DAIKIN OIL COOLING UNIT INSTRUCTION MANUAL

HP	MODEL NAME
1/3	AKS35AK Series
1/2	AKS55AK Series
1	AKS105AK Series
2	AKS205AK Series

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.

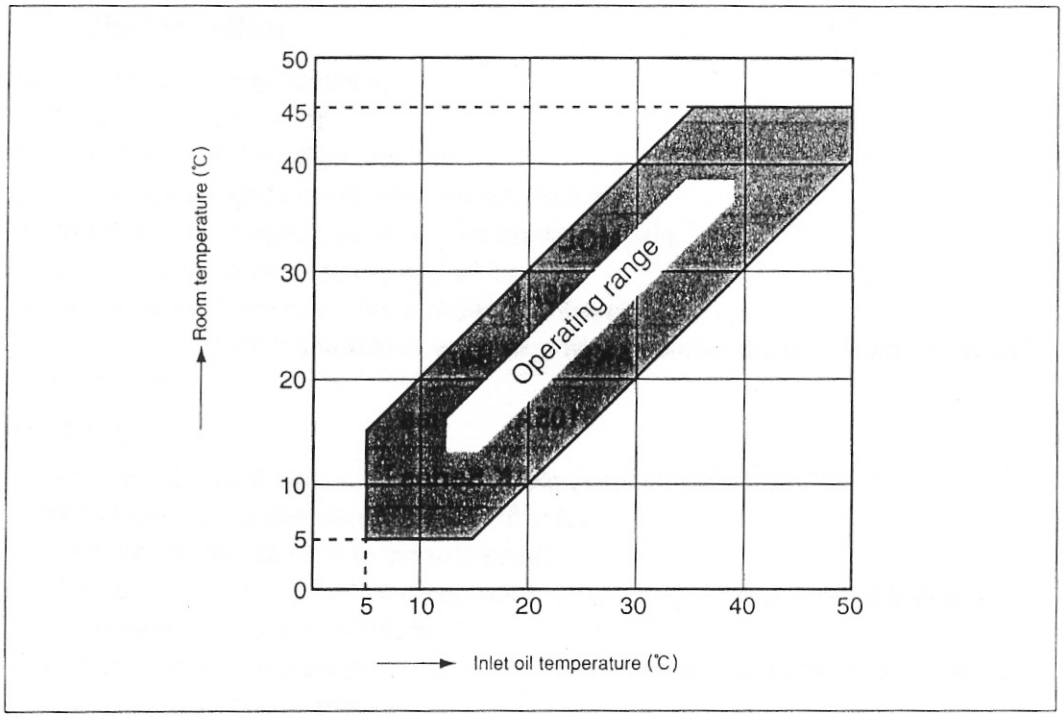
CONTENTS

1 CAUTIONS IN GENERAL

1-1 Operating range

Since Oil Cooling unit is a refrigeratior machine, the operative room and oil temperatures are limited.

Use Oil Cooling Unit in the range shown below.



1-2 Acceptable oils

Hydraulic fluids (of mineral oil origin) and lubricating oil shall be used for this unit.

Therefore, the followng 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 and 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, gasoilne, etc.

2 CAUTIONS FOR INSTALLATION

2-1 Installation location

- Install in the following locations.
  1) On a solid and flat floor.
  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 ares.

2-2 Oil piping

1) •Suction (Oil inlet) side.....—230~0mmHg (Vacuum pressure)
   •Discharge (Oil outlet) side.....3kgf/cm^2 or less.
   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.

2-3 Suction strainer (Line Filter)

Dirt trapped in the evaporator of Oil Cooling Unit causes not only reduction of cooling capacity but also trouble with the compressor and oil pump. Consequently, attach a 100~150 mesh suction strainer that causes little pressure loss in the suction end of the oil piping.

