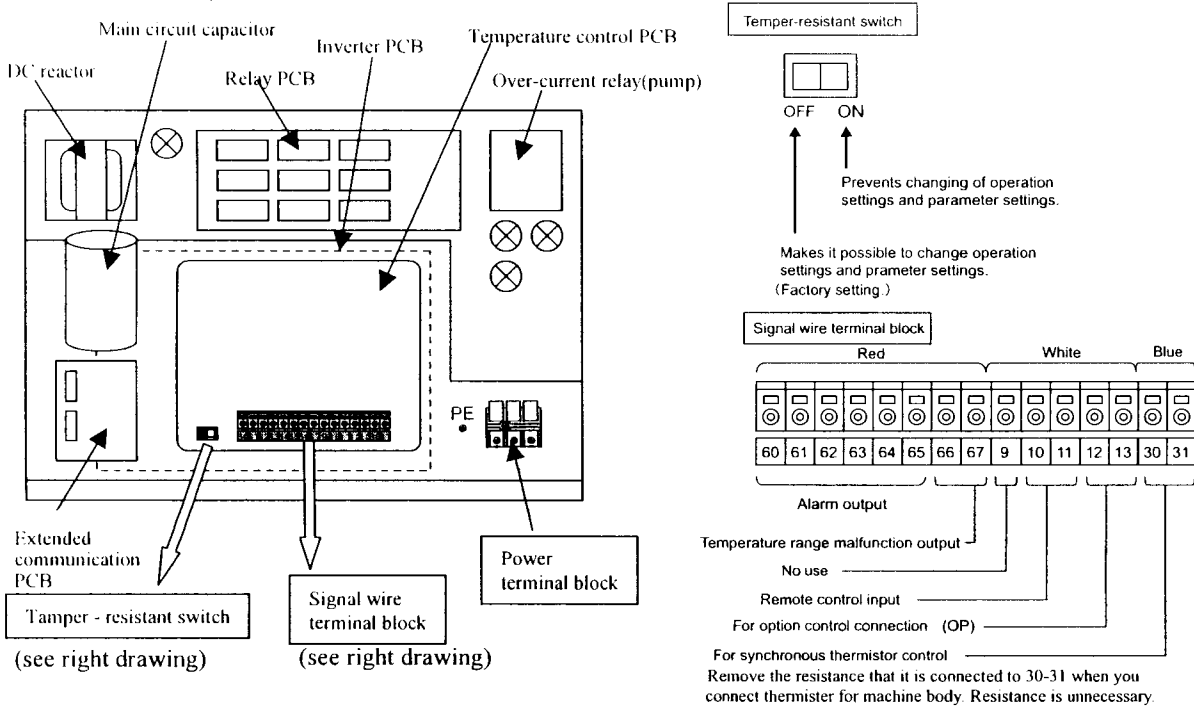
Note4) The high pressure switch is applied on AKZ(S)907 and CE model.

Note5) Since the main unit is not provided with a main power over-current breaker,be sure install the breaker given in the table.

5. ELECTRICAL WIRING

- The supply connection should be made in accordance to the National Wiring Regulations.
- In the supply, be sure to attach the following switch near the main unit.
Switch spec.: The contact separation between the open contacts should be at least 3mm.
- For electric wiring work, refer to the electric wiring diagram plate attached to the back side of switch box cover.
- Do not change the wirings nor operate the electromagnetic switches manually inside the OIL COOLING UNIT.

5-1 Switch box layout



5-2 Circuit breaker Installation

Since the main unit is not provided with a main power over-current circuit breaker, be sure to install the breaker given in the specification table (See 4-2).

We recommend to use an earth leakage breaker for more safety.

⚠ CAUTION



When using an earth leakage breaker, be sure to choose one which is compatible with an inverter. Non-compatible types might malfunction due to the extreme high-frequency noise from the inverter.

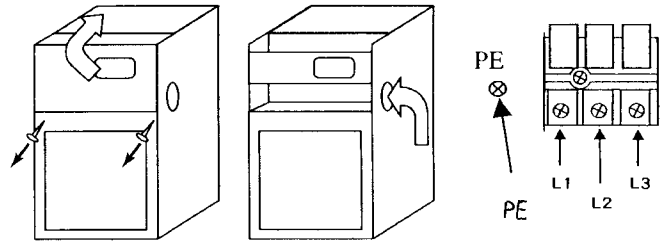
5-3 Grounding and power source connection

- 1) Remove the screw from the front cover under the operation panel, then lift the front cover to remove it.
- 2) Pass the supply wires through the hole (on either side of the unit).
- 3) Connect the supply wire and the protective earth wire to the terminal block.

◆ Diameter of wire

Standard	AKZ(S)257(-C),327(-C),437(-C),567(-C)	AKZ(S)907-C
JIS	heat-insulated vinyl 2.0mm ²	heat-insulated vinyl 3.5mm ²
UL	UL1015 AWG#14(2.0mm ²)	UL1015 AWG#12(3.3mm ²)
IEC	2.5mm ²	4.0mm ²

- ◆ Piping should be used for supply wire.
 - ◆ Supply only from main machine through piping.
 - ◆ Use M4 (M5 at AKZ(S)907) round crimping terminals for all wiring.
 - ◆ Fix the supply wire to the cable anchorage with cable band.
 - ◆ Some model has different protective earth(PE) terminal, make connection regarding to the electric circuit diagram
- 4) Replace the cover and fasten with the screw.
 - 5) A [U1] displayed on the display panel when the power is turned on indicates a negative phase connection, so replace either of the L1, L2, or L3 phases.



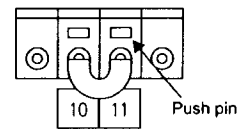
5-4 Remote control

Wire as indicated below for remote control.

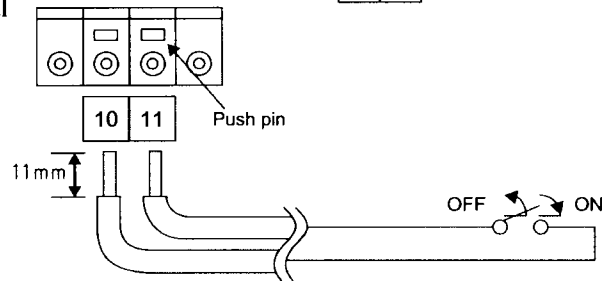
- 1) Part to be prepared.

Part	Single-pole, single-throw remote control switch or "a" contact capable of transmitting control signal. Note: Select one whose minimum applicable load is DC12V, 5mA.
Wiring material	Solid wire: ϕ 1.2 (AWG16) or Standard wire: 1.25mm ² (AWG16)
Tool	Flat-head screwdriver (one with ϕ 3 axis and 2.6 point width is recommended)

- 2) Remove the jumper (terminal Nos. [10]~[11]) from the terminal block by pushing push pin using screw driver.



- 3) Connect the part indicated in 1) above to this terminal block. Peel 11mm from the tip of the harness to be attached to the terminal block.
Single wires can simply be pushed into the terminal block when connecting them.
Insert twisted wire by pushing it in with a flat-head screwdriver.



5-5 Connecting the synchronous temperature sensor

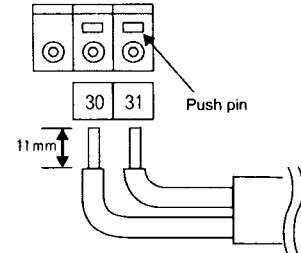
Follow the instructions below when connecting an optional synchronous sensor.

