

取説サイン用表紙



本文は 1/21頁以降

ダイキン OIL COOLIG UNIT  
取扱説明書

IP	掲載機種名
1	AKS100T, AKS100T-F69A

ダイキン工業(株)油機技術部

H7.9.5

承認	照査	担任	作成
			後藤

# INSTRUCTION MANUAL

## DAIKIN OIL COOLING UNIT

HP	MODEL NAME
1	AKS100T AKS100T-F69A AKS100T-F76A

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# 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.

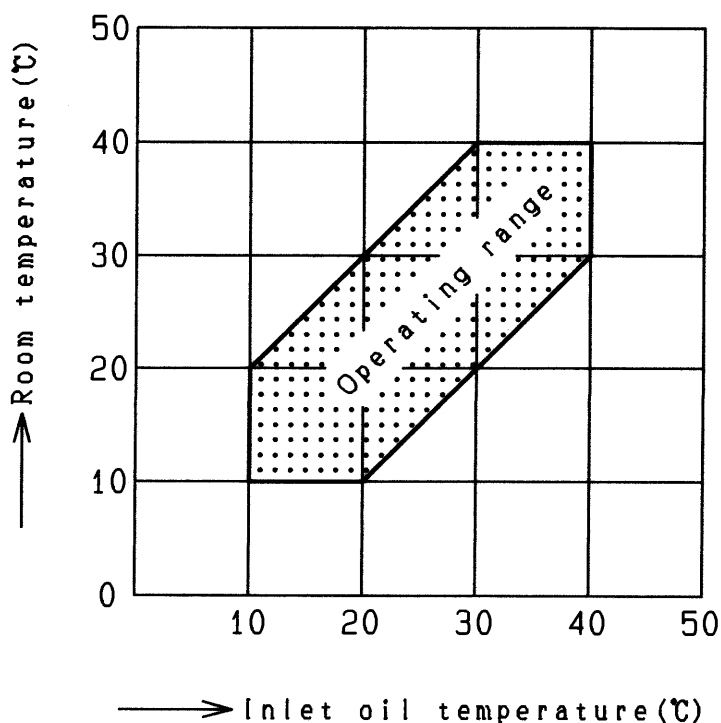
After persuading, please keep this with the spares.

## 1. CAUTIONS IN GENERAL

### 1-1 Operating range

The operative room and oil temperatures are limited.

Use Oil Cooling Unit in the range shown below.



### 1-2 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 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, gasoline, 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 area.

### 2-2 Oil piping

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

### 2-3 Oil tank

Be sure to keep the oil level over the lower line (red) of the oil gauge.

There may cause trouble in case the oil level is under it.

Tank capacity	35L
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### 3. ELECTRICAL WIRING

ⓐ For electric wiring work, refer to the electric wiring plate attached to the back side of the roof

ⓑ Do not change the wirings nor operate the electromagnetic switches manually inside the Oil Cooling Unit.

#### 3-1 Power source capacity

(Unit:KVA)

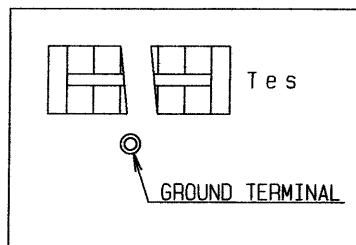
Rated voltage	AKS100T	AKS100T-69A
Three phase, 200Volts	2.5	2.5
Three phase, 220Volts	2.8	2.8

#### 3-2 Circuit breakers

Since this Oil Cooling Unit do not equipped the main power over-current circuit breaker, be sure to install the breaker of rated current 15A. (at 200V, 50/60Hz)