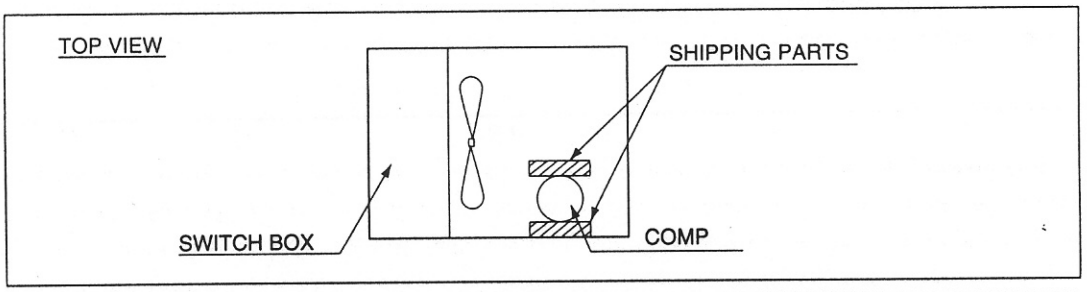
2-4 Oil tank

In order to intermix hot oil returned from a machine with cool oil from the Oil Cooling Unit uniformly, carefully design the partitions, piping, etc. in the tank. In addition, keep the lowest level in the oil tank, which is higher than the oil inlet and outlet and outlet to prevent air from being intermixed with oil.

Model	AKS35	AKS55	AKS105	AKS205
Tank capacity	20ℓ	60ℓ	100ℓ	200ℓ

2-5 Shipping Parts for Transport

If this unit has shipping parts, take away them before operation.
(If operated with the material attached, it causes foreign noise.)



3 ELECTRICAL WIRING

- The supply connection should be made in accordance to the National Wiring Regulations.
- In the supply, near to the appliance, should be an all pole switch for disconnect the appliance from the supply. The contact separation between the open contacts should be at least 3 mm.
- For electric wiring work, refer to the electric wiring plate attached to the back side of switch box cover.
- Do not change the wirings nor operate the electromagnetic swiches manually inside the OIL COOLING UNIT.

3-1 Power source capacity (3 phase)

Rated voltage	Power source capacity (KVA)			
	AKS35	AKS55	AKS105	AKS205
50Hz, 200Volts	1.2	1.7	2.3	4.7
60Hz, 220Volts	1.3	1.9	2.6	5.0

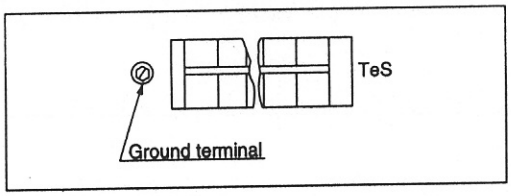
3-2 Circuit breakers

Since standard models, do not equipped the main power over-current circuit breaker be sure to install the breaker given in table below.

MODEL	AKS35, 55, 105	AKS205
Rated current of earth leakage circuit breaker	10A or 15A	15A or 16A

3-3 Grounding and power source connection

1) Remove the switch box cover.
2) Pass the main power wires and ground wire (600V PVC insulated power wire, 2mm^2 or more) through the power wiring supply hole (Φ27mm) in the left or right side panel and into the switch box.
3) Connect the ground wire to the ground terminal.