1) Items to be procured locally.

Parts	Optional parts for synchronizing the machinery (One of the following) <ul style="list-style-type: none"> AKS5-OP21 (R 1/8 screw-in type: lead wire 1600mm) AKS5-OP22 (Vand attachment type: lead wire 500mm)
Wiring material	If extension is necessary. Use the twisted-pair shielded cable (0.5mm ² or thicker). Note: Maximum length 20m

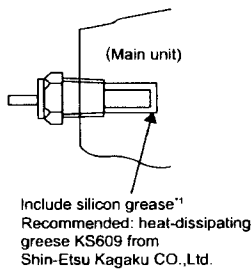
2) Connect the parts in 1) above to the terminal block [30-31].

Peel 11mm from the tip of the harness to be attached to the terminal block. Insert twisted wire by pushing it in with a flat-head screwdriver. Earthing only one side of the shield line, if used twist-pair shielded cable for extension.

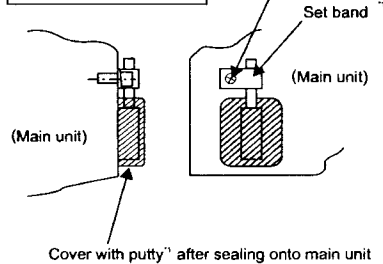


3) Attach the sensor.

Attaching the AKS5-OP21



Attaching the AKS5-OP22



CAUTION

- Directory air flow to the sensor causes the offset of sensing temperature. Use the thermal insulant like putty.
- Screw in the sensor at full length when use the AKS5-OP21.

CHECK

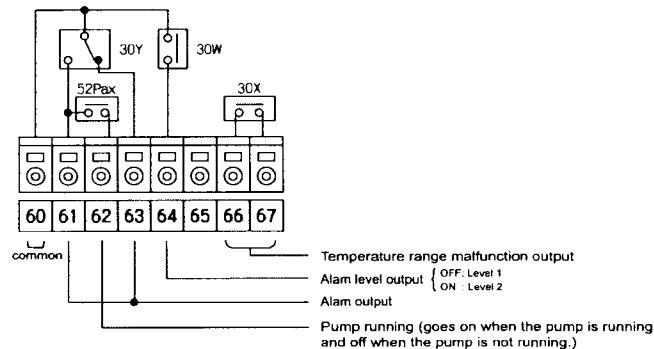
*1: Do not attach to the thermistor option (AKS5-OP**). Procure it locally.

5-6 Connecting the output contact

If you are using an output contact, connect any necessary signal wires as laid out below. See [Alarm Processes] for details on alarms.

If using together with an output contact, change the parameter settings and make sure it is connected properly. (See Item 6-2(6) [Parameter Setting Mode] for details on how to change the parameters.)

1) Signal output circuit



2) Alarm output logic

The alarm output logic can be changed using the Parameter settings.

3) The output signal will become undefined when the power is on. Set up the sequence in the main unit to ignore the signal for one second after the power is turned on.

CAUTION

- Use a load DC 10mV and 10uA or higher in order to prevent bad connections with the contact.
- Maximum loads are as follows; DC load: 30V and 2A or lower
- Be sure to use a surge protection device when connecting an induction load.

CHECK

The value of the first digit in the alarm output logic parameter [n01]	
[0](Initial setting) {Positive action}	[1] { B contact }
<p style="text-align: center;">Normal</p>	<p style="text-align: center;">Normal or power outage</p>
<p style="text-align: center;">Alarm generated or power outage</p>	<p style="text-align: center;">Alarm generated</p>

5-7 External output contact time chart

Operation status		Power off (including power outage)	Power on					
			Operation	Level 2 Malfunction	Operation	Level 1 Malfunction	Operation	
Setting conditions	Power	OFF	ON	Reset	Reset			
	Remote operation contact	Between 10-11	ON	OFF	ON			
	Operation panel	"Lock"key	ON	OFF	ON	ON		
External output contact mode and terminal symbol	When the logical output parameter is [0]	Normal (a contact)	Between 60-61	OFF	ON			
		Malfunction/Stop (power off) (b contact)	Between 60-63	ON	OFF			
		Pump operation (a contact)	Between 61-62	OFF	ON	OFF	ON	ON
		Maifunction level	Between 60-64	OFF			ON	
	When the logical output parameter is [1]	Maifunction (a contact)	Between 60-61	OFF			ON	
		Normal/Stop (power off) (b contact)	Between 60-63	ON			OFF	
		Pump operation (a contact)	Between 61-62	OFF	ON	OFF	ON	ON
		Maifunction level	Between 60-64	OFF			ON	

6. CAUTIONS FOR OPERATION

- 6-1 NEVER RUN WITHOUT OIL IN THE MACHINE. (This causes damage to the oil pump, etc.)
- 6-2 Prevent air from being mixed into the oil piping system.
(If air is mixed in, it causes noise.)
- 6-3 When using high viscosity oil and in the case of large pressure loss in oil piping outside the main unit, change the piping so that the pressure loss will be reduced. (Please refer to the reference item.) If this unit is used exceeding operating range, it may cause noise or troubles.
- 6-4 Since the delay timer is installed, the compressor may not run when restarted after operation is stopped. This is normal.
- 6-5 Install the drain pipe to the oil pan by all means. Further, do not install a drain pipe to the oil drain since it is for servicing purpose.

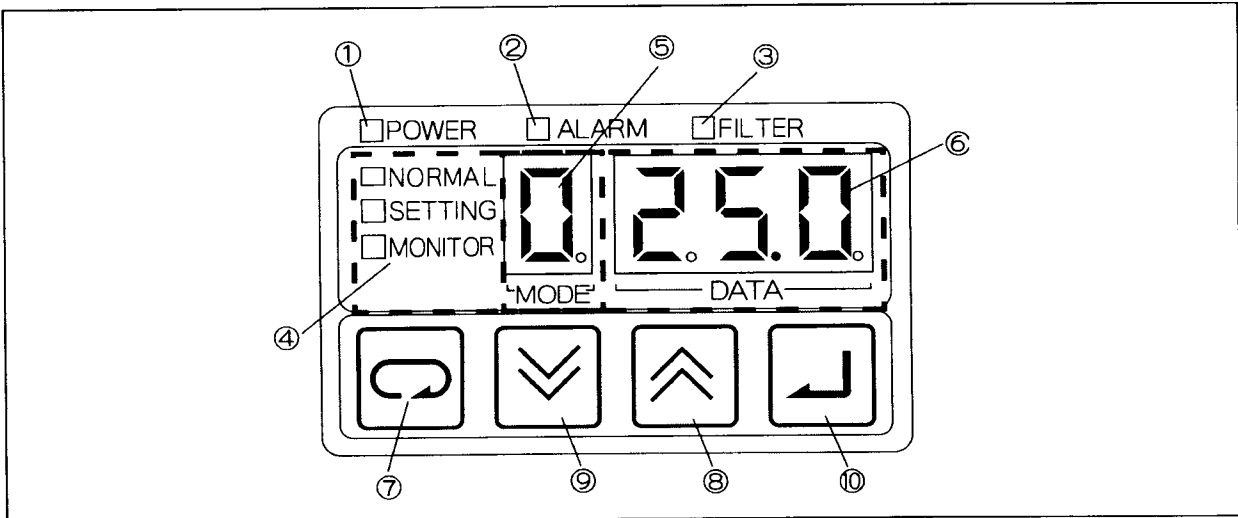
CAUTION



Be sure you have read and fully comprehended the contents of the operation manual before operating the unit.