#### 3-3 Grounding and power source connection

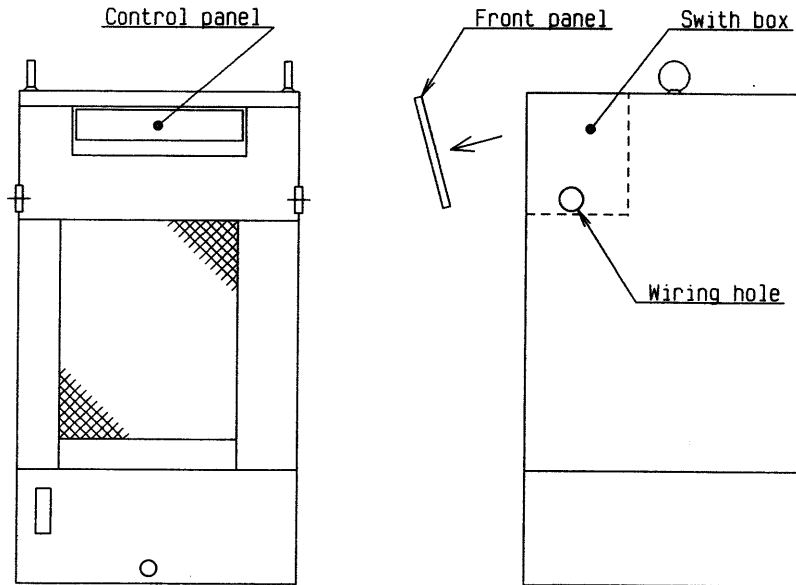
- 1) Remove the front panel.
- 2) Pass the main power wires and ground wire (600V PVC insulated power wire,  $2\text{mm}^2$  or more) through the power wiring supply hole ( $\phi 27\text{mm}$ ) in the left or right side panel and into the switch box.
- 3) Connect the ground wire to the ground terminal.



- 4) Connect main power source wires R, S and T to the corresponding R, S and T on the terminal strip.

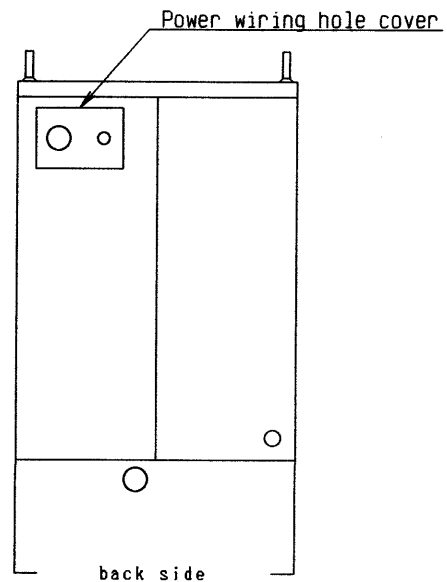
**【Wiring procedure】**

1) Remove the front panel, (it is able to draw the main power source wires from any side of the unit.)



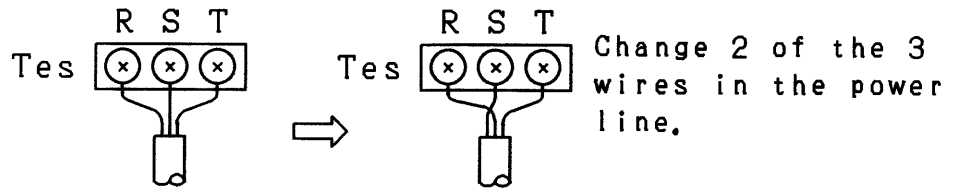
\*AKS100T-F69A.

Draw the main power source wires after removing the power wiring hole cover on the back side of the unit.