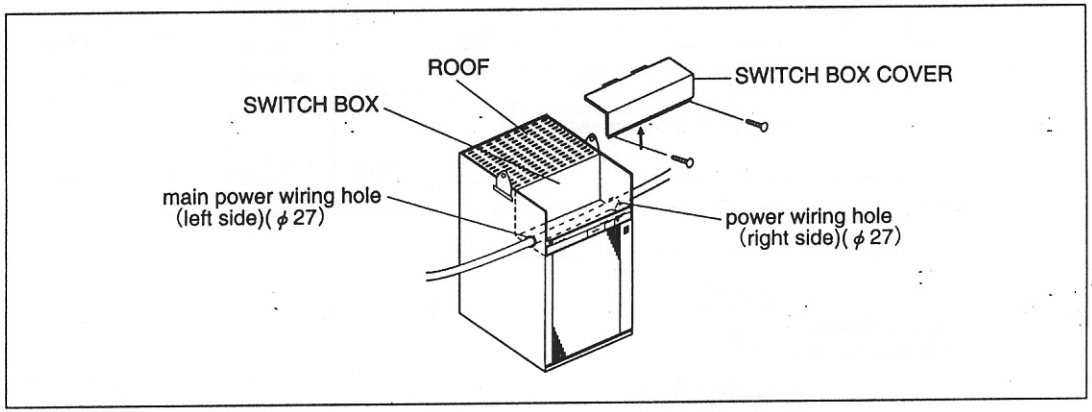


4) Connect main power source wired R, S and T to the corresponding R, S and T on the terminal strip (TeS).

■ Wiring procedure

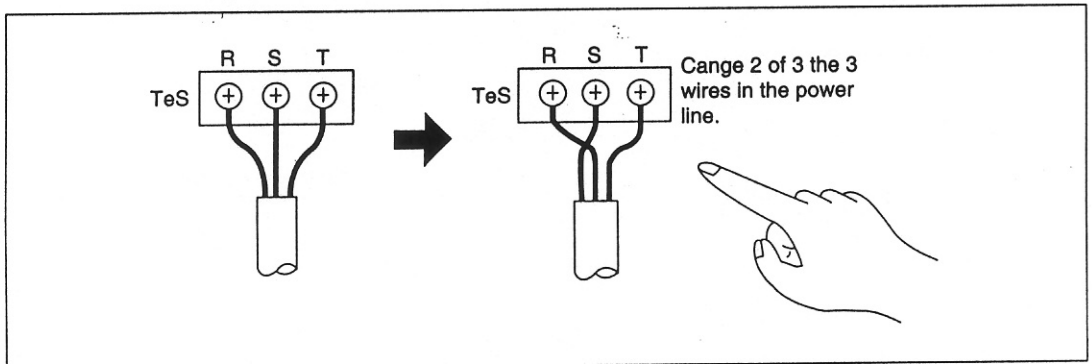
1) Standard model

It is able to drow the main power source wires from any side of the unit. In the case of the right side, pass the main power source wires through the power wiring hole in the right side pannel and hole in rear of switch box.



3-4 Changing wires for reverse phase

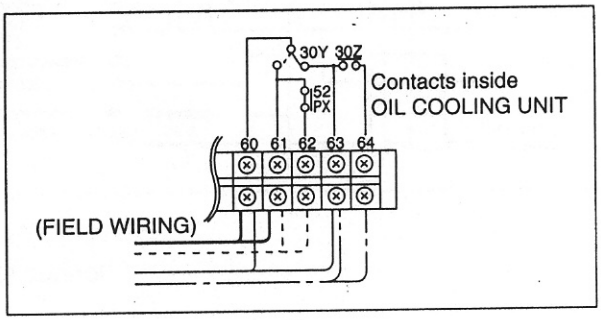
When the power source is connected to the reverse phase. Change the two wires; R and T, as shown in the Fig. below. If in reverse phase, an alarm display is indicated on the control panel by the individual abnormality display function .



3-5 Outside output connections

Outside output connection are as shown in the figure below.
Please use connecting terminals on necessity.

