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

To ensure proper use of this product, be sure to read through this instruction manual before using it. After reading this manual, keep it handy for your future reference.

Proper use results in power saving

If the air filter is clogged, the cooling performance deteriorates, causing excess power consumption.

Clean the air filter periodically to reduce power consumption.
Safety Precautions

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

The instructions described below are intended to prevent injury or damage to you and other people. Possible conditions that may result from improper handling are classified as follows:

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

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

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

All these instructions include important information on safety. Be sure to observe the instructions.

After reading this manual, be sure to keep it in place so that users can read it whenever required.

If this product is transferred to another person, be sure to attach this manual to the product.

To use this product safely, be sure to observe the following instructions, and safety laws and regulations for the relevant standards listed below.

1. Industrial Safety and Health Law
2. Fire Service Law
3. JIS B8361 General Rules for Hydraulic Systems

Precautions for installation

**DANGER**
Only qualified technical experts can handle the unit.

Transportation, installation, piping, electric wiring, operation, maintenance and inspection must be conducted by qualified technical experts.

Check the power supply (voltage, frequency and current).

Connect the power cable according to the procedure described in this instruction manual.

Connect the power cable according to the procedure described in “Electric Wiring” on page 7.

**WARNING**
Conduct electric wiring according to the ratings.

Conduct electric wiring according to "Regulation on Electrical Facilities" and "Internal Wiring Regulations". Improper wiring may result in burnout or fire. For overseas use, conduct electric wiring according to the local wiring standard.

Keep away from the unit when it is being carried with slings.

Never get close to the unit when it is being carried with slings. Failure to observe this instruction may result in fall or overturn of the unit, causing injury or property damage.

**CAUTION**
Ground the unit securely.

Check the weight, and hang the unit by the specified points.

Check the weight of the unit with the nameplate to make sure that it does not exceed the rated load capacity of the carrier. Hang the unit by the points specified in the outline drawing. Failure to observe this instruction may result in fall or overturn of the unit, causing injury or property damage.

If the unit is not grounded, you may get an electric shock.

Conduct electric wiring according to the ratings.

Check the fastening points with the outline drawing, and fasten the unit securely with bolts. Failure to observe this instruction may result in fall or overturn of the unit, if this unit is installed at an elevated position.

Fasten the unit during operation.

Check the fastening points with the outline drawing, and fasten the unit securely with bolts. Failure to observe this instruction may result in fall or overturn of the unit.
## Precautions for use

### Mandatory

**Prepare a circuit breaker at user’s site.**

The Oil Cooling Unit is not equipped with a circuit breaker. A circuit breaker exclusively for the Oil Cooling Unit should be provided by user. To ensure safety, it is recommended to use an earth leakage breaker. To use an earth leakage breaker, select an inverter-compatible type. (Recommended: 15 mA or 20 mA)

### Mandatory

**Do not tilt the unit.**

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

### Mandatory

**Precaution for using the CE model (optional)**

The optional CE model (AKZJ+8-C) Oil Cooling Unit is classified as an auxiliary machine of the main machine (Overvoltage Category II). It has been self-declared under the following conditions. Be sure to follow the specifications of the main machine.

1. Provide a main power supply circuit breaker for the main machine according to the EN60204-1 requirement.
2. Connect the power supply via a transformer with basic insulation rating.

* Basic insulation: Insulation provided for live parts to ensure fundamental protection against electric shock (under IEC Standard 60335-1)

### Mandatory

**Do not disassemble or repair the unit.**

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

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

### Mandatory

**Do not splash water.**

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

### Forbidden

**During transportation (including storage), do not tilt the Oil Cooling Unit more than 30°.**

If the unit is tilted more than 30°, the compressor may have a fault.

### Forbidden

**Precautions for use**

<table>
<thead>
<tr>
<th><strong>Before handling this unit, turn OFF the power supply.</strong></th>
<th><strong>Do not use the unit beyond specified operating conditions.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandatory</td>
<td>Mandatory</td>
</tr>
<tr>
<td><strong>Danger</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Do not handle the unit for 5 minutes after power supply is turned OFF.</strong></td>
<td><strong>Do not use the unit in explosive atmosphere.</strong></td>
</tr>
<tr>
<td>Forbidden</td>
<td>Forbidden</td>
</tr>
<tr>
<td><strong>During this period, electric discharge from the internal high-voltage parts (capacitors) has not been completed. Failure to observe this instruction may result in electric shock.</strong></td>
<td><strong>Do not install this unit in a place where evolution, inflow, retention or leak of inflammable gas may be expected, or where airborne carbon fiber is present. Failure to observe this instruction causes fire.</strong></td>
</tr>
<tr>
<td>Forbidden</td>
<td>Forbidden</td>
</tr>
<tr>
<td><strong>Do not operate the unit with the covers opened.</strong></td>
<td><strong>Do not disassemble or repair the unit.</strong></td>
</tr>
<tr>
<td>Forbidden</td>
<td>Do not disassemble or repair the unit.</td>
</tr>
<tr>
<td><strong>Do not operate the Oil Cooling Unit with the unit casing or terminal covers of the motor or other electric parts removed. Failure to observe this instruction may result in electric shock.</strong></td>
<td>Do not disassemble or repair the unit.</td>
</tr>
<tr>
<td>Forbidden</td>
<td>Do not disassemble or repair the unit.</td>
</tr>
<tr>
<td><strong>Keep your hand or body away from the unit during operation.</strong></td>
<td><strong>Do not splash water.</strong></td>
</tr>
<tr>
<td>Forbidden</td>
<td>Do not splash water.</td>
</tr>
<tr>
<td><strong>During operation, the external panel may become extremely hot. Be careful that your hand or body does not directly touch it. Otherwise, you may get a burn.</strong></td>
<td><strong>Do not immerse this unit in water, or splash water on the unit. Failure to observe this instruction may result in short-circuit or electric shock.</strong></td>
</tr>
<tr>
<td>Forbidden</td>
<td>Do not immerse this unit in water, or splash water on the unit. Failure to observe this instruction may result in short-circuit or electric shock.</td>
</tr>
</tbody>
</table>
**WARNING**

If refrigerant leaks, provide thorough ventilation.

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

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

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

Use a commercial power supply.

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

If an abnormal condition occurs, stop operation immediately.

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

**CAUTION**

Do not use the unit in special atmosphere.

Do not use this unit in special atmosphere, including dust, oil mist, high temperature or high humidity.

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

Do not put an obstacle within 500 mm from the air intake/exhaust port. If air intake/exhaust flow is blocked, this unit may not provide the specified cooling capacity.

Perform daily control of operating liquid pollution.

Pollution of the operating liquid causes the unit service life to be shortened. Use thorough caution about pollution of the operating liquid to maintain the pollution degree at NAS10 or lower level.

Ensure safety of the main machine before trial run.

Before executing a trial run, make sure that the main machine is set in safe conditions (the main machine will not run, or no accident occurs even if the main machine runs.) Failure to observe this instruction may result in injury or damage to the machine.

Do not step on the unit.

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

Cancel operation lock before running the main machine.

Before you start running the main machine, cancel the operation lock status with the Oil Cooling Unit operation panel. If you start the main machine in the operation lock status, the unit cannot control the operating liquid temperature, which may result in damage to the machine.

During transportation, fasten the unit securely.

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

Check liquid level in the tank.

Before start of operation, make sure that the tank is filled with operating liquid to an appropriate level.

Check the unit before operation.

Before start of operation, make sure that the electric wiring are properly conducted, and connecting parts are securely tightened.
Oil Cooling Unit and Accessories

Check the following items:

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

2. **Accessories**
   - An accessory package\(^1\) is attached to the top plate of the Oil Cooling Unit. Make sure that the following items are included in the accessory package.
     - 1. Instruction manual (This document): 1 volume
        - Keep this manual in place were users can read it whenever required.
     - 2. Rubber bushing for electric wiring (Large size, with cross slit): 1 pc.
        - When connecting the power cable, remove the resin cable hole cap in the side plate of the unit, and attach the rubber bushing. It is only for provisional use.\(^2\)
     - 3. Rubber bushing for electric wiring (Small size, with cross slit): 1 pc.
        - When connecting the signal cable, remove the resin cable hole cap in the side plate of the unit, and attach the rubber bushing. It is only for provisional use.\(^2\)

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

\(^2\): When connecting each cable finally, place the cable in a conduit. If the rubber bushing is used, the dust-proof effect of the electrical equipment box deteriorates, causing a fault. For details, refer to “Wiring procedure” on page 8.