7. OPERATIONS ON CONTROL PANEL

7-1 Introduction of control panel



No.	Name	Content
①	Power lamp	This lamp lights up when power is supplied.
②	Alarm lamp	This lamp lights up or flickers when an abnormality occurs. Level 1 alarm: Flicker Level 2 alarm: Light up
③	Filter lamp	This lamp lights up when compressor has run over the set time. In this case, you can light off the lamp by [ENT] key in normal mode.
④	Function display	It shows present operational mode. NORMAL: Normal mode SETTING: Operational data setting mode MONITOR: Monitor value display mode
⑤	Mode/ Selected No. display	It shows present temp. control mode, or data number of displayed data in data display.
⑥	Data display	It shows data of selected mode and data number.
⑦	Select [SEL] key	Use to select the function mode.
⑧	[UP] key	Use to change the display of operation mode/data number/data value forward by one step. By pressing and holding down this key, key repeat is started.
⑨	[DOWN] key	Use to change the display of operation mode/data number/data value backward by one step. By pressing and holding down this key, key repeat is started.
⑩	Confirmation [ENT] key	Use to fix operation mode/data number/data value being changed. Use to light off the filter sign lamp, when the filter sign lamp is on at the normal mode.

7-2 Function mode

There are five operation modes for the control panel, as listed below. Only three modes are commonly used for everyday operation. The other two modes should only be used by technical personnel with a thorough understanding of their uses, as misuse could cause the host machine to malfunction.

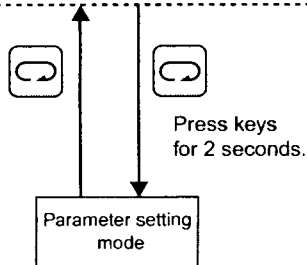
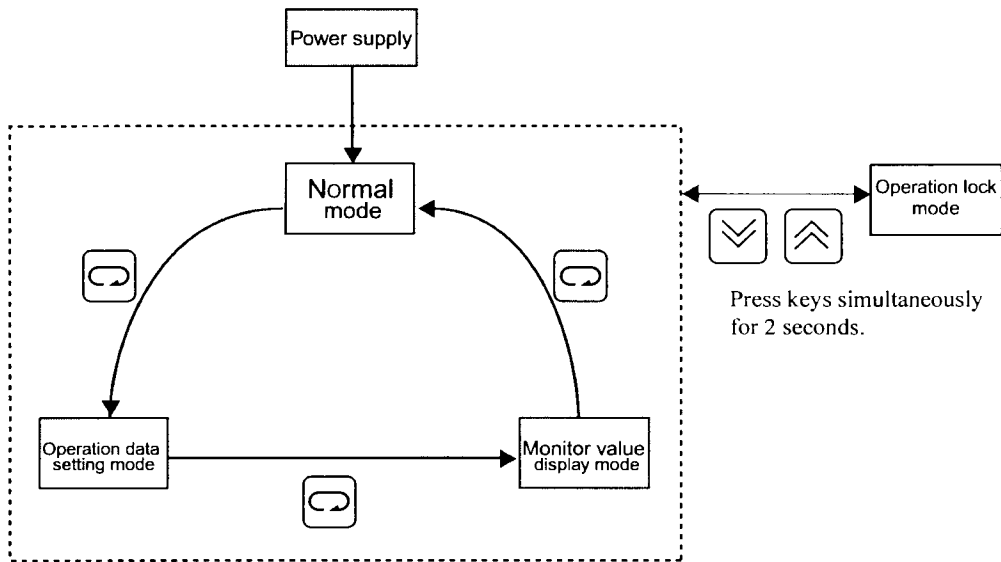
	Function mode	Description	LED STATUS
	Operation lock mode	Stops operation of the oil cooling unit in any setting mode.	
○	Normal mode	Displays the current operation mode and the target control value.	"NORMAL" illuminates
○	Operation data setting mode	Sets the operation mode and the target control value.	"SETTING" illuminates
○	Monitor value display mode	Displays the current value of each sensor.	"MONITOR" illuminates
	Parameter setting mode	Sets the basic parameters for the oil cooling unit.	"SETTING" flickers

(Remark) ○: Commonly used mode.

(1) Switching between modes

Normally you press the  key to switch between modes.

To switch to special modes, you must press a particular combination of keys for 2 seconds.



⚠ CAUTION

- Factory default of operation mode is "Operation lock mode".
- When start the operation, operate the control panel for release the lock mode. (see. (4) operation lock mode)
- Factory defaults of operation setting are
 - Mode : 3 (Oil inlet and air temp synchronous control)
 - Offset : ±0 K

(2) Normal mode

This is the mode that the unit automatically enters when the power is turned on.

In this mode, the data display automatically shows the status of the oil cooling unit.

	Operation panel display	Remarks
Normal operation		MODE: displays the operation mode. DATA: displays the operation goal temperature.
Alarm generated		MODE: off DATA: displays the alarm code by flashing. ALARM lamp: flashes for level 1 malfunction remains on for level 2 malfunction.
Filter sign generated		MODE: displays the operation mode. DATA: displays the operation goal temperature. FILTER lamp: flashes. Can be released by pressing the key.
Operation lock		MODE: off DATA: 'Loc' is displayed by flashing. Can be released by pressing the and keys for five seconds. When in operation lock, all operations including the oil cooling unit pump shut down.

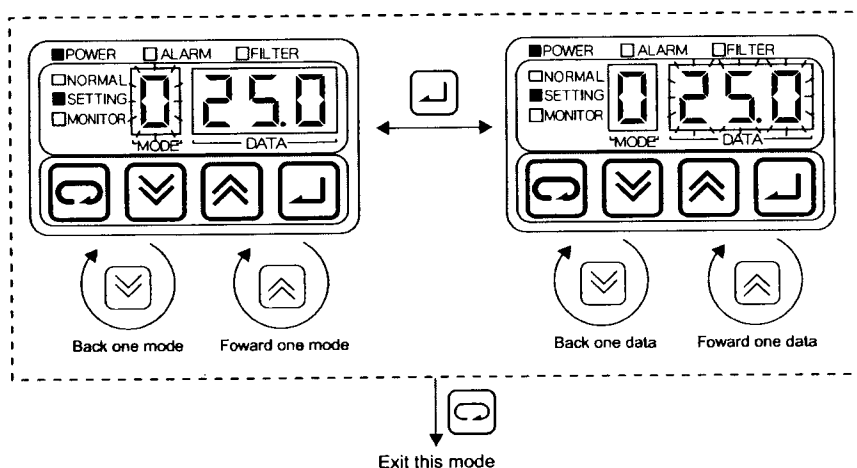
(3) Operation setting mode

You can set the oil cooling unit's operation mode and the temperature control goal in this mode.

You can select the mode and the data with the key.

The mode and the data are confirmed by pressing the key when the data display is flashing.

If you press the key before that, the mode or data being changed will be lost, and operation will continue again with the original settings.



● Fixed temperature control (modes 0~2)

Controls the unit so that the controlled temperature reaches the set temperature.

● Synchronous temperature control (modes 3~8)

Controls so that the controlled temperature reaches the temperature calculated according to the formula below.

$\text{Control goal temperature} = \text{synchronous original temperature} + \text{set value (off-set)}$
--

However, if the result is lower than 5.0°C, then the temperature is limited to 5.0°C, and if it is higher than 50.0°C, then it is limited to 50.0°C.