Output signal	Wiring Symbols (Shown Below)	Operation mode / Operation switch (BS) / Connecting Terminals	Stopping	Normal Operation	Abnormal (Protection device on)	Normal Operation	Power Failure	Normal Operation
			ON	RESET →	ON			ON
Operation	———	Between 60-61	OFF	ON				
Stopping	———	Between 60-63	ON	OFF				
Pump Operation	- - - -	Between 61-62	OFF	ON	OFF (Protective device against high oil temperature actuated. (51P) is actuated.)			
Abnormal	——·——	Between 63-64	OFF		ON			



3-6 Remote control

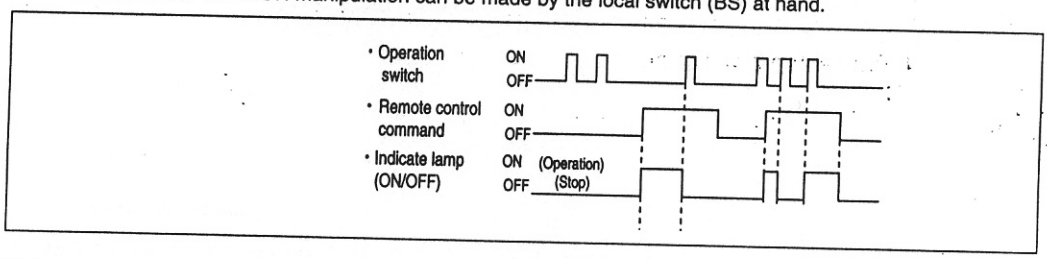
1) AUTO/MANUAL Switch

It is able to select a operation method by AUTO/MANUAL swicth (SW1……refer to P.28) on the control circuit board.

AUTO/MANUAL Switch	AUTO		MANUAL	
Operation Manipulation	Power source ON/OFF	Remote ※1 Control 1	Remote ※2 Control 2	Local Operation Switch

※1 In this case, it is not able to control the unit by local switch (BS).

※2 When operation is to be made by remote control, the operating command by the remote control supersedes others. However, when the remote control command is ON, and AUTO/MANUAL switch is set on the MANUAL side, STOP/OPERATION manipulation can be made by the local switch (BS) at hand.



2) Wiring procedure

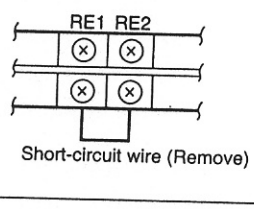
Wire as indicated below for remote control.

Parts to be prepared.

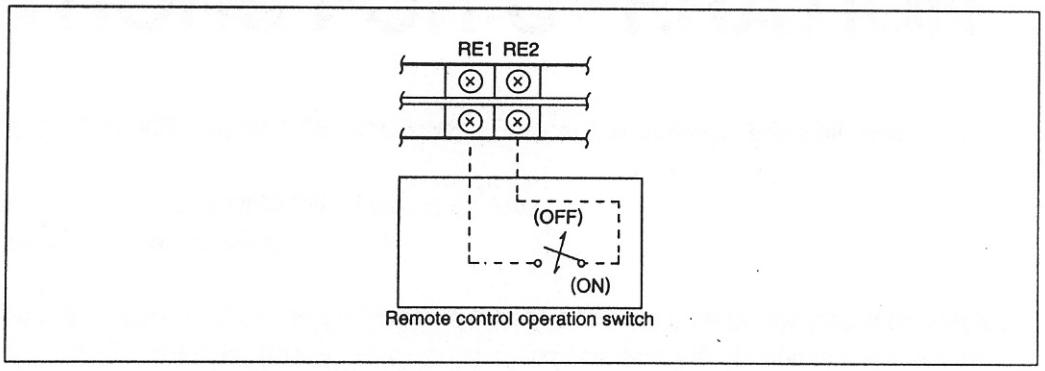
Part	Wiring material
Single-pole, single-throw remote control switch or "a" contact capable of transmitting control signal.	600V PVC insulated wire (IV) 2mm² min. (electrical work)

1) Remove the switch box cover.

2) Remove the short-circuit wire (terminal Nos.[RE1]-[RE2]) from the terminal strip inside the switch box. Refer to the layout on the electrical schematic plate attached to the back of the front panel. (Refer to the figure below.)



3) Connect Nos. [RE1] and [RE2] on the terminal strip with the remote control operation switch or "a" contact capable of transmitting a control signal. (Refer to the figure below.)