2) Changing wires for reverse phase

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

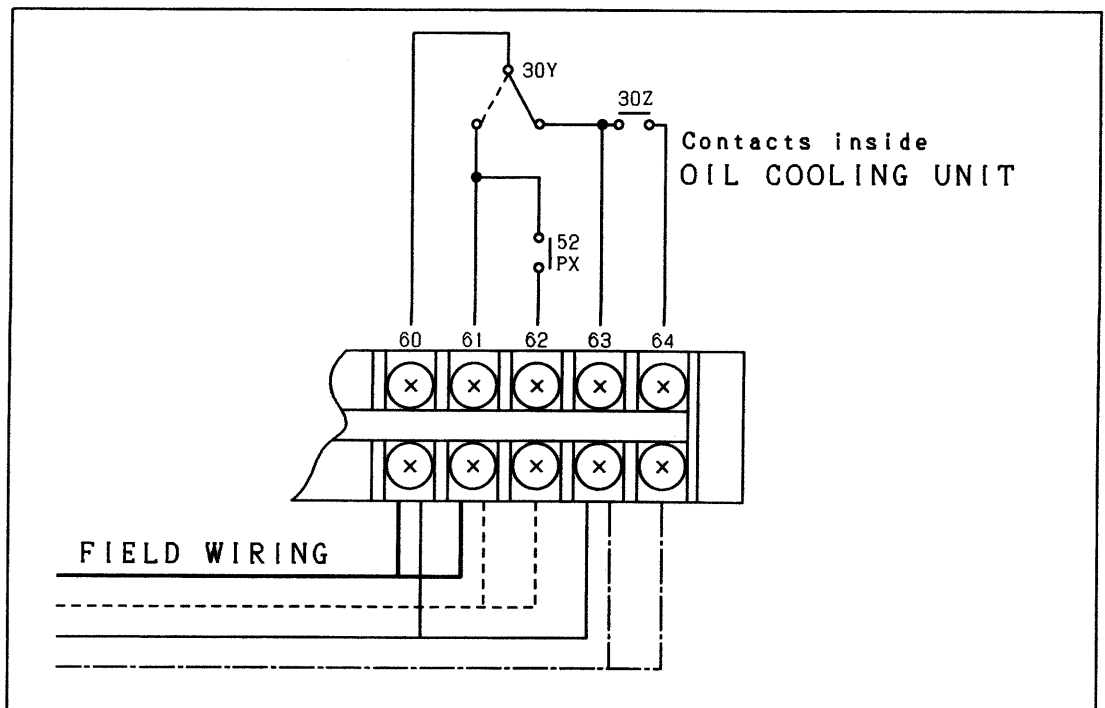


### 3-4 Outside output connections

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

#### 1) Standard model

Wiring Symbols (Shown Below)	Operation mode Operation Switch (BS) Connecting Terminals	Stopping	Normal Operation	Abnormality (Protection) (device on)	Normal Operation	Power Failure	Normal Operation
		ON		RESET → ON			ON
——	Between 60-61	OFF	ON				
——	Between 60-63	ON	OFF				
- - - -	Between 61-62	OFF	ON	OFF			
		( Protective device against high oil temperature actuated, (51P) is actuated, )					
- - - -	Between 63-64	OFF		ON			





### 3-5 Remote control

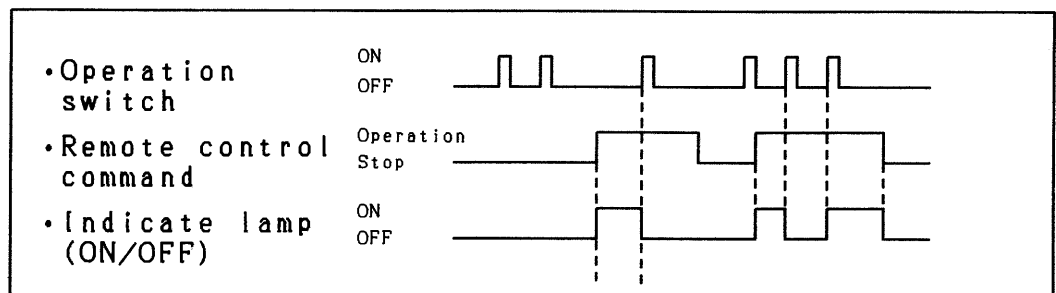
#### 1) AUTO/MANUAL switch

It is able to select a operation method by AUTO/MANUAL switch(SW1...refer to P.12) on the control circuit board.

AUTO/MANUAL switch	AUTO		MANUAL	
Operation	Power source	*1 Remote Control 1	*2 Remote Control 2	Local Operation switch(BS)
Manipulation	ON/OFF			

\*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.