● Direct capacity control (mode 9)

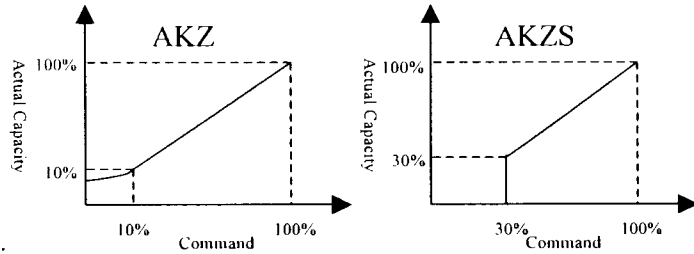
Does not control the temperature but directly controls the cooling capacity.

《AKZ-type》

Operation from 10 %~100% is possible.
0% setting means compressor stop.

《AKZS-type》

Operation from 30%~100% is possible.
Will run at 30% even if set between 1%~29%.
0% setting means compressor stop.





No.	Mode	Target object	Based object	Setting Range		Degree
				AKZ-type	AKZS-type	
0	Oil inlet temp. fixed control	Oil inlet temp.	Fixed (Constant)	5.0~50.0	5.0~50.0	°C
1	Oil outlet temp. fixed control	Oil outlet temp.	Fixed (Constant)		—	
2	Machine body temp. fixed control	Machine body temp.	Fixed (Constant)		5.0~50.0	
3	Oil inlet and room air temp. synchronous control	Oil inlet temp.	Room air temp.	-9.9~9.9	-9.9~9.9	K
4	Oil inlet and machine body temp. synchronous control	Oil inlet temp.	Machine body temp.		-9.9~9.9	
5	Oil outlet and room air temp. synchronous control	Oil outlet temp.	Room air temp.		—	
6	Oil outlet and machine body temp. synchronous control	Oil outlet temp.	Machine body temp.		—	
7	Oil outlet and oil inlet temp. synchronous control	Oil outlet temp.	Oil inlet temp.		—	
8	Machine body and room air temp. synchronous control	Machine body temp.	Room air temp.	-9.9~9.9	-9.9~9.9	
9	Direct control of cooling capacity of inverter compressor	—	—	0~100	0~100	%



※ Machine body temperature synchronous control requires that a synchronous temperature sensor (optional part) be attached.

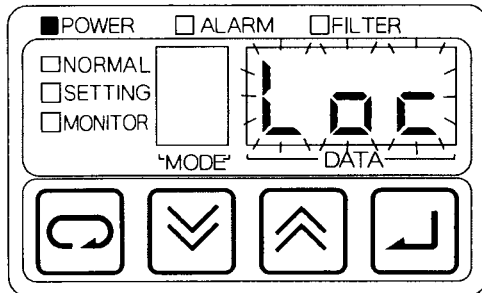
Not all operation modes may be available, depending on the model of oil cooling unit.

(4) Operation lock mode

This mode shuts down all operations for the oil cooling unit, and forbids the operation of any key other than lock release.

Press the  and  keys for two seconds in one of the normal modes (normal mode, operation setting mode, or monitor mode). “Loc” will flash on the data display and turn into the operation lock mode..



Also press the  and  keys for two seconds when disengaging operation lock mode.

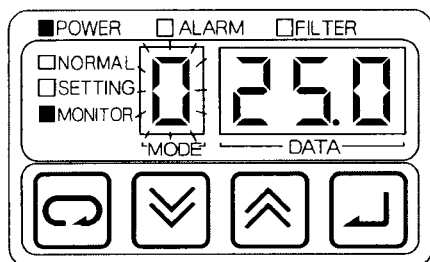


When running or stopping the oil cooling unit with the control panel, use this operation.

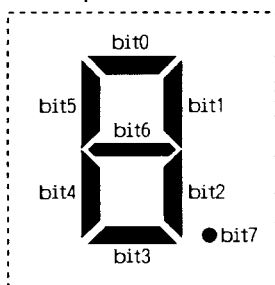
(5) Monitoring data mode

This mode is displaying temperature detected by each sensor and the IN/OUT condition.

You can choose any data by  key  key.



(Example) Display the machine body temperature as 25°C





No.	Content
0	Machine body temp. [TH1] *1)
1	Oil outlet temp. [TH2] *1)
2	Air temp. [TH3] *1)
3	Oil inlet temp. [TH4] *1)
4	Spare [TH5] *1)
5	ΔT [TH4 - TH2] *1)
6	Direct control value (%)
7	Frequency of INV for comp. (rps)
8	Frequency of INV for pump (Hz)
9	State of expanded DIN (100 column), DOUT (1 column) *2)

*1)“99.9” is displayed at disconnected or failure condition.


*2) This function is available with optional communication expansion PCB.




(6) Parameter setting mode


This mode sets the parameters which define the basic operation of the oil cooling unit.

Select the parameter number using the  and  keys with 'P' flashing in the mode display.

After the parameter number has been displayed on the data display for approximately 0.5 seconds, the data will be displayed.

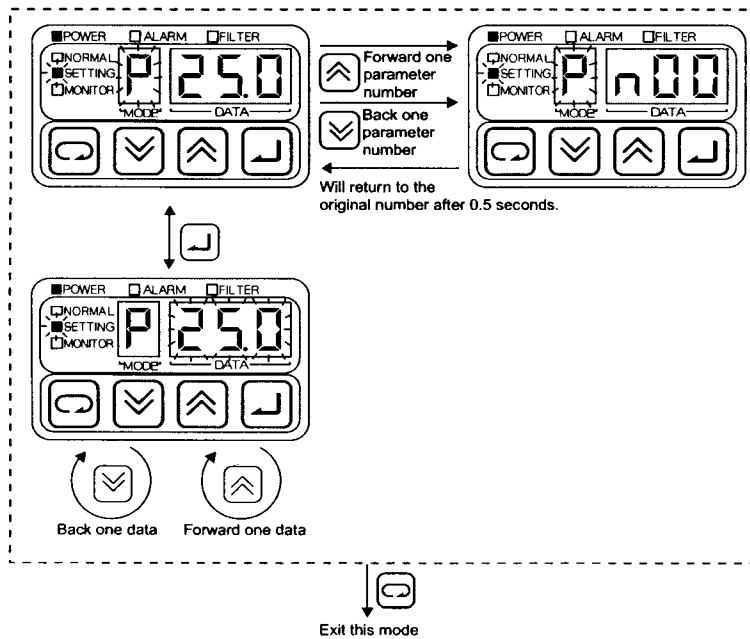
Pressing the  key will start the data display flashing.

The  and  keys will change the data, and the  will confirm the changes.

If the  key is pressed before confirming the data, the data will return to the original values.

Note: Some parameters become activated right away while others will only become activated after the power has been shut off and then turned back on.

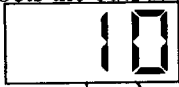
See the parameter list to see to which group the changed parameter belongs.