4) Put switch box cover.

4 CAUTIONS FOR OPERATION

4-1 **NEVER RUN WITHOUT OIL IN THE MACHINE.** (This causes damage to the oil pump, etc.)

4-2 Prevent air from being mixed into the oil piping system.
(If air is mixed in, it causes noise)

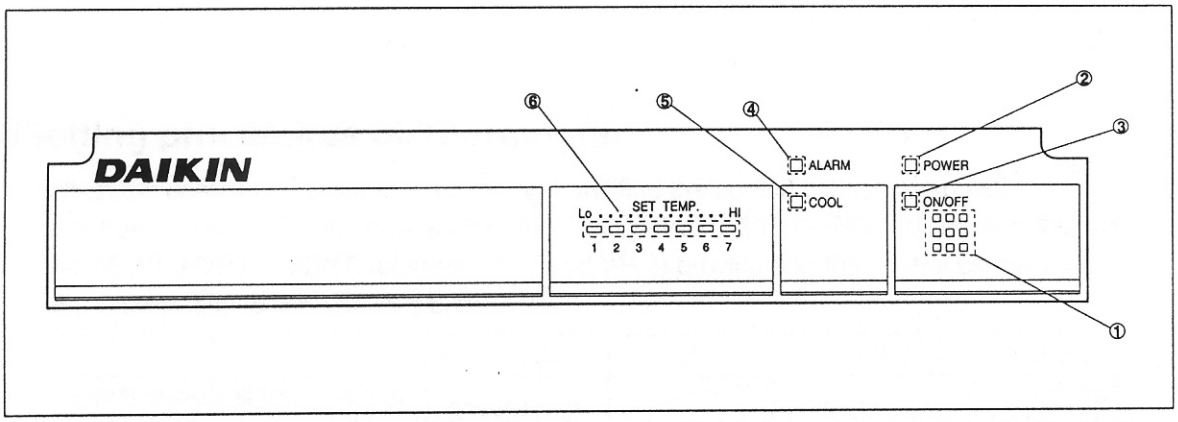
4-3 When using high viscosity oil and large pressure loss in oil piping change the piping so that the pressure loss will be reduced. (Please refer to the reference item.) If this unit is used in such a way than exceeds its if this unit is used than the exceeding operating range, it may cause noise or troubles. Please pay attention to if this unit is used than the exceeding operating range.

4-4 Since the deley timer is installed, the OIL COOLING UNIT will not start again immediately after it was stopped in order to protect the compressor from being overloaded. This is normal and does not indicate any problem with the OIL COOLING UNIT.

4-5 The thermostat controller adjusts entering oil temperature of the OIL COOLING UNIT.

4-6 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.

5 NAMES, FUNCTIONS AND OPERATIONS ON CONTROL PANEL



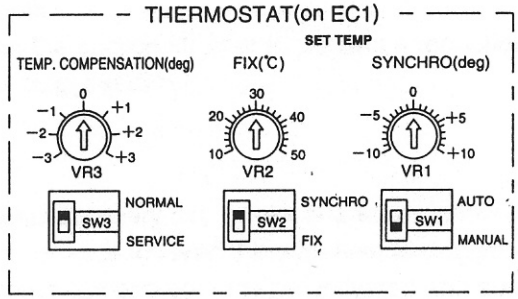
NO.	Name	Functions and actuations
(1)	Operation switch(BS)	This is the ON/OFF switch of power supply for operating circuits. Operating manipulation can be made by this switch when remote control command (between [RE1] and [RE2]) is ON, and AUTO/ MANUAL switch is set on the MANUAL side. [The remote control command is shortcircuitted (under ON condition) as factory set.]
(2)	Indicator lamp (power-white)	When power is supplied, this indicator lamp is lit. At this stage, the OIL COOLING UNIT is not under operating condition yet.
(3)	Indicator lamp (operation-green)	When this indicator lamp is lit, it indicates that the OIL COOLING UNIT is in normal operation. At this stage, the pump operates.
(4)	Indicalor lamp (abnormality-red)	This indicator lamp lights up or flickers when an abnormality occurs. At this time, refer to Troubleshooting Guide (P.31, 32 and P.33) and check various positions.
(5)	Indicalor lamp (Compressor operation -green)	When this indicator lamp is lit, it indicates that the compressor is normal operation. (However, it does not relate to the pump's operation.)
(6)	Indicalor lamp (oil temperature-green)	When the unit is under normal condition, this indicator lamp displays entering oil temperature level. (This lamp is lit under normal condition.) If under an abnormal condition, this indicator lamp displays individual abnormality. (This lamp flickers under abnormal condition.) Refer to Troubleshooting Guide (P.31, 32 and P.33) and check various positions.