---

**Model Identification and Specifications**

- **Model**: AKZJ908, AKZJ568, AKZJ458, AKZJ358
- **Series**: Standard (–A), Built-in breaker (–B), CE model (–C), Immersion type (–D), Built-in heater (–E), Different-voltage model (–H)
- **Capacity (%)**: 30
- **Operation Settings**: Temperature (or machine temperature) tuning, constant tank liquid temperature, Holding constant tank liquid temperature
- **Alarm Settings**: Machine temperature tuning control, Communication with main machine
- **Alarm/Warning Output Logic**: Setting Additional Function, Timer Operation, Monitor Items

---

**Names and Functions of the Control Panel Parts**

- Menu: Standard
- Setting Additional Function: 19
- Communication with main machine: 35
- Machine temperature tuning control: 34

---

**Daily maintenance/inspection**

- To leave the unit unused for a long period
- Periodic maintenance/inspection
- Daily maintenance/inspection
- Although no alarm is activated

---

**Troubleshooting**

- When an alarm is activated
- When the unit operation seems abnormal
- Periodic maintenance/inspection

---

**Operation Setting**

- Checking Initial Operating Conditions: 18
- Monitoring Items: 23
- Setting Additional Function: 27
- Timer Operation: 24
- Holding constant tank liquid temperature: 20
- Cooling liquid in the tank at constant capacity: 22
- Machine temperature tuning control: 34
- Communication with main machine: 35

---

**Useful Functions**

- Monitoring Items: 23
- Setting Additional Function: 27
- Timer Operation: 24
- Holding constant tank liquid temperature: 20
- Cooling liquid in the tank at constant capacity: 22
- Machine temperature tuning control: 34
- Communication with main machine: 35

---

**Maintenance/Inspection**

- Monitoring Items: 23
- Setting Additional Function: 27
- Timer Operation: 24
- Holding constant tank liquid temperature: 20
- Cooling liquid in the tank at constant capacity: 22
- Machine temperature tuning control: 34
- Communication with main machine: 35
Precautions for Installation

Installation place and oil piping

- To install this unit, select a place that meets the following conditions:
  1. Level, rigid floor (Inclination: 5° max.)
  2. A place where the unit is not exposed to direct sunlight or heat
  3. A place with proper ventilation and little humidity
  4. A place where exhaust air does not circulate (exhaust air will not be taken into the unit)
  5. A place that allows easy access to piping and wiring
  6. A place with little contaminant, waste, dust particles or oil mist
  7. A place free from explosive atmosphere (evolution, inflow, retention or leak of inflammable gas)

- Do not place an object that may block air flow within 500 mm from the air intake/exhaust port.

Note 1. About the specified liquid level range

1) During cooling operation with the liquid level lower than the specified range, the moisture of the atmosphere condenses on the exposed part of the cooling coil, causing the condensate to be mixed into the liquid. If the liquid level further decreases, it results in cooling capacity deterioration, and also causes a fault of the unit.

2) During heating operation the liquid level lower than the specified range, the heating element of the heater is exposed or discolored, or may emit burning smell. If the liquid level further decreases, the heater activates the overheat protection device. This condition hinders normal operation, and also causes a fault of the unit.

3) If the liquid level falls below the specified range due to liquid level fluctuations during operation, the liquid overflows from the tank. To prevent the above 1) to 3) problems, be sure to maintain the liquid level within the specified range.

Mount a float switch to ensure that the liquid level in the tank is within the specified range.

2. Give thorough consideration to the layout of the partitions and inlet/outlet piping for the installation tank, so that the low-temperature liquid that has been cooled with the OILCON unit can be uniformly mixed with the high-temperature liquid returned from the machine.
**Installation Procedure**

**Installation tank (Prepared by user)**

Select the size and machining dimensions of the installation tank from the table below.

<table>
<thead>
<tr>
<th>Size</th>
<th>Depth</th>
<th>Tapping hole pitch</th>
<th>Through hole</th>
</tr>
</thead>
<tbody>
<tr>
<td>AKZJ188,358,458</td>
<td>500 or more</td>
<td>400 or more</td>
<td>390</td>
</tr>
<tr>
<td>AKZJ568</td>
<td>690 or more</td>
<td>500 or more</td>
<td>500</td>
</tr>
<tr>
<td>AKZJ908</td>
<td>770 or more</td>
<td>500 or more</td>
<td>590</td>
</tr>
</tbody>
</table>

**Return filter (Prepared by user)**

If cutting swarf or chips accumulate on the OILCON cooling coil surface, it results in cooling capacity deterioration, and also causes a fault of the unit.

Be sure to attach a highly-efficient return filter at the return (liquid inlet) port.

**Viscosity of operating liquid**

Make sure that the viscosity of the operating liquid is within the specified operating range (0.5 to 200 mm²/s).

If the operating liquid is oil, note that the viscosity characteristic varies depending on the oil type (ISO VG∗∗). (See the chart on the right.)

**Example of viscosity (Kinematic viscosity coefficient)**

1. In winter: 195 mm²/s (ISO VG32, Oil temperature: 5°C)
2. In summer: 29 mm²/s (ISO VG32, Oil temperature: 40°C)
Electric Wiring

- Conduct electric wiring according to the local wiring standard.
- The Oil Cooling Unit (except for the “–B” model) is not equipped with a circuit breaker. A circuit breaker exclusively for the unit should be mounted to the main machine.
- For electric wiring, refer to the electric wiring diagram on the nameplate attached to the rear of the electrical equipment box cover.
- Do not change the wiring in the Oil Cooling Unit. Do not touch the protection devices.

Starting/stopping the Oil Cooling Unit

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

1. Directly starting/stopping the Oil Cooling Unit with the main machine power supply
   When the circuit breaker for the main machine is turned ON, the Oil Cooling Unit starts operation. To stop the unit, turn OFF the circuit breaker for the main machine.

2. Starting/stopping the Oil Cooling Unit with the remote control contact (see page 9)
   When the remote control switch is turned ON, the Oil Cooling Unit starts operation. To stop the unit, turn OFF the remote control switch.

3. Starting/stopping the Oil Cooling Unit with the control panel
   If you keep pressing the ▶ and ▼ keys for at least 2 seconds in the “operation lock” mode, the Oil Cooling Unit starts operation according to preset conditions. If you keep pressing the ▶ and ▼ keys for at least 2 seconds during operation, “Loc” blinks on the data display, and the Oil Cooling Unit will be stopped (locked).
Mounting a circuit breaker

The Oil Cooling Unit is not equipped with a circuit breaker. Be sure to mount a 3-pole circuit breaker exclusively for the Oil Cooling Unit to the main machine. For the breaker capacity, refer to the specifications of each model (see page 9). To ensure safety, it is recommended to use an earth leakage breaker.

* Mount a circuit breaker exclusively for the Oil Cooling Unit.

**CAUTION**

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

Wiring procedure

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

2. Insert the power cable into the power cable insertion hole (φ28) in the side plate of the unit. When using the different-voltage model (–E), insert the power cable into the transformer box.

3. Insert the remote control signal cable and external output signal cable into the signal cable insertion hole (φ22) in the side plate of the unit. When inserting each cable from the left side of the unit (when viewed from the front of the unit), place the cable along the guide rail in the electrical equipment box. Then, fasten the cable to the cable anchor at the bottom of the electrical equipment box by using a tie band etc.

4. Connect the power cable to the power supply terminal block. Connect the ground cable to the PE (ground) terminal.

   - The cable size should conform to those listed below, or a larger size.