Parameter List

No.	Content	Min. value	Max. value	Initial set	Unit	AKZ	AKZS	Setting at re-operation	Remarks
n00	Filter sign setting time	0	9	3	100Hr	○	○		
n01	Logic of alarm output	0	11	0	—	○	○	○	
n02	Alarm level of option contact	0	3	0	—	○	○		
n03	Alarm level of option contact 2	0	2	0	—	○	○		
n04	Pump operation rate at ECO mode	30	100	50	%		○		
n05	Reserved	0	0	0	—				
n06	Gain of temp. control P (at low deflection)	1	999	216	—	○	○		The initial values vary depending on the models.
n07	Gain of temp. control I (at low deflection)	1	999	168	—	○	○		
n08	Gain of temp. control P (at high deflection)	1	999	216	—	○			
n09	Gain of temp. control I (at high deflection)	1	999	168	—	○			
n10	Warning setting 1	0	465	0	—	○	○		Refer to the section of Temperature Error Warning Function.
n11	Warning setting data 1	0	609	0	—	○	○		
n12	Warning setting 2	0	465	0	—	○	○		
n13	Warning setting data 2	0	609	0	—	○	○		
n14	Warning setting 3	0	465	0	—	○	○		
n15	Warning setting data 3	0	609	0	—	○	○		
n16	Warning setting 4	0	465	0	—	○	○		
n17	Warning setting data 4	0	609	0	—	○	○		
n18	Warning setting 5	0	465	0	—	○	○		
n19	Warning setting data 5	0	609	0	—	○	○		
n20	On/Off of parallel communication	0	1	0	—	○	○	○	Option part for communication to be prepared.

- n00: filter sign setting time
The filter cleaning sign lamp will light up on the display panel once the compressor's accumulated operating time exceeds the set amount of time.
Can be set in 100-hour intervals. For example, entering '3' will set it for 300 hours.
- n01: Logic of alarm output
Sets the output logic of alarms or warnings.



Output logic for alarm output(60,61,63)and warnings(66,67)on the signal wire terminal block.

Setting	Contact point	0			1 (2~9 run the same as 1)		
		When running normally	During power outage	When an alarm is generated	When running normally	During power outage	When an alarm is generated
alarm output	60-61	ON	OFF	OFF	OFF	OFF	ON
	60-63	OFF	ON	ON	ON	ON	OFF
Temperature range malfunction output (Warning output)	66-67	ON	OFF	OFF	OFF	OFF	ON

The output logic for the DOUT signal (communication extension PCB (an option) is necessary).
See the operating manual(SE03940) for the communication extension PCB for further details.

- n02: Alarm level of option contact
Sets the operation for the signal input to the optional protective device connection terminal (option) on the signal wire terminal block.
'0': does not use the option contact. (Factory setting)
'1': generates a level 1 malfunction when the option contact shuts off.
'2': generates a level 2 malfunction when the option contact shuts off.
'3': generates a level 1 malfunction if the option contact is still not on 30 seconds after the pump starts operating. (Flow-switch compatible)
[Note] Simply connecting a protective device to the option terminal will not run the protective functions.
This parameter must be set.
- n03: Alarm level of option contact 2
Sets the operation for the signal input to CN7 (option contact 2) on the temperature control P-board.
'0': does not use the option contact 2. (Factory setting)
'1': generates a level 1 malfunction when the option contact 2 shuts off.
'2': generates a level 2 malfunction when the option contact 2 shuts off.
[Note] Option contact 2 may be used as an option when the unit is sent from the factory.
- n04: Pump operation rate at ECO mode
Sets the proportion of the pump operation frequency to the commercial power frequency when in Eco mode.
Setting it to 100% will prevent switching to ECO mode operation.
[Note] Do not set a value lower than the oil flow amount necessary for your machine.
- n05: Reserved
This value is not effective now.
- n06: Gain of temperature control P (at low deflection)
- n07: Gain of temperature control P (at low deflection)
- n08: Gain of temperature control P (at high deflection) (for AKZ type)
- n09: Gain of temperature control P (at high deflection) (for AKZ type)
- n06~n09 set the temperature control gain.
AKZS: uses n06 and n07 for the whole control range.
AKZ : uses n06 and n07 when the difference in temperature between the control goal and the set temperature is small.
uses n08 and n09 when the difference in temperature between the control goal and the set temperature is large.
- n10, n12, n14, n16, n18: Temperature warning setting
Sets the selection of comparison for temperature warnings 1~5 as well as what action to be taken when the conditions are fulfilled.
See the chapter "Temperature Warnings" for further details.
- n11, n13, n15, n17, n19: Temperature warning setting
Sets the value for comparison for temperature warnings 1~5.
See the chapter "Temperature Warnings" for further details.
- n20: On/Off of parallel communication
Sets whether or not to carry out parallel communication with the main unit.
'0': does not carry out (factory setting)
'1': carries out
If you connect a communication extension P-board and set the parameter to '0', its parallel output will be used to output alarm status and temperature warnings individually.

7-3 Temperature warning function

This function notifies the customer that “the oil cooling unit needs inspecting” when the monitored temperature exceeds the set temperature range.

Five optional temperature detects can be set with the parameter, besides the temperature malfunction/protective function inside the unit.

Parameter setting

1) Setting the function setting parameters

Monitored item

0	Do not use the warning function
1	Machine body temperature [TH1]
2	Exiting oil temperature [TH2]
3	Room temperature [TH3]
4	Entering oil temperature [TH4]

Item to be compared

0	Do not use the warning function
1	Machine body temperature [TH1] ≥
2	Exiting oil temperature [TH2] ≥
3	Room temperature [TH3] ≥
4	Entering oil temperature [TH4] ≥
5	Absolutely ≥
6	Absolutely ≤

Action

	30X relay output	Low oil temperature protection	High oil temperature protection
0	×	×	×
1	○	×	×
2	×	○	×
3	○	○	×
4	×	×	○
5	○	×	○

2) Setting the data setting parameters

Differential temperature (K)
Setting temperature/temperature difference (°C)

3) Warning display

Malfunction warning lamp: goes off
Data display: flashes
Warning setting item + E flashes (first and second digits)

4) Setting example

For this example the function setting parameter is set to “323” and the data setting parameter to “4.1”.

Monitored item: Room temperature [TH3]

Item to comparison: Exiting oil temperature [TH2]

Action: 30X relay output, low oil temperature protection

Set temperature difference: 4°C

Differential: 1K

So, if the following formula

room temperature [TH3] – exiting oil temperature [TH2] ≥ 4(°C)

is fulfilled, then the warning will start, the 30X relay output will go off, the low oil temperature protection will start and the compressor will shut down.

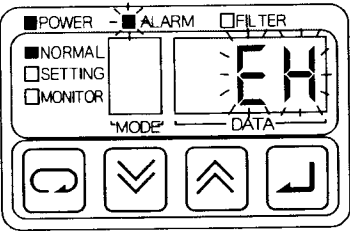
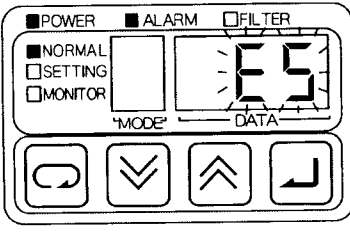
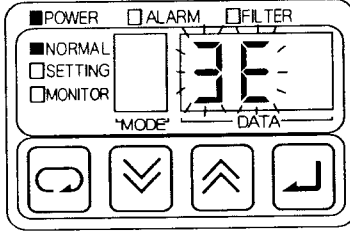
If, after these conditions have been fulfilled, the following formula
room temperature [TH3] – exiting oil temperature [TH2] ≥ 4-1(°C)
becomes true, then the warning will be disengaged.

5) Precautions

- ① Setting a value which is not included in the function setting parameters will deactivate that setting and it will not function.
- ② There are some function settings which although possible to set, are nevertheless impossible in reality, so exercise caution when making the settings.
- ③ If a malfunction occurs in the temperature sensor which has been set for warning, this will be treated as though the warning conditions had been fulfilled.
- ④ If the communication extension PCB(option) is connected, the individual warning status will be able to be detected at the main unit as DOUT. (Cannot be used simultaneously with the main unit communication function.)