■Setting procedures of Thermostat

When the control box cover is removed, you will find the control curcuit board (EC1) on right side from the front. Set the temperature level by operating SYNCHRO/FIX switch (SW2) and the TEMP. ADJUSTMENT volumes (VR 1 and VR 2) provided on the control curcuit board (EC1) according to the following procedure.

	SW 2	VR 1	VR 2	※VR 3
Synchronous oil temperature control type	SYNCHRO.	−10～+10℃ (at any point)	(indifferent)	−3～+3℃ (at any point)
Fixed oil temperature control type	FIX	(indifferent)	10～50℃ (at any point)	−3～+3℃ (at any point)

※ It is able to correct the setting value of the TEMP. ADJUSTMENT volumes (VR1. VR2) in the range of −3(deg) to +3(deg) by the TEMP. COMPENSATION volume (VR3).



6 MAINTENANCE AND INSPECTION

6-1 Repair work with safty

This OIL COOLING UNIT has been manufactured under strict quality control in our factory but if it is necessary for repair (parts replacement, etc.), the following cautions should be observed.

1) Turn OFF the operation switch, and power source.
   After switching over to service side of SW3 on control circuit board.
2) Fire may be used for repair work, so dismount the OIL COOLING UNIT from the machine and drain all oil. Furthermore, choose a place of no danger of fire and a well ventilated place where there is no danger of suffocation caused by the release of the refrigerant.

6-2 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 poweder, acid or solvents such as benzene, hot water, etc. because they will damage the paint.

6-3 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.
2) Periodically clean the suction strainer to prevent a reduction of oil flow volume to the pump caused by clogging dirt.

6-4 Air filter

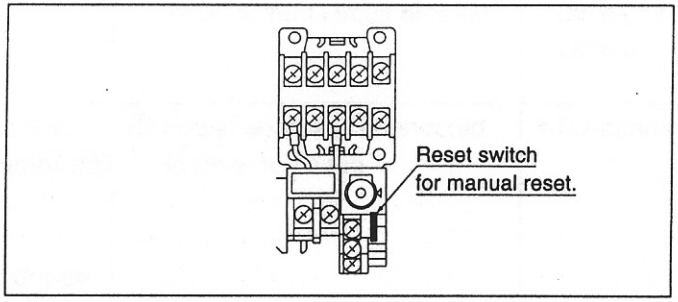
1) Wash the air filter once every two weeks in a water below 40℃. (Not only is air flow reduced and performance lowered if the air filter is clogged with dirt and dust but the device to protect the compressor may be activated and smooth operation will not be possible)
2) If operated without the air filter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

6-5 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 caraful that oil dust and dirt do not build up on the surface of the OIL COOLING UNIT condenser.

6-6 When the protective device works.

1) If something abnormal occurs (protection device function), are reset when main power source is turned OFF of once NORMAL/SERVICE swicth is set on the SERVICE side. Refer to the Troubleshooting Guide (P.31,32 and P.33) and take the required countermeasures.
2) For circuit breaker (CB):
   If the CB is activated, there is a short-circuit in the operation circuit. Check and repair and then set the handle (gray) to the ON side.
3) For fan and pump motors (51P). (manual reset type)
   If 51P is activated, solve the cause of the problem and then push the reset bottons (51P-green).