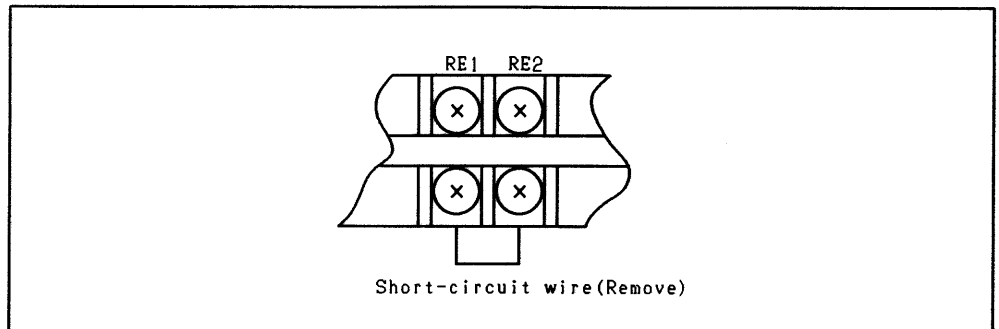


#### 2) Wiring procedure

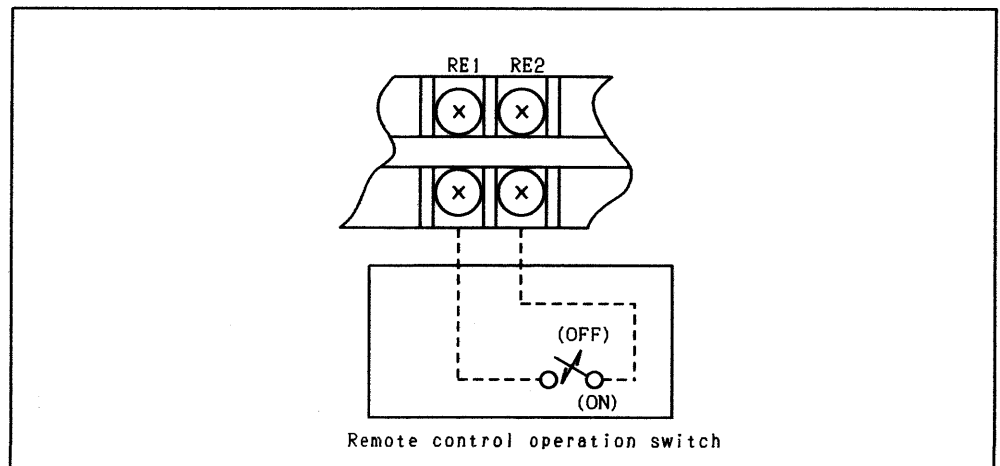
Wire as indicated below for remote control.  
Parts to be prepared.

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

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

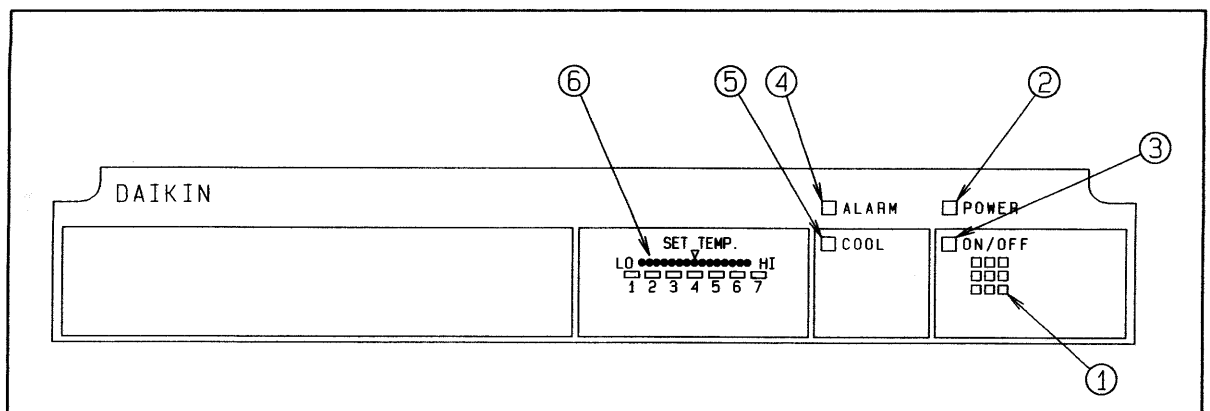


- (4) Put the front panel.