7-4 Alarm display

When a malfunction occurs in the oil cooling unit, the content of the malfunction is displayed in the following three ways. It will also be output to the output contact. (See “5-6 Connecting the output contact”.)

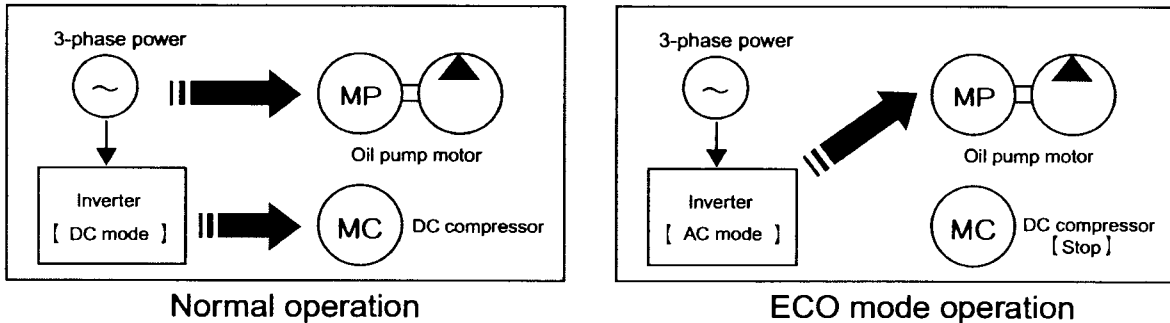
Failure level	Display	Running status	Output contact
High level alarm (level 1)	 <p>Malfunction warning lamp: flashes Data display: flashes Alarm code flashes (second and third digits)</p>	Oil circulation pump stops.	Output
Low level alarm (level 2)	 <p>Malfunction warning lamp: flashes Data display: flashes Alarm code flashes (second and third digits)</p>	Oil circulation pump operates, but the oil cooling unit stops.	Output
Warning (level 3)	 <p>Malfunction warning lamp: goes off Data display: flashes Monitored item +E flashes (first and second digits)</p>	The oil cooling unit continues to operate normally. But the temperature of monitored item is out of range.	See temperature warning function (7-3).

※ If more than one malfunction occurs at once, the malfunction with the highest level will be displayed.

8. DUAL MODE INVERTER FUNCTION

8-1 Functions

The dual mode inverter is a function which operates (ECO mode operation) the oil pump at a tower speed than the commercial power frequency, by using the inverter, which would normally drive the DC compressor, as an AC inverter when the compressor is stopped.



Precaution:

- This function is only available with AKZS type.
- Turning the dual mode inverter function on will stop the capacity control function with the electronic expansion valve, leading to a drop in accuracy for controlling oil temperature.
Check to make sure there is no problem with the oil temperature control system before use.

8-2 How to make the settings

The dual mode inverter function settings are made using parameters.

① ON/OFF setting

- To turn the dual mode inverter function on:
Set parameter n04 (pump operation rate at dual mode) to between 30% and 99%.
(Note) · Set a value which is not lower than the oil flow amount required by your machine.
 - If a flow switch is embedded, there is a possibility that it might improperly detect due to the discharge pressure drop. Keep this in mind when making the settings.
- To turn the dual mode inverter function off:
Set parameter n04 to 100%.

9. MAINTENANCE AND INSPECTION

9-1 Casing

- 1) Wipe the casing surface with a dry cloth. In any case, do not pour water directly. (When it is wet, which causes electricity leakage and fire.)
- 2) Do not use a brush, polishing powder, acid or solvents such as benzene, hot water, etc. because they will damage the paint.

9-2 Oil tank and suction strainer

- 1) Keep the proper oil level in a oil tank to prevent sucking in of air, etc.
Always keep the oil clean in the tank.
Periodically clean the suction strainer to prevent a reduction of oil flow volume to the pump caused by clogging dirt.

9-3 Air filter

- 1) Wash the air filter once every two weeks in a water below 40°C.
(Not only is air flow reduced, performance lowered and consumption up if the air filter is clogged with dirt and dust but the device to protect the compressor may be activated and smooth operation will not be possible.)
- 2) If operated without the air filter engaged, it may cause troubles.
- 3) Clean the condenser with a brush, air gun, etc. if it is very dirty.
(Wear gloves when working since the fin of the condenser is dangerous.)

9-4 For a prolonged layoff

- 1) Put a cover over the OIL COOLING UNIT to prevent dust or water from getting into the OIL COOLING UNIT.
- 2) Turn OFF the operation switch and main power.
- 3) Be careful that oil dust and dirt do not build up on the surface of the OIL COOLING UNIT condenser.

10.TROUBLE SHOOTING

If your oil cooling unit does not function properly, first check the following.

If the trouble persists, contact our service center and give a description of ① Model name, ② Production number (① and ② are shown on the machine nameplate) and ③ the condition of your machine (in as much details as possible).

10-1. When abnormal operation is suspected although an alarm is not raised

Item	Condition	Cause	Remedy
1	The unit does not work at all.(The power indicator lamp on the operation panel does not light up.)	① The main power is not supplied, or wiring to the power source (L1, L2) is disconnected.	○ Check the wiring to see that the power is supplied to the power terminal.
2	The pump does not run.	① The remote operation inputs [10] - [11] are off.	○ Check the connection of the remote operation inputs.
		② The unit is in operation lock mode.(The unit was shipped in operation lock mode.)	○ Release lock mode on the operation panel.
3	Oil does not flow although the pump is running. Low oil circulation with loud pump noise.	① Piping on suction side of the pump is loose.	○ Check the packing of the piping, and tighten the piping.
		② The suction strainer is clogged.	○ Clean the suction strainer. ○ Change the oil in the oil tank if it is dirty.
		③ The oil level of the oil tank is too low.	○ Replenish the oil tank with oil.
		④ Excessive pressure loss in the oil discharge piping causes pump relief to work.	○ Use a larger-diameter oil pipe and shorten the piping.
		⑤ Excessive pressure loss in the oil suction piping causes pump cavitation.	
4	The compressor does not run although the pump is running.	① Thermostat control stops the compressor.	---
		② Anti-restart timer for the compressor (30 sec.) is activated.	○ Make sure that the compressor starts after a lapse of time set by the timer.
		③ Low oil temperature protection (at an inlet oil temperature of 2 °C or below) is activated.	○ Make sure that the compressor functions normally at an inlet oil temperature of 5°C or higher.
		④ Low outside temperature protection (at an ambient temperature of -2°C or below) is activated.	○ Check that the compressor functions normally at an ambient temperature of 0°C or higher.
		⑤ Operation mode is set at mode 9 and at 0%.	○ Change to the proper operation mode.
5	Oil is not cooled although the pump and the compressor are running.	① There is an obstruction near the air inlet/outlet.	○ Remove the obstruction.
		② The air filter is dirty.	○ Clean the air filter.
		③ Ambient temperature is high, and drooping operation is performed.	○ See the catalog to check the capacity within the operating temperature range, and select a model with proper capacity.
		④ Heat load is too large.	
		⑤ Set temperature is too high.	○ Change to proper temperature setting.
		⑥ If the exhaust air temperature is almost the same as ambient temperature even though the compressor is running, refrigerant gas is in short supply.	○ Contact our service center.
6	The fan keeps rotating for some time even though the remote controller is turned off. (AKZ567, AKZX907)	① To reduce restarting time of the compressor, residual operation (about 60 sec.) is performed.	○ Make sure that the fan stops rotating when the residual operation time elapses after the compressor stops.(AKZ327 and AKZ437 are interlocked with pump operation because they are integral with a pump.)
7	Operation setting cannot be done.	① If "----" appears on the data display, a temperature sensor to be used in that operation mode is not connected.	○ Connect the temperature sensor first.
		② If "----" appears momentarily when the ENT key (far-right key) is pressed, the tamper-resistant switch is set to ON.	○ Turn the tamper-resistant switch (SW1) on the control circuit board to the OFF position.