6-7 Pressure Level Check

1) Use the oil pressure gauge port Rc 1/8 (plug-in type with hexagonal hole), for checking inlet pressure levels of the OIL COOLING UNIT.

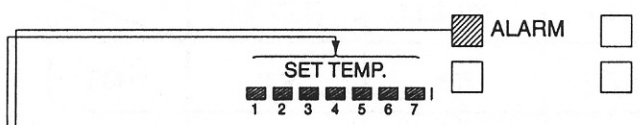
7 TROUBLESHOOTING GUIDE

Check the following if the OIL COOLING UNIT does not function properly.
If the OIL COOLING UNIT still does not function properly, contact our office and give the following particulars: (1) model, (2) manufacturing No. [(1) and (2) are on the machine nameplate], (3) condition of the machine (as much detail as possible.)

Item	Condition	Cause	Remedy
1	Power is ON but power indicator lamp (white) does not light up.	① Power indicator lamp does not light up.	• Replace indicator board (EC2)
		② Control circuit fuse is blown.	• Replace fuse. • Check and repair the short-circit points in the operation circuit.
		③ Control circuit breaker is OFF. [model with main power over-current circuit breaker]	• Turn the circuit breaker ON. • Check and repair the short-circit points in the operation circuit.
2	Power is ON but an abnormality lamp(red) flickers. (1) Protective device against reverse phase actuated	① Power source is connected to reverse phase	• Re-connect 2 phases out of 3
3	Pump runs but no oil flow. Low oil circuation, with air suction and loud pump noise.	① Oil piping on suction side is loose.	• Check if the suction piping is tight. Tighten if-not tight.
		② Suction strainer is clogged.	• Clean the suction strainer. • Change the oil in the oil tank if it is dirty.
		③ Tank oil level is too low.	• Eliminate the cause of the drop in oil level and add oil.
		④ Excessive pressure loss in the oil piping causes relief valve actuation and pump cavitation.	• Use larger diameter pipe and shorten the piping.

Item	Condition	Cause	Remedy
4	Pump runs but compressor does not.	① Thermostat functions properly and stops the compressor.	• Set the thermostat to the low temperature side and check if the compressor starts. The compressor won't start if oil temperature is too low. Wait until oil temperature rises.
		② Thermostat (delay timer 105±15 sec, setting) is activated.	• Reset the timer and check if the compressor starts.
		③ Thermostat is damaged.	• Replace thermostat.
5	Compressor worked but the pump and compressor stopped without the power and abnormality display lamp lighting up.	① Power is off.	• Check the main power source.
6	Compressor worked but an abnormality signal was output and the abnormality display lamp lit up. (1) An abnormality took place at the thermistor	① The thermistor is broken. ② Wiring of the thermistor is shortcircuitted or dislocated.	• The thermistor must be replaced. Carry out wiring connections correctly.
	(2) Protective thermostat for high oil temp is actuated.	③ Oil temperature is abnormally high.	• Suspend operation until oil temperature goes down.

Item	Condition	Cause	Remedy
6	(3) Compressor protection thermostat (49C) is actuated. (4) Compressor motor overcurrent relay (51C) is actuated. (5) High pressure switch (63H) is actuated. (6) Fan and pump motor overcurrent relay (51P) is actuated.	④ The air filter is clogged.	• Clean the air filter.
		⑤ There are obstacles near the suction/exhaust ports.	• Remove the obstacles.
		⑥ Ambient (room) temperature is too high.	• Use the unit within its operation range. If there is a heat source, remove it.
		⑦ Oil temperature is too high.	• Use at low oil temperature.
		⑧ Compressor does not run.	• Compressor must be replaced (service).
		⑨ Oil viscosity is too high.	• Replace with lower viscosity oil.
		⑩ Same as 3-④	• Same as 3-④
	(7) An abnormality took place at the control circuit board (EC1)	⑪ The control circuit board is out of order.	• The control circuit board must be replaced.