## 4. CAUTIONS FOR OPERATION

- 4-1 NEVER RUN WITHOUT OIL IN OIL COOLING UNIT.  
(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 being large pressure loss in oil piping outside, change the piping so that pressure loss will be reduced. (Please refer to the referential data.) If this unit is used more than the operating range, it may causes noise or troubles.
- 4-4 Since a delay timer is installed, the unit may not run again immediately after it has been stopped in order to protect the compressor from being overloaded. This is normal and does not have any problem.
- 4-5 The thermostat controller adjusts inlet oil temperature of the OIL COOLING UNIT.
- 4-6 Further, do not install a drain pipe to the oil drain since it is for sevincing purpose.

## 5. NAMES, FUNCTIONS AND OPERATIONS ON CONTROL PANEL



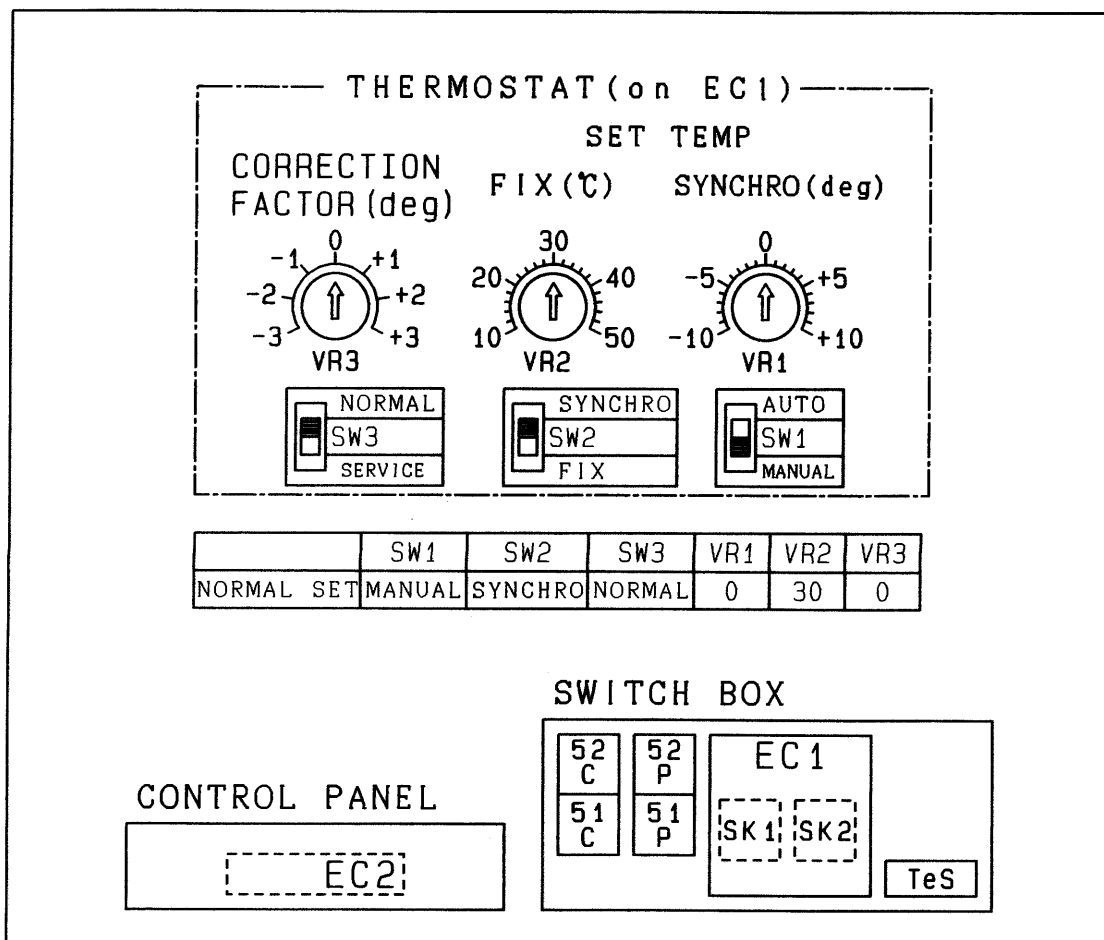
No.	Name	Functions and operations
①	Operation switch(BS)	This is the ON/OFF switch of power supply for operating circuits. Operating manipulation can be made by this switch when remote control command [between (RE1) and (RE2)] is ON, and AUTO/MANUAL switch is set on the MANUAL side. [The remote control command is shortcircuited (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	Indicator lamp (abnormality-red)	This indicator lamp lights up or flickers when an abnormality occurs. At this time, refer to Troubleshooting Guide, and check various positions.
⑤	Indicator lamp (Compressor operation-green)	When this indicator lamp is lit, it indicates that the compressor is on normal operation. (However, it does not relate to the pump's operation.)
⑥	Indicator lamp (oil temperature-green)	When the unit is under normal condition, this indicator lamp displays inlet oil temperature level. (This lamp is lit under normal condition.) If under abnormal condition, this indicator lamp displays individual abnormality. (This lamp flickers under abnormal condition. Refer to Troubleshooting Guide and check various positions.