10-2. When an alarm is raised

Alarm Code	Alarm Level	Description of Alarm	Cause	Remedy
AA	2	Heater is overheated (F2H; 51H) (Only for models with a heater)	① Oil does not flow.	Check if the oil hydraulic circuit is connected properly, and the pump is running normally.
			② The heater cannot be cut off. (The electromagnetic switch for heater (K1M) was fused.)	Contact our service center.
E1	1	System trouble	① Internal parameter is improper.	Contact our service center.
E3	2	High pressure switch (53PH; 63H) was activated.	① Oil temperature or ambient temperature is so high as to exceed specifications.	Use within operating temperature range.
			② There is an obstruction near the air inlet/outlet.	Do not place anything which may interfere with the air passage within 500 mm from the air inlet/outlet.
			③ The air filter is clogged, or the condenser is dirty.	Clean the air filter referring to Section 8 "Maintenance/Inspection".
			④ The fan is not running (AKZ567, AKZ907).	Contact our service center.
			⑤ Other than the above	Contact our service center.
E5	2	Compressor dome temperature bimetal (S2B; 49C) was activated.	① Oil temperature or ambient temperature is so high as to exceed specifications.	Use within operating temperature range.
			② There is an obstruction near the air inlet/outlet.	Do not place anything which may interfere with the air passage within 500 mm from the air inlet/outlet.
			③ The air filter is clogged, or the condenser is dirty.	Clean the air filter referring to Section 8 "Maintenance/Inspection".
			④ The fan is not running (AKZ567, AKZ907).	Contact our service center.
E6	2	Compressor (M2C) is locked.	① The compressor is out of order. (It must be replaced.)	Contact our service center.
E9	2	Broken wire in electronic expansion valve (Y1E)	① There is a broken wire in electronic expansion valve.	Contact our service center.
EH	1	Pump overcurrent relay (F1M; 51P) was activated.	① It has become overloaded due to use of high-viscosity oil.	Use operating oil having viscosity of 4 - 200mm ² /s at the oil temperatures within operating range.
			② Power supply voltage is lower than the operating range, and the pump current has increased.	Check if the power supply voltage is lower than the operating range. Also check if the power supply voltage drops for several seconds on startup of other machine.
			③ Pump motor wiring was broken. (Open-phase operation)	Contact our service center.
			④ Scuffing occurred in pump, or pump motor is out of order.	Contact our service center.
EJ	1	Locally provided protective device (OP.) was activated.	① Field-connected protective device (some unit products are connected at the factory) was activated.	Check the trouble detected by the protective device activated.
HI	2	Pneumatic/temperature sensor trouble (TH1: Machine body synchronous sensor) (TH3: Ambient temperature sensor)	① A break in a wire or short circuit occurred in a pneumatic sensor necessary for control.	Identify the sensor which is malfunctioning in monitor display mode on the operation panel ("99.9" will appear), and check the wiring.
FH	2	Inlet oil temperature exceeded 60°C.	① The heating value of the main unit exceeds the cooling capacity of the oil cooling unit. (Model selection error)	If the machine is installed properly, and the compressor is running with 100% capacity (you can check in monitor mode), select a size larger cooling capacity model.
			② Cooling capacity is degraded due to an obstruction near the air inlet/outlet.	Do not place anything which may interfere with the air passage within 500 mm from the air inlet/outlet.
FH	2	Inlet oil temperature exceeded 60°C.	③ The nominal point temperatures (ambient temperature 35°C, oil temperature 35°C) are exceeded, leading to drooping of the capacity.	If the nominal temperature is exceeded, cooling capacity drops below the nominal capacity due to drooping control. Make sure that the cooling capacity of the oil cooling unit exceeds the heating value of the main unit over the whole range of operating temperatures.
			④ Temperature control is not available because operation is performed in mode 9 (direct capacity command).	Operate in appropriate operation mode. (The direct capacity command mode does not perform feedback control of temperature.)
			⑤ No more refrigerant gas	If exhaust air temperature is almost the same as ambient temperature even though the compressor is running, the problem is suspected in refrigerant gas. Contact our service center.
JH	2	Oil temperature sensor trouble (TH2: Outlet oil temperature sensor) (TH4: Inlet oil temperature sensor)	① A break in a wire or short circuit occurred in an oil temperature sensor necessary for control.	Identify the sensor which is malfunctioning in monitor display mode on the operation panel ("99.9" will appear), and check the wiring.
L0	2	Inverter/compressor trouble	① The compressor or inverter is out of order.	Contact our service center.
LC	2	Transmission trouble between INV CPU and temperature control CPU	① Communication error occurred between the control P-board and the inverter P-board.	Contact our service center.
P1	2	Open phase, unbalanced power supply	① Open phase was detected in L3 phase.	Make sure that L3 phase is properly connected to the power terminal block.
			② There is unbalanced power supply voltage between phases.	Make sure that the difference in power supply voltages between phases does not exceed 10V.
			③ Other than ① and ②	Contact our service center.
U1	1	Negative phase power	① Power supply connection is performed in negative phase.	Replace two of the three phases in power wiring.
U2	2	Instantaneous interruption/undervoltage	① Power supply voltage is below 170V.	Check to see that the power supply voltage is as per the rated voltage. Also check if a voltage sag occurs on startup of peripheral equipment.
U9	2	Other system transmission trouble (Communication error between master and slave)	① Communication error occurred between the master and a slave.	Make sure that the communication line to the slave is connected normally. (This alarm is raised only when there is no response from a slave in master-slave communication.)
UH	2	System failure (EEPROM error)	① Trouble occurred in the parameter stored in the control P-board.	Contact our service center.
UJ	2	OP2 was activated.	① The factory-connected option protective device was activated. (For a model with a heater, an overcurrent protective device is activated [short circuit/ground fault in the heater].)	Eliminate the cause of activation of the option protective device. (For a model with a heater: Contact our service center.)
IE	-	Abnormal temperature range warning 1	① The temperature of the monitoring target exceeded the set range. (This is not a breakdown of the oil cooling unit.)	Check the setting of warning.
~				
SE	-	Abnormal temperature range warning 5		

11. NOTES FOR REPLACING OLDER MODEL (AKS'5' series and AKZ'6' series)

■ Alarm output

In the 7-series, alarm output (30Z) of the previous models is not used any more.

When you are using 30Z, you can change the 30Y output to the same output as 30Z by parameter setting. Please take this procedure. (Note that the compatibility of terminal block number will be lost.)

The terminal block numbers [64] and [65] which were used as the 30Z output previously are now used as the alarm level output. So, take care not to perform improper wiring.