TROUBLE DIAGNOSIS FANCTION
☼ : LIGHTING ◑ : FLICKER

ALARM(RED)	◑	☼	☼	◑	☼	☼	☼	◑	☼
No. OF PILOT (GREEN LAMP)	——	◑ 1	◑ 2	◑ 3	◑ 5	◑ 6	◑ 7	◑ ◑ 6 7	◑ ◑ ◑ 5 6 7
FAILURE MODE	POWER SOURCE	Th-A	Th-O	OIL TEMP HIGH	49C	51C	63H	51P	EC1
	Reverse phase.	Room thermister is broken.	Oil thermister is broken.	Protective device against high oil temperature actuated.	Compressor protection thermostat (49C) is actuated.	Compressor motor overcurrent relay (51C) is actuated.	High press. switch (63H) is actuated.	Fan and pump motor overcurrent relay (51P) is actuated.	An abnormality took place at the control circuit board (EC1)

7	Pump, compressor and fan run but oil is not cooled. IS COLD ?	① Same as 6-④ to ⑦	• Same as 6-④ to ⑦
		② Same as 3.	• Same as 3.
		③ Over-loading.	• Eliminate the cause of overloding.
		④ Setting of thermostat too high.	• Set it properly.
		⑤ Lack of refrigerant gas.	• Recharge (refrigerant gas).

8 REFERENCE

8-1 Connection piping size

	AKS35	AKS55	AKS105	AKS205
Oil inlet	Rc 1/2 (female)	Rc 3/4 (female)	Rc 1(female)	Rc 1•1/4 (female)
Oil outlet	Rc 1/2 (female)	Rc 3/4 (female)	Rc 1(female)	Rc 1•1/4 (female)
Oil drain	Rc 1/4 (male)			
Oil pan drain	Rc 1/2 (female)			

8-2 Quick reference table of pipe sizes and maximum pipe (When hoses for low pressure are to be installed)

(Inlet piping)

unit : m

model \ size(mm)		Rc 1/2 (¢12.7)	Rc 3/4 (¢19)	Rc 1 (¢25.4)	Rc1•1/4 (¢31.8)	Rc1•1/2 (¢38.1)
AKS35	50Hz	0.9	4.5	(13.5) *1	–	–
	60Hz	0.8	4.0	(12) *1	–	–
AKS55	50Hz	–	2.1	6.3	(15) *1	–
	60Hz	–	1.7	5.1	(12) *1	–
AKS105	50Hz	–	–	2.8	6.7	–
	60Hz	–	–	2.3	5.5	–
AKS205	50Hz	–	–	–	5	10
	60Hz	–	–	–	4	8

** Conditions : ISO VG32, Viscosity 300 mm^2/S (Oil temperature 0℃)

*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 resisitance.

Calculation method of piping resistance

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

Pipig resistance : $\Delta P = 6.07 \times \nu \times Q \times L \times D^4$

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

ν : Coefficient of kinematic viscocity (mm^2/S)-Refer to a viscocity/Temperature Char

Q : Flow rate (ℓ/min.) L : Piping length

D : Internal diameter of pipe (mm)

(Outlet piping)

unit : m

model \ size(mm)		Rc 1/2 (¢12.7)	Rc 3/4 (¢19)	Rc 1 (¢25.4)	Rc1·1/4 (¢31.8)
AKS35	50Hz	9	*2	*2	–
	60Hz	8	*2	*2	–
AKS55	50Hz	4.2	21	*2	–
	60Hz	3.4	17	*2	–
AKS105	50Hz	1.8	9	28	–
	60Hz	1.4	7	23	–
AKS205	50Hz	–	–	20	48
	60Hz	–	–	16	40