<table>
<thead>
<tr>
<th>Cable type</th>
<th>Model/Series name</th>
<th>Power cable insertion hole (φ28)</th>
<th>Signal cable insertion hole (φ22)</th>
</tr>
</thead>
<tbody>
<tr>
<td>JIS</td>
<td>Heat-resistant vinyl, 2.0 mm²</td>
<td>Heat-resistant vinyl, 3.5 mm²</td>
<td>Heat-resistant vinyl, 5.5 mm²</td>
</tr>
<tr>
<td>UL cable</td>
<td>UL1015 AWG#14 (equivalent to 2.0 mm²)</td>
<td>UL1015 AWG#12 (equivalent to 3.3 mm²)</td>
<td>UL1015 AWG410 (equivalent to 5.5 mm²)</td>
</tr>
<tr>
<td>IEC/CENELEC cable</td>
<td>2.5 mm² (245 IEC53/H05RR-F)</td>
<td>4.0 mm² (245 IEC53/H05RR-F)</td>
<td>6.0 mm² (245 IEC53/H05RR-F)</td>
</tr>
</tbody>
</table>

   - To connect each cable, use M4 (AKZJ908: M5) shielded round crimp terminal.
   - Place the power cable in a conduit.
   - For remote control input connecting procedure, refer to page 9.
   - For external output contact connecting procedure, refer to page 10.

4. Re-mount the top plate, and fasten it with the screws.
Outline of electrical equipment box (Typical)

Connection of remote control input

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

1. **Local procurement items**
   - **Component**: Single-pole, single-throw remote control switch, or “a” contact that enables operation command output
     - **Note**: Select a switch whose minimum allowable load is 12 VDC and 5 mA.
   - **Wiring material**: Single-core cable: φ1.2 (AWG16), or twisted cable: 1.25 mm² (AWG16), M3 crimp terminal

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

   - 12 VDC is applied across these terminals (Terminal [10]: negative polarity, [11]: positive polarity).
### Connection of external output contact

To output the Oil Cooling Unit operation status signal to the main machine, connect the required signal cable to the signal terminal block according to the procedure below. For details of alarms, refer to “Alarm list” (page 38). To use an output contact, change the parameter setting, and make sure that the output contact normally operates. (For parameter setting changing procedure, refer to page 39.)

#### 1. Screw terminal and cable size

<table>
<thead>
<tr>
<th>Screw terminal</th>
<th>JIS cable</th>
<th>IEC cable</th>
<th>UL cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>M3</td>
<td>0.25 mm² – 1.25 mm²</td>
<td>0.3 mm² – 1.5 mm²</td>
<td>AWG*22 – *16</td>
</tr>
</tbody>
</table>

#### 2. Connect each cable by using a round crimp terminal.

#### 3. Use a twisted cable.

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

### CAUTION

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

### Value of the first digit in alarm output logic parameter (n01)

<table>
<thead>
<tr>
<th>0 (Factory setting)</th>
<th>1 (Positive action)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Alarm output logic parameter" /></td>
<td><img src="image" alt="Alarm output logic parameter" /></td>
</tr>
</tbody>
</table>

### External output timing chart

<table>
<thead>
<tr>
<th>Operation status</th>
<th>Power OFF (including power failure)</th>
<th>Power ON</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Run</td>
<td>Alarm level 2</td>
</tr>
<tr>
<td>Power supply</td>
<td>off</td>
<td>off</td>
</tr>
<tr>
<td>Remote control contact</td>
<td>off</td>
<td>off</td>
</tr>
<tr>
<td>Operation panel (LOCK key)</td>
<td>off</td>
<td>off</td>
</tr>
<tr>
<td>Normal (&quot;a&quot; contact)</td>
<td>off</td>
<td>off</td>
</tr>
<tr>
<td>Alarm/Stop (Power OFF) (&quot;b&quot; contact)</td>
<td>off</td>
<td>off</td>
</tr>
<tr>
<td>Agitator operation (&quot;a&quot; contact)</td>
<td>off</td>
<td>off</td>
</tr>
<tr>
<td>Alarm level</td>
<td>off</td>
<td>off</td>
</tr>
<tr>
<td>Normal/Stop (Power OFF) (&quot;b&quot; contact)</td>
<td>off</td>
<td>off</td>
</tr>
<tr>
<td>Agitator operation (&quot;a&quot; contact)</td>
<td>off</td>
<td>off</td>
</tr>
<tr>
<td>Alarm level</td>
<td>off</td>
<td>off</td>
</tr>
</tbody>
</table>

### Alarm output logic

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

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

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

---

This document contains important information about the connection of external output contacts, alarm output logic, and external output timing charts for an Oil Cooling Unit. It provides detailed instructions for setting up the output contacts, including screw terminal sizes, cable types, and connection methods. The document also includes a caution section highlighting the necessary steps to ensure safe operation. The external output timing chart is a crucial part of this document, offering a clear overview of the timing and conditions for different operational scenarios.
Electric wiring diagram (Typical: AKZJ358)
### Specifications (AKZJ188/358/458)

#### Oil Cooling Unit equivalent horsepower (HP)

<table>
<thead>
<tr>
<th>Model</th>
<th>0.5</th>
<th>1.2</th>
<th>1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>AKZJ188</td>
<td>1.8</td>
<td>3.5</td>
<td>5.6</td>
</tr>
<tr>
<td>AKZJ358</td>
<td>9.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AKZJ458</td>
<td>18</td>
<td>35</td>
<td>45</td>
</tr>
</tbody>
</table>

#### Model Identification and Specifications

**Model identification**

<table>
<thead>
<tr>
<th>Menu symbol (Note 1)</th>
<th>Series symbol (8 series)</th>
<th>Nominal cooling capacity (Note 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>* * 8</td>
<td>Equivalent to 0.5 kW</td>
</tr>
<tr>
<td>C</td>
<td>* * 8</td>
<td>Equivalent to 1.2 kW</td>
</tr>
<tr>
<td>H</td>
<td>* * 8</td>
<td>Equivalent to 1.5 kW</td>
</tr>
</tbody>
</table>

- **Menu symbol (Note 1)**
  - B: Circuit breaker (with built-in breaker)
  - C: CE-conformable
  - H: Built-in heater
  - E: Different voltage (Built-in transformer)

- **Series symbol (8 series)**
  - AKZJ: Energy-saving high-precision inverter oil cooling unit

- **Nominal cooling capacity (Note 2)**
  - Indicates cooling capacity at standard point with commercial power supply frequency of 60 Hz. (Net oil temperature and room temperature: 35°C, VG32-equivalent oil is used.)
  - 18: 1.8 kW
  - 35: 3.5 kW
  - 45: 4.5 kW
  - 56: 5.6 kW
  - 90: 9.0 kW

---

**Handling Before Operation**

**Model Identification and Specifications**

**Specifications (AKZJ188/358/458)**

<table>
<thead>
<tr>
<th>Oil Cooling Unit equivalent horsepower (HP)</th>
<th>0.5</th>
<th>1.2</th>
<th>1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>AKZJ188</td>
<td>AKZJ358</td>
<td>AKZJ458</td>
</tr>
<tr>
<td>AKZJ188</td>
<td>1.8 kW</td>
<td>3.5 kW</td>
<td>5.6 kW</td>
</tr>
<tr>
<td>AKZJ358</td>
<td>9.0 kW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AKZJ458</td>
<td>18 kW</td>
<td>35 kW</td>
<td>45 kW</td>
</tr>
</tbody>
</table>

**Model identification**

<table>
<thead>
<tr>
<th>Menu symbol (Note 1)</th>
<th>Series symbol (8 series)</th>
<th>Nominal cooling capacity (Note 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>* * 8</td>
<td>Equivalent to 0.5 kW</td>
</tr>
<tr>
<td>C</td>
<td>* * 8</td>
<td>Equivalent to 1.2 kW</td>
</tr>
<tr>
<td>H</td>
<td>* * 8</td>
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- **Menu symbol (Note 1)**
  - B: Circuit breaker (with built-in breaker)
  - C: CE-conformable
  - H: Built-in heater
  - E: Different voltage (Built-in transformer)

- **Series symbol (8 series)**
  - AKZJ: Energy-saving high-precision inverter oil cooling unit

- **Nominal cooling capacity (Note 2)**
  - Indicates cooling capacity at standard point with commercial power supply frequency of 60 Hz. (Net oil temperature and room temperature: 35°C, VG32-equivalent oil is used.)
  - 18: 1.8 kW
  - 35: 3.5 kW
  - 45: 4.5 kW
  - 56: 5.6 kW
  - 90: 9.0 kW