■ Setting procedure of thermostat

When the front panel is removed, you will find a control circuit board (EC1) on the right side from the front. Set a temperature level by the operating SYNCHRO/FIX switch (SW2) and the TEMP. ADJUSTMENT volume (VR1 or VR2) provided on the control circuit board (EC1) according to the following procedure.

setting \ symbol	SW2	VR1 (deg)	*VR2 (°C)	*VR3 (deg)
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 -3deg. to +3deg. by the CORRECTION FACTOR volume (VR3).



## 6. MAINTENANCE AND INSPECTION

### 6-1 Repair work with safety

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.

2) Fire may be used for repair work, so dismount OIL COOLING UNIT from a 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 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 powder, acid or solvents such as benzene, hot water, etc., because they will damage the paint.

### 6-3 Oil tank

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.

### 6-4 Air filter

1) Wash the air filter once every two weeks in a water below 40°C. (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 layout

1) Put a cover over the OIL COOLING UNIT to prevent dust or water from getting into the unit.

2) Turn off main power source.

3) Be careful 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 (protective device function), there are reset when main power source is turned off or once NORMAL/SURVICE switch (SW3) is set on the SURVICE side.

Refer to the Troubleshooting Guide 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.

## 7. TROUBLESHOOTING GUIDE

Check the following if OIL COOLING UNIT 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 details 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-circuit 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-circuit points in the operation circuit.
2	Power is ON but an abnormality lamp (red) flickers.	① Power source is connected to reverse phase.	▶ Re-connect 2 phases out of 3.
3	Pump runs but no oil flow. Low oil circulation, with air suction and loud pump noise.	① Tank oil level is too low.	▶ Eliminate the cause of the drop in oil level and add oil.
		② Excessive pressure loss in the oil piping causes relief valve actuation and pump cavitation.	▶ Use large 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 $105 \pm 15$ 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 indicator lamp lighting up.	① Power is OFF.	▶ Check the main power source.
6	Compressor worked but an abnormality signal was output and the abnormality indicator lamp lit up. (1) An abnormality took place at the thermistor.	① The thermistor is broken.	▶ The thermistor must be replaced.
		② Wiring of the thermistor is shortcircuited or dislocated.	▶ 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 (51P) 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 operating 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.	
⑨ Oil viscosity is too high.		▶ Replace with lower viscosity oil.	
⑩ Same as 3-②.		▶ Same as 3-②.	
	(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.