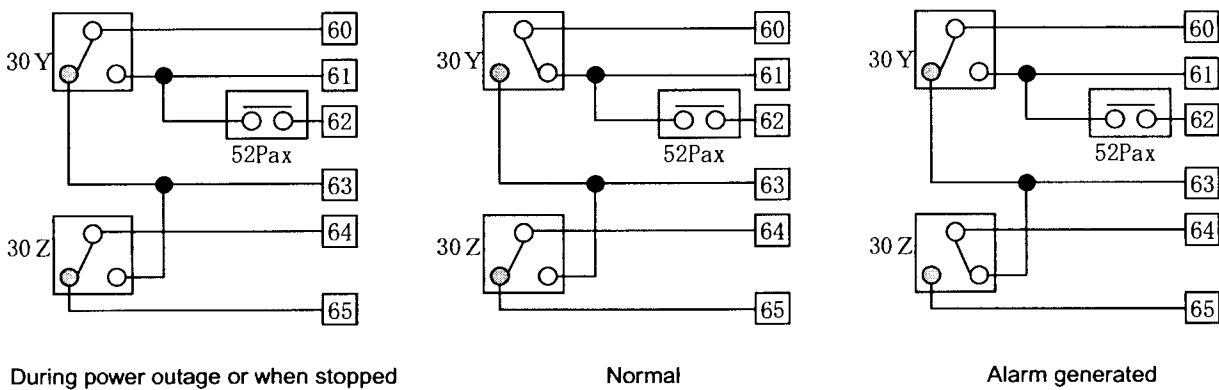
See the chapter [Alarm output] for the output circuit for the 7 series.

Parameter value	7 series terminal	Meaning of the signal	6 series compatibility	6 series terminal
0	60 ↔ 61	No malfunction and lock off.	◎	60 ↔ 61
0	61 ↔ 62	Pump running.	◎	61 ↔ 62
0	60 ↔ 62	No malfunction and pump running.	◎	60 ↔ 62
0	60 ↔ 63	Malfunction or power outage or locked.	◎	60 ↔ 63
1	60 ↔ 61	Malfunction or locked.	○	64 ↔ 63
1	60 ↔ 63	(No malfunction and lock off) or power outage	○	64 ↔ 65

◎: Full compatibility

○: Signal function compatibility (without terminal block number compatibility)

Reference: Previous model alarm output circuit



■ Dealing with the high oil temperature alarm [FH]

Previously, the high oil temperature alarm had been treated as a [level 1] malfunction, so that the pump would stop running when it was generated. With the 7 series, however, it has been reassigned as a [level 2] malfunction, under which the pump continues running, in order to protect the main unit.

■ Deletion of the timer operation function

The heater has not been included as a standard on the 7 series. If you consider one necessary, please tell us separately.

12. REFERENCE

12-1 Connection piping size

	AKZ(S)147	AKZ(S)257·327·437	AKZ(S)567·907
Oil inlet	Rc3/4 (female)	Rc1 (female)	Rc1 1/4 (female)
Oil outlet	Rc3/4 (female)	Rc1 (female)	Rc1 1/4 (female)
Oil drain	UNF 7/16-20 (male)		
Oil pan drain	Rc3/8 (female)		

12-2 Quick reference table of pipe sizes and maximum pipe

(Inlet piping)

unit : m

Model \ Size (mm)		Rc3/4 (φ 19)	Rc1 (φ 25.4)	Rc1·1/4 (φ 31.8)	Rc1·1/2 (φ 38.1)
AKZ(S)147	50Hz	2.1	6.3	(15)*1	—
	60Hz	1.7	5.1	(12)*1	—
AKZ(S)257 327 437	50Hz	—	2.8	6.7	—
	60Hz	—	2.3	5.5	—
AKZ(S)567 907	50Hz	—	—	5	10
	60Hz	—	—	4	8

Conditions: ISO VG32, Viscosity 300mm²/S (Oil temperature 0°C)

* 1. The description may not be applicable depending on specifications of the piping.

Please consult with us in such a case.

* 2. Please refer to the calculation formula for piping resistance.

Calculation method of piping resistance

When size of the oil pipe is to be determined, calculate the piping resistance according to the following formula.

Piping resistance: $\Delta P = 6.07 \times v \times Q \times L / D^4$

(However, this is the case when normal hydraulic fluid and lubricating oil are used.)

v : Coefficient of kinematic viscosity (mm²/S) --- Refer to

viscosity/Temperature Chart

Q: Flow rate (/min.)

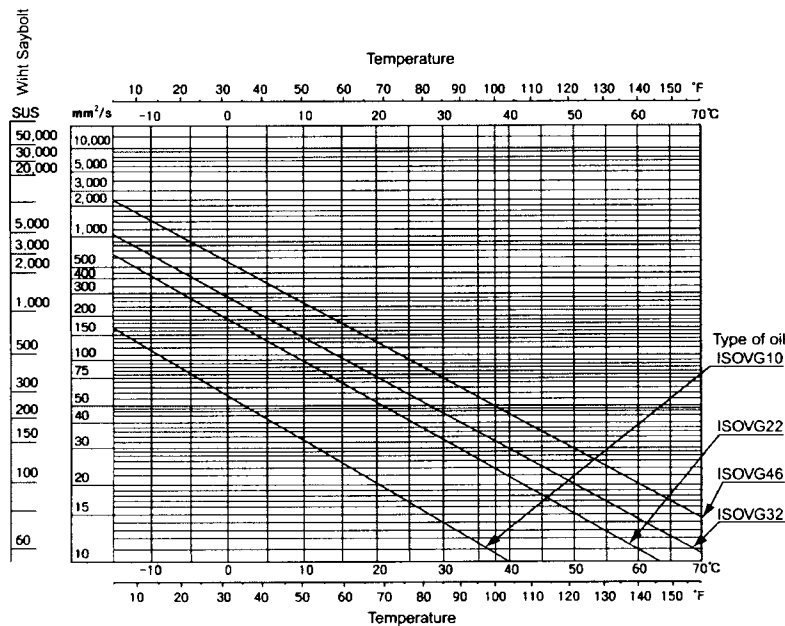
L: Piping length (m)

D: Internal diameter of pipe (mm)

(Outlet piping)

unit : m

Model \ Size (mm)		Rc1/2 (φ 12.7)	Rc3/4 (φ 19)	Rc1 (φ 25.4)	Rc1 1/4 (φ 31.8)
AKZ(S)147	50Hz	4.2	21	*2	—
	60Hz	3.4	17	*2	—
AKZ(S)257 327 437	50Hz	1.8	9	28	—
	60Hz	1.4	7	23	—
AKZ(S)567 907	50Hz	—	—	20	48
	60Hz	—	—	16	40



DAIKIN

DAIKIN INDUSTRIES,LTD.

Oil Hydraulics & Lubrication Div.

URL : <http://www.daikin.co.jp>

OSAKA Esaka Bldg.,21-3, Tarumicho,
3-chome, Suita City, Osaka, 564-0062 Japan
Tel.06(6378)8763 FAX.06(6378)8737

TOKYO Mitsuboshi 3rd Bldg.,13-6, Iwamotocho,
2-chome, Chiyoda-ku, Tokyo, 101-0032 Japan
Tel.03(5822)5431 FAX.03(5822)5434

NAGOYA Nagoya Bldg.,17, Shirakabe,1-chome,
Higashi-ku, Nagoya City, 461-0011 Japan
Tel.052(955)0750 FAX.052(955)0749

HIROSHIMA 9-7, Ohsu,5-chome,
Minami-ku, Hiroshima City, 732-0802 Japan
Tel.082(282)1151 FAX.082(282)9611

FACTORY SOLUTION GROUP
Esaka Bldg.,21-3, Tarumicho,
3-chome, Suita City, Osaka, 564-0062 Japan
Tel.06(6378)8779 FAX.06(6378)8738
E-mail: hyd_eco@daikin.co.jp

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