---

**Handling Before Operation**

**Model Identification and Specifications**

**Specifications (AKZJ188/358/458)**

<table>
<thead>
<tr>
<th>Oil Cooling Unit equivalent horsepower (HP)</th>
<th>0.5</th>
<th>1.2</th>
<th>1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>AKZJ188</td>
<td>AKZJ358</td>
<td>AKZJ458</td>
</tr>
<tr>
<td>AKZJ188</td>
<td>1.8 kW</td>
<td>3.5 kW</td>
<td>5.6 kW</td>
</tr>
<tr>
<td>AKZJ358</td>
<td>9.0 kW</td>
<td></td>
<td></td>
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<tr>
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### Specifications (AKJZ568/908)

<table>
<thead>
<tr>
<th>Property</th>
<th>2.0</th>
<th>3.0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Oil Cooling Unit equivalent horsepower (HP)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td>AKJ568</td>
<td>AKJ908</td>
</tr>
<tr>
<td><strong>Cooling capacity (50/60 Hz)</strong></td>
<td>kW</td>
<td>kW</td>
</tr>
<tr>
<td>AKJ568</td>
<td>4.0kVA/11.4A</td>
<td>4.0kVA/11.4A</td>
</tr>
<tr>
<td>AKJ908</td>
<td>4.8kVA/12.5A</td>
<td>Same as standard</td>
</tr>
<tr>
<td><strong>Transformer capacity</strong></td>
<td>kVA</td>
<td>kVA</td>
</tr>
<tr>
<td>AKJ568</td>
<td>3.3kVA/9.4A</td>
<td>3.4kVA/9.0A</td>
</tr>
<tr>
<td>AKJ908</td>
<td>7.5kVA/21.6A</td>
<td>Same as standard</td>
</tr>
<tr>
<td><strong>Exterior color</strong></td>
<td>White</td>
<td>White</td>
</tr>
<tr>
<td><strong>Evaporator (Fully-enclosed DC swing type)</strong></td>
<td>Equivalent to 1.5 kW</td>
<td>Equivalent to 2.2 kW</td>
</tr>
<tr>
<td><strong>Condenser</strong></td>
<td>Open coil type</td>
<td>Cross flat coil type</td>
</tr>
<tr>
<td><strong>Propeller fan</strong></td>
<td>φ400, 90 W×4P</td>
<td>φ450, 150 W×4P</td>
</tr>
<tr>
<td><strong>Agitator</strong></td>
<td>Is. 50 vs. 4P</td>
<td>Is. 50 vs. 4P</td>
</tr>
<tr>
<td><strong>Temperature control</strong> (Selectables)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tuning type</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Reference</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Room temperature or machine temperature</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tuning range</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Control target</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tank liquid temperature</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fixed</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Control target</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tank liquid temperature</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Refrigerant control</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Motor</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>**Agitator inner thermostat, Reverse-phase protector, Restart prevention timer, Low-room temperature protection thermostat, High oil temperature protection thermostat, Low oil temperature protection thermostat, Discharge pipe temperature thermostat, Condenser temperature thermostat, Refrigerant leak detector, Inverter protector, No-fuse breaker (–H only), High-pressure pressure switch (–C only), Compressor protection thermostat (–C only), Overflow prevention thermostat, Condenser temperature thermostat (–H only), Condenser pressure switch (–C only), Inverter protector (–C only), Overheat prevention temperature thermostat (–H only), Fuse (–H only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Protection device</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Applicable oil</strong></td>
<td>Water-soluble cutting/grinding oil, Cutting/grinding oil, Lubricating oil, Hydraulic oil, Water for industrial use</td>
<td></td>
</tr>
<tr>
<td><strong>Sound level (Measured at 1 m from unit, at 1 m height, in anechoic room)</strong></td>
<td>dB (A)</td>
<td>65</td>
</tr>
<tr>
<td><strong>Transportation vibration resistance</strong></td>
<td>Vertical: 14.7 m/s² (1.5 G) x 2.5 hr (10 to 100 Hz sweep/5 min)</td>
<td></td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>kg</td>
<td></td>
</tr>
<tr>
<td><strong>AG</strong></td>
<td>1.25</td>
<td>1.65</td>
</tr>
</tbody>
</table>

**Note:**
- 1: Cooling capacity is the value at standard point (inlet oil temperature and room temperature: 35˚C, ISO VG32 oil). The product tolerance is approx. ±5%.
- 2: Be sure to use a commercial power supply. Using an inverter power supply may result in burnout. Voltage fluctuation range should be within ±10%.
- If voltage fluctuation exceeds ±10%, consult DAIKIN.
- 3: For the different-voltage model, three types (–E1, –E2 and –E3) are available depending on the power supply voltage. (see page 12.)
- 4: The optional machine temperature tuning thermostat is required. (For details, see page 13.)
- 5: The –C model is supplied with MSDS (Material Safety Data Sheet) for refrigerant R410A.
- 6: This product is not equipped with a circuit breaker. The user must prepare a circuit breaker.
- 7: Conventional "1 HP" equivalent models (AKJ106/AKZJ287 class) have been integrated into AKZJ358 ("1.2 HP" equivalent).
Before Operation

Before operating the Oil Cooling Unit, check the following items:

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

2. **Electric wiring**
   - Check if the unit mounting parts are securely fastened to the tank top plate with bolts.
   - Check if the ground cable is securely connected.
   - Be sure to use a commercial power supply. Using an inverter power supply may result in burnout.

3. **Liquid level in the tank**
   - Be sure to maintain the liquid level in the tank within the specified range. (See page 5.)
   (Operating the unit with a liquid level out of the specified range causes a fault of the unit.)

4. **Delay timer**
   - The OILCON unit incorporates a delay timer. Therefore, when the compressor is stopped once and then restarted, the compressor may not start. This does not mean a fault of the unit. (See page 5.)

5. **Applicable liquid**
   - The OILCON unit can be used for water-soluble cutting/grinding fluid, cutting/grinding oil, water for industrial use, lubricating oil, hydraulic oil (mineral oil). It cannot be applied to the following oils (liquids), and a liquid that may corrode the cooling coil (SUS304).

   1) Flame-resistant hydraulic oil
      - Phosphoric ester type
      - Chlorinated hydrocarbon type
      - Water + glycol type
      - W/O, O/W emulsion type

   2) Chemicals and food liquids (drinking water etc.)
   3) Fuels (kerosene, gasoline, etc.)
   4) Water other than for industrial use

6. **Electric wiring**
   - Check if the cable size is larger than the specified size. (Refer to “Wiring procedure” on page 5.)
   - Check if the power supply voltage is within the following range:
     - 50 Hz........200 V ±10%
     - 60 Hz........200/220 V ±10%
   - Check if a circuit breaker is provided exclusively for each Oil Cooling Unit.
# Part Names and Functions

## Standard (–B, –C, –H)

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Function</th>
<th>No.</th>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Compressor</td>
<td>Sucks and compresses the low-temperature, low-pressure gas refrigerant produced in the evaporator, to produce high-temperature, high-pressure gas.</td>
<td>(9)</td>
<td>Air filter</td>
<td>Located at the front of the condenser. It is intended to prevent cooling capacity deterioration by eliminating dust adhering to the condenser from the air intake.</td>
</tr>
<tr>
<td>(2)</td>
<td>Condenser</td>
<td>Conducts heat exchange between the high-temperature, high-pressure gas refrigerant produced in the condenser, to produce high-temperature, high-pressure liquid refrigerant.</td>
<td>(10)</td>
<td>Room temperature thermistor</td>
<td>Detects the inlet air temperature.</td>
</tr>
<tr>
<td>(3)</td>
<td>Fan (for condenser)</td>
<td>Forcibly blows air to accelerate heat exchange between the refrigerant in the condenser and the air.</td>
<td>(11)</td>
<td>Circuit breaker (“–B” only)</td>
<td>Tripped when over-current flows through the circuit. It is intended to protect the internal electric wiring.</td>
</tr>
<tr>
<td>(4)</td>
<td>Electronic expansion valve</td>
<td>The valve mechanism reduces pressure of the high-temperature, high-pressure liquid refrigerant produced in the condenser, to produce low-temperature, low-pressure liquid/gas mixed refrigerant.</td>
<td>(12)</td>
<td>High-pressure pressure switch (“–C” only)</td>
<td>Tripped when high-pressure alarm is activated. It is intended to protect the refrigerant system for the condenser etc.</td>
</tr>
<tr>
<td>(5)</td>
<td>Cooling coil</td>
<td>Evaporates the low-temperature, low-pressure liquid refrigerant produced in the electronic expansion valve through heat exchange between the refrigerant and oil, to produce low-temperature, low-pressure gas refrigerant.</td>
<td>(13)</td>
<td>Compressor protection thermostat (“–C” only)</td>
<td>Tripped when compressor head high-temperature alarm is activated. It is intended to protect the compressor.</td>
</tr>
<tr>
<td>(6)</td>
<td>Agitator motor</td>
<td>Runs the agitator.</td>
<td>(14)</td>
<td>Heaters (“–H” only)</td>
<td>During warm-up in winter, the electric heater heats up the oil to a preset temperature.</td>
</tr>
<tr>
<td>(7)</td>
<td>Agitator</td>
<td>Improves the cooling efficiency by agitating the liquid in the tank.</td>
<td>(15)</td>
<td>Transformer (“–E” only)</td>
<td>Intended for the different-voltage model.</td>
</tr>
<tr>
<td>(8)</td>
<td>Liquid temperature thermistor</td>
<td>Detects the controlled liquid temperature in the tank.</td>
<td>(16)</td>
<td>Control panel</td>
<td>OILCON operation panel (See page 16. )</td>
</tr>
</tbody>
</table>
## Names and Functions of the Control Panel Parts