Item	Condition	Cause	Remedy																																																		
	<p style="text-align: center;"> <input checked="" type="checkbox"/> ALARM   <input type="checkbox"/> POWER  <input type="checkbox"/> COOL   <input type="checkbox"/> ON/OFF            SET TEMP.            LO.....HI            1 2 3 4 5 6 7         </p> <table border="1" data-bbox="464 539 1342 936"> <thead> <tr> <th colspan="2">TROUBLE DIAGNOSIS FUNCTION</th> <th colspan="2">LIGHTING</th> <th colspan="2">FLICKER</th> </tr> </thead> <tbody> <tr> <td>ALARM (RED)</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>No. OF PILOT (GREEN LAMP)</td> <td>—</td> <td>1</td> <td>2</td> <td>3</td> <td>5</td> </tr> <tr> <td>FAILURE MODE</td> <td>POWER SOURCE</td> <td>Th-A</td> <td>Th-0</td> <td>OIL TEMP. HIGH</td> <td>49C</td> </tr> <tr> <td></td> <td>Negative phase</td> <td>Room thermistor is broken</td> <td>Oil thermistor is broken</td> <td>Protective device against high oil temperature actuated</td> <td>Compressor protection thermostat (49C) is actuated</td> </tr> </tbody> </table> <table border="1" data-bbox="721 994 1318 1357"> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>6</td> <td>7</td> <td>6 7</td> <td>5 6 7</td> </tr> <tr> <td>51C</td> <td>63H</td> <td>51P</td> <td>EC1</td> </tr> <tr> <td>Compressor motor overcurrent relay (51C) is actuated</td> <td>High press. switch (63H) is actuated</td> <td>Fan and pump motor overcurrent relay (51P) is actuated</td> <td>An abnormality took place at the control circuit board (EC1)</td> </tr> </tbody> </table>	TROUBLE DIAGNOSIS FUNCTION		LIGHTING		FLICKER		ALARM (RED)						No. OF PILOT (GREEN LAMP)	—	1	2	3	5	FAILURE MODE	POWER SOURCE	Th-A	Th-0	OIL TEMP. HIGH	49C		Negative phase	Room thermistor is broken	Oil thermistor is broken	Protective device against high oil temperature actuated	Compressor protection thermostat (49C) is actuated									6	7	6 7	5 6 7	51C	63H	51P	EC1	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)	<p style="text-align: center;">*AKS100T-F69A type "Th-M" (thermistor for machine) replaces "Th-A".</p>	
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7	Pump, compressor and fan run but oil is not cooled.	① Same as 6-④ to ⑦. ② Same as 3. ③ Over-loading. ④ Setting of thermostat too high. ⑤ Lack of refrigerant gas.	▶ Same as 6-④ to ⑦. ▶ Same as 3. ▶ Eliminate cause of overloading. ▶ Set it properly. ▶ Recharge is required.																																																		

\*In case of change or recharge, our research is required.

## Referential Data

### ■ Caution for handling piping outside of the unit

#### 1) Piping on the external side

Provide the piping on the external side so that pressure loss will be less than setting pressure of a relief valve of a pump.

#### 2) Calculation method of piping resistance

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

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

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

v: Coefficient of kinematic viscosity (mm<sup>2</sup>/s)

- Refer to the Viscosity/Temperature Chart.