### Outline of control panel

![Diagram of control panel](image)

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Description</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Power lamp (Green)</td>
<td>Lit while power supply is ON.</td>
<td></td>
</tr>
<tr>
<td>(2)</td>
<td>Operation mode indicator</td>
<td>Indicates the control panel operation mode.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>NORMAL: Normal mode</td>
<td>page 17</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SETTING: Operation setting mode</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MONITOR: Monitor mode</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>TIMER: Timer setting mode</td>
<td></td>
</tr>
<tr>
<td>(3)</td>
<td>Operation mode/data number display</td>
<td>Display the current operation mode (NORMAL/SETTING), or the data number currently displayed on the data display.</td>
<td></td>
</tr>
<tr>
<td>(4)</td>
<td>Data display</td>
<td>Displays various data.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The displayed data vary depending on the operation mode and data number.</td>
<td></td>
</tr>
<tr>
<td>(5)</td>
<td>[SELECT] (selection) key</td>
<td>Used to select each mode.</td>
<td></td>
</tr>
<tr>
<td>(6)</td>
<td>[DOWN] key</td>
<td>Decrements the number of operation mode or data number/value by one.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If you keep pressing this key, the number is decremented by ten.</td>
<td></td>
</tr>
<tr>
<td>(7)</td>
<td>[UP] key</td>
<td>Increments the number of operation mode or data number/value by one.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If you keep pressing this key, the number is incremented by ten.</td>
<td></td>
</tr>
<tr>
<td>(8)</td>
<td>[ENTER] (registration) key</td>
<td>Registers an operation mode, data number or data changed.</td>
<td></td>
</tr>
<tr>
<td>(9)</td>
<td>Timer mode lamp (Red)</td>
<td>Blinks while the unit is halted in the timer mode.</td>
<td>page 24</td>
</tr>
<tr>
<td>(10)</td>
<td>Alarm lamp (Red)</td>
<td>When an alarm is activated:</td>
<td>page 38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blinks (Operation stops).........................Alarm level 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lit (Only the compressor stops),.............Alarm level 2</td>
<td></td>
</tr>
</tbody>
</table>
Operation mode

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

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
<th>Operation mode indicator</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation lock mode</td>
<td>Disables operations of the Oil Cooling Unit regardless of preset conditions.</td>
<td>“NORMAL” lamp is lit.</td>
<td>page 18</td>
</tr>
<tr>
<td>Normal mode</td>
<td>Displays the current operation mode and control target value.</td>
<td>“SETTING” lamp is lit.</td>
<td>page 18</td>
</tr>
<tr>
<td>Operation setting mode</td>
<td>Specifies an operation mode and control target value.</td>
<td>“SETTING” lamp is lit.</td>
<td>page 18</td>
</tr>
<tr>
<td>Monitor mode</td>
<td>Displays the current value of each thermistor etc.</td>
<td>“MONITOR” lamp is lit.</td>
<td>page 23</td>
</tr>
<tr>
<td>Timer setting mode</td>
<td>Used to set up time for the ON timer.</td>
<td>“TIMER” lamp is lit.</td>
<td>page 24</td>
</tr>
<tr>
<td>Parameter setting mode</td>
<td>Used to set up basic parameters of the Oil Cooling Unit.</td>
<td>“SETTING” lamp blinks.</td>
<td>page 24</td>
</tr>
<tr>
<td>Auto-tuning mode</td>
<td>Used to set up the function for control response improvement.</td>
<td>“NORMAL” lamp blinks.</td>
<td>page 30</td>
</tr>
</tbody>
</table>

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

Mode changing operation

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

CAUTION

- The factory setting is the “Operation lock” mode.
  To start operation, cancel the operation lock mode.
  (See page 18.)
- With the standard model, the initial operating conditions are as follows:
  Operation mode: 3 (Room temperature tuning, Tank liquid temperature control) Temperature difference: 0.0 (K)
Checking Initial Operating Conditions

Turn ON the power supply for the Oil Cooling Unit.
Check the indication on the control panel.

Is “U1” displayed on the control panel?
YES
It means reverse-phase connection. Exchange two phases out of three phases (L1, L2 and L3).

NO

Is the “Operation lock” mode selected?
YES
Cancel the operation lock mode.

NO

The DAIKIN factory setting is the “Operation lock” mode.

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

Check the initial operating conditions.
Check the current operation settings on the control panel display.

With the standard model, the factory setting of the operation mode is “3” (Room temperature tuning, Tank liquid temperature control), and the temperature difference is “0.0 (K)”.

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

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

Example) Room temperature: 35°C

Changing operation settings

Holding constant tank liquid temperature
See page

Tuning tank liquid temperature to room temperature (or machine temperature)
See page

Cooling liquid in the tank at constant capacity (%)
See page
Operation Setting

The Oil Cooling Unit operation setting provides the following modes.

<table>
<thead>
<tr>
<th>Control method</th>
<th>Reference temperature</th>
<th>Control target</th>
<th>Operation mode</th>
<th>Setting range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holding constant tank liquid temperature</td>
<td></td>
<td>Tank liquid temperature</td>
<td>0 (p. 20)</td>
<td>5.0–50.0 (°C)</td>
</tr>
<tr>
<td>Tuning tank liquid temperature to room temperature (or machine temperature)</td>
<td>Room temperature</td>
<td>Tank liquid temperature</td>
<td>3 (p. 21)</td>
<td>–9.9–9.9 (K)</td>
</tr>
<tr>
<td>Cooling liquid in the tank at constant capacity (%)</td>
<td></td>
<td>Tank liquid temperature</td>
<td>4 (p. 21)</td>
<td>–9.9–9.9 (K)</td>
</tr>
</tbody>
</table>

*1: For control target measuring points, see the figure below.
*2: Optional function using optional parts
*3: Operation modes 1, 2 and 5–8 cannot be used.
*4: K (Kelvin) is a symbol of the SI unit system that indicates a temperature difference (°C).

System outline drawing

An example of a main machine coolant system using the Oil Cooling Unit is shown below.

(19:2007年9月20日 午後3時4分)

Description on the refrigerating cycle

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

Note:1. The system components other than the AKZJ series Oil Cooling Unit should be provided by user (main machine).
Holding constant tank liquid temperature

**Setting procedure**

1. **Select the operation setting mode.**
   - Go to the operation setting mode with the key.
   - The “SETTING” lamp on the operation mode indicator lights.
   - The number on the operation mode display blinks.
   - See "Mode changing operation" on page 17.

2. **Change the operation mode.**
   - When the number on the operation mode display is blinking, change the number to “0” with the or key.
   - The number on the operation mode display remains lit.

3. **After changing the number, press the key to register it.**
   - After the number is registered, the number on the data display blinks.
   - The number on the operation mode display remains lit.

4. **Change the temperature setting.**
   - When the number on the data display is blinking, change the set value to a desired oil temperature with the or key.

5. **After changing the set value, press the key to register it.**
   - After the temperature setting is registered, the number on the operation mode display blinks.
   - The number on the data display remains lit.

6. **Return to the normal mode.**
   - Press the key three times, to return to the normal mode.
   - The “NORMAL” lamp on the operation mode indicator lights.

---

**Example**

Outlet oil temperature, Fixed temperature control
(Temperature setting: 25°C)
Tuning tank liquid temperature to room temperature (or machine temperature)

To tune tank liquid temperature to room temperature (or machine temperature), the following two types of operation settings are available.

- Tuning tank liquid temperature to room temperature
- Tuning tank liquid temperature to machine temperature

With the above operation settings, the OILCON unit controls the tank liquid temperature so as to keep the difference between the room or machine temperature (reference temperature) and the tank liquid temperature (control target) at a constant value as the user specified, according to a change in the room or machine temperature. The temperature difference setting range is –9.9 to +9.9 (K).

Setting procedure

1. Select the operation setting mode.
   - Go to the operation setting mode with the [ key.
   - See “Mode changing operation” on page 17.
   - The "SETTING" lamp on the operation mode indicator lights.
   - The number on the operation mode display blinks.

2. Change the operation mode.
   - When the number on the operation mode display is blinking, change the number to "3" or "4" with the [ or ] key.

3. After changing the number, press the [ key to register it.
   - After the number is registered, the number on the data display blinks.
   - The number on the operation mode display remains lit.

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

5. After changing the set value, press the [ key to register it.
   - After the temperature setting is registered, the number on the operation mode display blinks.
   - The number on the data display remains lit.

6. Return to the normal mode.
   - Press the [ key three times, to return to the normal mode.
   - See “Mode changing operation” on page 17.
   - The "NORMAL" lamp on the operation mode indicator lights.
Cooling liquid in the tank at constant capacity (%)

With the above operation setting, the OILCON unit executes cooling operation according to the specified command value (%). Therefore, tank liquid temperature control is disabled.

The capacity setting range is 0 to 100%.
- The capacity (%) is an approximate index.
- When the capacity is set to "0"%, the compressor stops. (The pump and fan are running.)
- Even if the capacity command value is the same, the actual cooling capacity varies depending on the room temperature and the tank liquid temperature.

**Setting procedure**

1. **Select the operation setting mode.**
   - Go to the operation setting mode with the key.
   - See “Mode changing operation” on page 117.
   - The “SETTING” lamp on the operation mode indicator lights.
   - The number on the operation mode display blinks.

2. **Change the operation mode.**
   - When the number on the operation mode display is blinking, change the number to “9” with the or key.

3. **After changing the number, press the key to register it.**
   - After the number is registered, the number on the data display blinks.
   - “9” on the operation mode display remains lit.

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

5. **After changing the set value, press the key to register it.**
   - After the temperature setting is registered, the number on the operation mode display blinks.
   - The number on the data display remains lit.

6. **Return to the normal mode.**
   - Press the key three times, to return to the normal mode.
   - See “Mode changing operation” on page 117.
   - The “NORMAL” lamp on the operation mode indicator lights.
Monitor Items

When the "Monitor mode" is selected, the following items can be checked.

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Machine temperature [Th5]</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Not used</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Room temperature [Th3]</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Tank liquid temperature [Th4]</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Not used</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Not used</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Capacity command value (%)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Compressor inverter rotation speed (rps)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Not used</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Status of expansion DIN (third digit)/DOUT (first digit)</td>
<td></td>
</tr>
</tbody>
</table>

1: Nos. 0, 2, and 3 indicate a temperature detected with each thermistor.
   When the relevant thermistor is not connected or has a wire break, "99.9" is displayed.
2: "0" is displayed.
3: With the factory setting, "J" is displayed. However, it is for indication only. Actual communication is enabled when the optional expansion communication board is mounted.

Operating procedure

1. Select the monitor mode.
   - Go to the monitor mode with the key.
   - See "Mode changing operation" on page 17.
   - The "MONITOR" lamp on the operation mode indicator lights.
   - The value on the data number display blinks.

2. Monitor the current status.
   Change the value on the data number display to a desired value with the or key.
   
   When the data number is changed, the temperature currently detected with the thermistor and input/output values simultaneously appear on the data display.

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

With the “ON” timer, the Oil Cooling Unit can be started after elapse of a desired time. This mode can be used to warm up the main machine.

The operation start time setting range is 0 to 99 hours (in one hour steps).

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

Operating procedure

1. Select the timer mode.
   - Go to the timer mode with the key.
   - See “Mode changing operation” on page 17.
   - The “TIMER” lamp on the operation mode indicator lights.
   - “0” blinks on the data display.

2. Specify an operation start time.
   - Change the value on the data display to a desired value with the or key.
   - The unit of set value is “h” (hour).

3. Set up the timer.
   - Press the key to register the timer setting.
   - When the timer is activated, the Oil Cooling Unit is halted.
   - The “TIMER” lamp (red LED) blinks.
   - Keep the main power supply ON.

Main machine warm-up

- With the built-in heater model (-H), the electric heater heats up liquid in the tank to a preset temperature during main machine warm-up in winter. Combining this function with timer operation enables more effective warm-up.
  
  Heater ON: When tank liquid temperature is at least 2.1°C lower than preset temperature
  Heater OFF: When tank liquid temperature is equal to, or higher than preset temperature

- Regardless of the operation mode, the OILCON unit turns ON/OFF the heater by detecting the tank liquid temperature. (Only when the compressor is not in operation)

- Note that the heater cannot perform high-precision tank liquid temperature control.
# Additional Setting Functions

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

## 1 Additional setting functions

- **Auto-tuning**: Automatically sets up the parameters appropriately for the system. See page 30.
- **Temperature range warning**: Activates warning output when tank liquid temperature exceeds preset temperature range. See page 27.
- **Alarm/warning output logic**: Outputs signal from Oil Cooling Unit to main machine. See page 33.
- **Communication with main machine**: Enables communication with main machine when optional board is mounted (see page 35). Refer to HM01568.

## 2 Parameter list

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

<table>
<thead>
<tr>
<th>Additional setting function</th>
<th>No.</th>
<th>Item</th>
<th>Minimum value</th>
<th>Maximum value</th>
<th>Initial value</th>
<th>Unit</th>
<th>Necessity of power supply reset</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto-tuning</td>
<td>n00</td>
<td>Not used</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n01</td>
<td>Alarm output logic</td>
<td>0</td>
<td>11</td>
<td>0</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n02</td>
<td>OP contact level</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n03</td>
<td>OP2 contact level</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n04</td>
<td>Outlet oil temperature decrease</td>
<td>0.0</td>
<td>10.0</td>
<td>8.0</td>
<td>°C</td>
<td></td>
<td>For auto-tuning</td>
</tr>
<tr>
<td></td>
<td>n05</td>
<td>P/I gain calculation coefficient</td>
<td>0.1</td>
<td>10.0</td>
<td>7.0</td>
<td>–</td>
<td></td>
<td>See page 33</td>
</tr>
<tr>
<td></td>
<td>n06</td>
<td>Control gain P (for low deviation)</td>
<td>1</td>
<td>999</td>
<td>120</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n07</td>
<td>Control gain I (for low deviation)</td>
<td>1</td>
<td>999</td>
<td>120</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n08</td>
<td>Control gain P (for high deviation)</td>
<td>1</td>
<td>999</td>
<td>120</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n09</td>
<td>Control gain I (for high deviation)</td>
<td>1</td>
<td>999</td>
<td>120</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n10</td>
<td>Warning setting 1</td>
<td>0</td>
<td>465</td>
<td>0</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n11</td>
<td>Warning setting data 1</td>
<td>0.0</td>
<td>60.9</td>
<td>0.0</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n12</td>
<td>Warning setting 2</td>
<td>0</td>
<td>465</td>
<td>0</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n13</td>
<td>Warning setting data 2</td>
<td>0.0</td>
<td>60.9</td>
<td>0.0</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n14</td>
<td>Warning setting 3</td>
<td>0</td>
<td>465</td>
<td>0</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n15</td>
<td>Warning setting data 3</td>
<td>0.0</td>
<td>60.9</td>
<td>0.0</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n16</td>
<td>Warning setting 4</td>
<td>0</td>
<td>465</td>
<td>0</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n17</td>
<td>Warning setting data 4</td>
<td>0.0</td>
<td>60.9</td>
<td>0.0</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n18</td>
<td>Warning setting 5</td>
<td>0</td>
<td>465</td>
<td>0</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n19</td>
<td>Warning setting data 5</td>
<td>0.0</td>
<td>60.9</td>
<td>0.0</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n20</td>
<td>Use of parallel communication</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>–</td>
<td></td>
<td>The optional board is required.</td>
</tr>
<tr>
<td></td>
<td>n21 to n38</td>
<td></td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
<td>Never attempt to change these settings. Otherwise, the unit may malfunction.</td>
</tr>
</tbody>
</table>

Note: The initial value varies depending on the model. Automatically set up by auto-tuning.
3 Parameter setting procedure
You can set the parameter that enables the additional setting functions of the Oil Cooling Unit.
For description of the additional setting functions and parameter list, refer to page [page number].