Q: Flow rate (L/min)    L: Pipe length (m)

D: Internal diameter of pipe (mm)

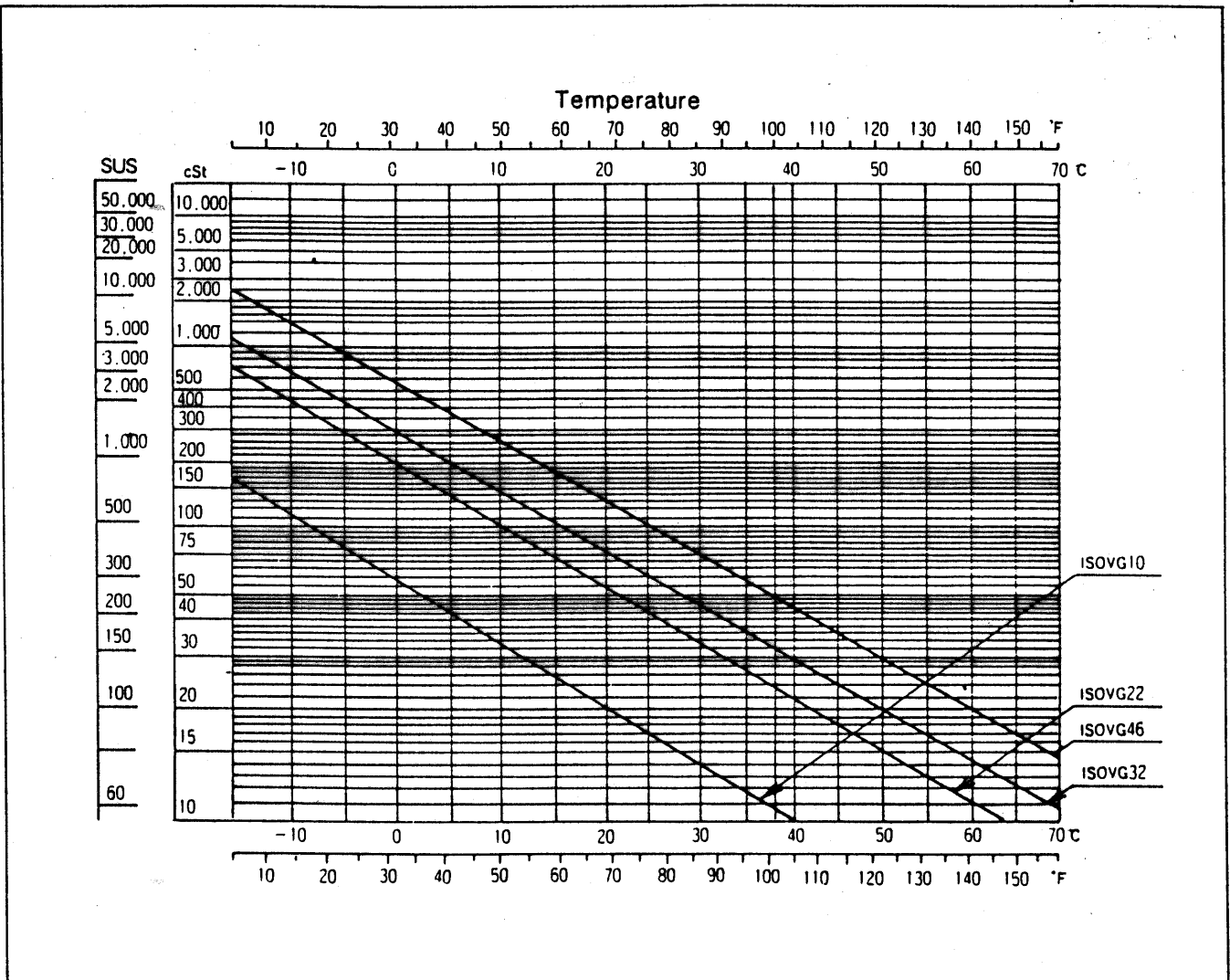
● Oil viscosity differs greatly with temperature in winter and summer. Examine the piping resistance with the average temperature during winter.

Season	Viscosity (Coefficient of kinematic viscosity)
Winter (ISO VG32, oil temperature 5°C)	195mm <sup>2</sup> /s
Summer (ISO VG32, oil temperature 40°C)	29mm <sup>2</sup> /s

HM 1477

Viscosity/Temperature Chart

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