**Setting procedure**

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

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

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

4. **Change the set value.**
   - When the value on the data display is blinking, change the set value with the **
     
   or **
     
   key.

5. **After changing the set value, press the **
     
   key to register it.**
   - After the set value is registered, the value on the data display remains lit.
   - "P" blinks on the data number display.

6. **Return to the normal mode.**
   - Press the **
     
   key, to return to the normal mode.
   - See "Mode changing operation" on page [page number].
   - The "NORMAL" lamp on the operation mode indicator lights.
Setting Additional Function—“Temperature range warning”

Outline of the function

- As an additional function of the Oil Cooling Unit, you can set up the “Temperature range warning” function. This function allows you to specify a desired temperature range within the Oil Cooling Unit operating range. When the control temperature exceeds the preset range, the unit informs you of the “Temperature range warning” condition.

- The “Temperature range warning” function provides the following settings:
  1) External output (30X relay output: ON): Turns ON/OFF the contact (66, 67) of the signal terminal block.
     (See the output logic on page 23.)
  2) Compressor forced stop—Warning: Stops the compressor. (Indication: 1E to 5E)
     Warning status will be automatically reset when preset warning reset temperature is reached.
  3) Alarm stop—“FH” alarm: Stops the compressor. (Indication: FH)
     (See “Alarm output logic” on page 10.)
     The warning reset setting is inactive. (When the power supply is turned ON again, the compressor restarts operation.)

Parameter setting

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

<table>
<thead>
<tr>
<th>Types of temperature range warning</th>
<th>Parameter Group A</th>
<th>Parameter Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Low liquid temperature (Fixed temperature)</td>
<td>n10</td>
<td>n11</td>
</tr>
<tr>
<td>(2) High liquid temperature (Fixed temperature)</td>
<td>n12</td>
<td>n13</td>
</tr>
<tr>
<td>(3) Low liquid temperature (Temperature difference)</td>
<td>n14</td>
<td>n15</td>
</tr>
<tr>
<td>(4) High liquid temperature (Temperature difference)</td>
<td>n16</td>
<td>n17</td>
</tr>
<tr>
<td>(5) Reserve</td>
<td>n18</td>
<td>n19</td>
</tr>
</tbody>
</table>

* For temperature range warning, the above (1) to (5) types are available. Actually, however, any combinations of these types are enabled. The above (1) to (5) types can be simultaneously used.

Application of temperature range warning

(1) When Tank liquid temperature [Th4] is 15°C or lower, the compressor stops. (Warning)
(2) When Tank liquid temperature [Th4] is 35°C or higher, the compressor stops (FH alarm), and the 30X relay output turns ON.
(3) When Tank liquid temperature [Th4] is at least 5°C lower than the room temperature [Th3] (or machine temperature [Th5]), the 30X relay output turns ON.
(4) When Tank liquid temperature [Th4] is at least 5°C higher than the room temperature [Th3] (or machine temperature [Th5]), the 30X relay output turns ON.
Description on parameter settings (Group A)

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

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

<table>
<thead>
<tr>
<th>Temperature range warning condition setting</th>
<th>Temperature range warning operation setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Third digit</td>
<td>Second digit</td>
</tr>
<tr>
<td>(1) n10 Tank liquid temperature [Th4] 4 ≤ Fixed value 6</td>
<td>External output (&quot;Rely 30&quot; output: ON) 1</td>
</tr>
<tr>
<td>(2) n12 Tank liquid temperature [Th4] 4 ≥ Fixed value 5</td>
<td>External output (&quot;Rely 30&quot; output: ON) 1</td>
</tr>
<tr>
<td>(3) n14 Room temperature [Th3] 3</td>
<td>Tank liquid temperature [Th4] 4</td>
</tr>
<tr>
<td>(4) n16 Tank liquid temperature [Th4] 4</td>
<td>– Room temperature [Th3] 3</td>
</tr>
<tr>
<td>(4)</td>
<td>– Machine temperature [Th5] 1</td>
</tr>
</tbody>
</table>

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

(1) When Tank liquid temperature [Th4] is 15˚C or lower, the compressor stops. (Warning) n10 462
(2) When Tank liquid temperature [Th4] is 35˚C or higher, the compressor stops (FH alarm), and the 30X relay output turns ON. n12 455
(3) When Tank liquid temperature [Th4] is at least 5˚C lower than the room temperature [Th3] (or machine temperature [Th5]), the 30X relay output turns ON. n14 341 (141)
(4) When Tank liquid temperature [Th4] is at least 5˚C higher than the room temperature [Th3] (or machine temperature [Th5]), the 30X relay output turns ON. n16 431 (411)
Description on parameter settings (Group B)

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

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

<table>
<thead>
<tr>
<th>Temperature range warning temperature</th>
<th>Temperature range warning reset temperature (Temperature difference for automatic reset)¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second digit</td>
<td>First digit</td>
</tr>
<tr>
<td>(1) n11</td>
<td>0 to 60 (°C)</td>
</tr>
<tr>
<td>(2) n13</td>
<td></td>
</tr>
<tr>
<td>(3) n15</td>
<td></td>
</tr>
<tr>
<td>(4) n17</td>
<td></td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th></th>
<th>Parameter settings</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>When Tank liquid temperature [Th4] is 15°C or lower, the compressor stops. (Warning) [When Tank liquid temperature [Th4] becomes 17°C, the warning status will be automatically reset.]</td>
<td>n11 15.2²</td>
</tr>
<tr>
<td>(2)</td>
<td>When Tank liquid temperature [Th4] is 35°C or higher, the compressor stops (FH alarm), and the 30X relay output turns ON.</td>
<td>n13 35.0</td>
</tr>
<tr>
<td>(3)</td>
<td>When Tank liquid temperature [Th4] is at least 5°C lower than the room temperature [Th3] (or machine temperature [Th5]), the 30X relay output turns ON. [When the difference between room temperature [Th3] and Tank liquid temperature [Th4] becomes 4°C or less, the] warning status will be automatically reset.</td>
<td>n15 5.1³</td>
</tr>
<tr>
<td>(4)</td>
<td>When Tank liquid temperature [Th4] is at least 5°C higher than the room temperature [Th3] (or machine temperature [Th5]), the 30X relay output turns ON. [When the difference between room temperature [Th3] and Tank liquid temperature [Th4] becomes 3°C or less, the] warning status will be automatically reset.</td>
<td>n17 5.2⁴</td>
</tr>
</tbody>
</table>

*²: 17 (Temperature range warning reset temperature) – 15 (Temperature range warning temperature) = 2
*³: 5 (Temperature range warning temperature) – 4 (Temperature range warning reset temperature) = 1
*⁴: 5 (Temperature range warning temperature) – 3 (Temperature range warning reset temperature) = 2
For Temperature Control Improvement—“Auto-tuning mode”

To use the Oil Cooling Unit in normal conditions, this function is not required.

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

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

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

Auto-tuning (Conceptual drawing)

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

<table>
<thead>
<tr>
<th>Parameter No.</th>
<th>Item</th>
<th>The auto-tuning mode automatically writes calculated values of temperature control gain (P and I) into specified parameters.</th>
</tr>
</thead>
<tbody>
<tr>
<td>n05</td>
<td>P/I gain calculation coefficient (Response coefficient)</td>
<td>Initial value: 7.0</td>
</tr>
<tr>
<td>n06</td>
<td>Temperature control gain P (for low deviation)</td>
<td>Calculated temperature control gain P</td>
</tr>
<tr>
<td>n07</td>
<td>Temperature control gain I (for low deviation)</td>
<td>Calculated temperature control gain I</td>
</tr>
<tr>
<td>n08</td>
<td>Temperature control gain P (for high deviation)</td>
<td></td>
</tr>
<tr>
<td>n09</td>
<td>Temperature control gain I (for high deviation)</td>
<td></td>
</tr>
</tbody>
</table>

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

- Outline of operation
  The auto-tuning mode executes the following steps. Check the Oil Cooling Unit status in each step.

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

1. Starting auto-tuning
   - Keep pressing these keys simultaneously for two seconds.
   - (Original operation mode)
   - Normal mode

2. Step: 0 (Checking tuning conditions)
   - Cancel
   - (Original operation mode)
   - Normal mode

3. Step: 1 (Operation for stabilizing initial status)
   - Cancel
   - (Operation at 1% capacity)
   - Normal mode

4. Step: 2 (Operation for collecting control target data)
   - Cancel
   - (Operation at 10% capacity)
   - Normal mode

5. Step: 3 (Calculation of temperature control gain P and I from collected data, and writing gain into each parameter)
   - Cancel
   - (Operation at 0% capacity: Stop)

6. Completion of auto-tuning
   - Cancel
   - (Operation at 0% capacity: Stop)
   - Normal mode
1. When starting auto-tuning, make sure that the oil temperature is nearly equal to the room temperature (in stable condition). Leave the main machine under no load (stopped).

2. If the remote signal turns OFF or an alarm is activated during execution of auto-tuning, an error occurs (auto-tuning cannot be executed), and the corresponding error message appears. To cancel the error, press the key. (The unit returns to the normal mode.) Check the remote signal, or examine the cause of the alarm. After taking a corrective action, execute auto-tuning again.

3. Before starting auto-tuning, select an operation mode to determine the control target thermistor. (Select any operation mode other than "9".)
   Operation mode 0, 3 or 4 ⇒ Tank liquid temperature thermistor
   Then, set Parameter [n04] by referring to [Note] 4. below.

4. In Step 2, the machine may be over-cooled. To suppress machine over-cooling, specify an auto-tuning end condition in Parameter [n04].
   Parameter [n04] Outlet oil temperature decrease (Auto-tuning end condition)
   Setting range: 0.0 to 10.0°C, Initial value: 8.0°C
   When the tank liquid temperature has decreased by the temperature specified with this parameter, auto-tuning (data collection) ends. If the specified temperature range is too small, temperature control gain may not be correctly calculated. You should set this parameter to the maximum value in the range where it does not cause damage to the machine.

5. To calculate more suitable temperature control gain based on the data collected in Step 3, you must specify a response coefficient in Parameter [n05]. (Through response coefficient adjustment, you can select whether to place importance on stability or response speed.)
   Parameter [n05] P and I gain calculation coefficient (Response coefficient)
   Setting range: 0.1 to 10.0, Initial value: 7.0
   Setting a smaller value improves stability. Setting a larger value improves response speed. If the set value is extremely large or small, the unit may not normally perform temperature control. First, you should execute auto-tuning with the initial value of 7.0.

6. Depending on the condition of the control target (machine), the unit may not calculate suitable temperature control gain in a single auto-tuning operation. You should execute auto-tuning two or three times to average the calculated values, or use the value that most frequently appears (except for an extreme value). To calculate a more suitable temperature control gain, you may change Parameter [n05] (see [Note] 5. above).

7. In the following cases, temperature control is not stabilized because the compressor turns ON/OFF without being subjected to inverter control.
   (1) Operation under small load (Cooling capacity: 30% or less)
   (2) Rapid load change (Transition period)
Alarm/Warning Output Logic

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

1. Connect the required signal cable to the signal terminal block.
   (For the connecting method, refer to "Connection of external output contact" on page 10.)
2. Set Parameter [n01].
   n01: Alarm/warning output logic (First digit).

<table>
<thead>
<tr>
<th>Setting</th>
<th>0</th>
<th>1 (2 to 9: Same operation as with 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Contact</td>
<td>Normal</td>
</tr>
<tr>
<td>Alarm output</td>
<td>60–61</td>
<td>ON</td>
</tr>
<tr>
<td>Temperature range</td>
<td></td>
<td>60–63</td>
</tr>
<tr>
<td>warning output</td>
<td>66–67</td>
<td>ON</td>
</tr>
</tbody>
</table>

First digit: Specifies alarm output logic (60, 61, 63) and warning output logic (66, 67) of the signal terminal block.
Second digit: Specifies DOUT signal output logic. (Optional communication expansion board is required.)
For details, refer to "Communication Expansion Board Instruction Manual" (HM01568).

Alarm Settings for Optional Protection Devices (Installed by User)

The Oil Cooling Unit can activate an alarm by receiving an output signal from optional protection devices (e.g. flow switch).

**When using OP terminals [12] and [13]:**
   (See "Outline of electrical equipment box" on page 9.)
2. Set Parameter [n02].
   *0*: OP terminal is not used. (Factory setting)
   *1*: When OP contact turns OFF, Alarm Level 1 is activated.
   *2*: When OP contact turns OFF, Alarm Level 2 is activated.
   *3*: When OP contact is not ON after 30 seconds from agitator operation start, Alarm Level 1 is activated.

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

**When using OP 2 terminal [CN2]:**
1. Connect the signal cable of the optional protection device to [CN2] on the Oil Cooling Unit control board.
   (See "Outline of electrical equipment box" on page 9.)
2. Set Parameter [n03].
   *0*: OP2 terminal is not used. (Factory setting)
   *1*: When OP2 contact turns OFF, Alarm Level 1 is activated.
   *2*: When OP2 contact turns OFF, Alarm Level 2 is activated.

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

Machine temperature tuning control

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

Optional Parts

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Lead wire length L (m)</th>
<th>Dimensions</th>
<th>Application (Installed by user)</th>
<th>Compatible model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine temperature tuning</td>
<td>AKZ8–OP–K5</td>
<td>(5 m)</td>
<td></td>
<td>For machine temperature tuning control</td>
<td>AKZ8 series</td>
</tr>
<tr>
<td>thermistor</td>
<td>AKZ8–OP–K10</td>
<td>(10 m)</td>
<td></td>
<td>(embedded in machine body)</td>
<td></td>
</tr>
<tr>
<td>Machine temperature tuning</td>
<td>AKZ8–OP–A5</td>
<td>(5 m)</td>
<td></td>
<td>For machine temperature tuning control</td>
<td></td>
</tr>
<tr>
<td>thermistor</td>
<td>AKZ8–OP–A10</td>
<td>(10 m)</td>
<td></td>
<td>(attached to machine body surface)</td>
<td></td>
</tr>
</tbody>
</table>

Mounting procedure

Oil Cooling Unit

Connect the round terminal (1.25–3) of the above part to terminals [30] and [31] of the X2M terminal block in the electrical equipment box. (No polarity)

(See “Outline of electrical equipment box” on page 19.)

Main machine

For AKZ8–OP–K

- Rc 1/8 (in machine body)
- Prepared hole Ø, Depth: 20 min.
- Fill silicone grease into hollow.
- Recommended grease: Shin-Etsu Chemical Co., Ltd., Heat-radiating grease, Part No. KS609

Connection to terminals 30 and 31 of Oil Cooling Unit X2M terminal block

CAUTION

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

For AKZ8–OP–A

- Band and mounting screw shall be prepared by user.
- Place the thermistor in contact with the machine body, and cover it with putty.

Connection to terminals 30 and 31 of Oil Cooling Unit X2M terminal block
Optional Parts

Communication with main machine

When this optional board is mounted to the Oil Cooling Unit to connect this unit to the main machine:

1. You can change the operation mode and operation setting from the main machine.
2. You can read the Oil Cooling Unit alarm code and temperature data (machine temperature, room temperature, inlet oil temperature, outlet oil temperature, temperature difference between inlet and outlet, and inverter frequency data) from the main machine.

* To execute parallel communication, you must set the corresponding parameter. (See page [25].) The Oil Cooling Unit cannot communicate with the main machine simply by mounting this optional board. For serial communication, parameter setting is not required.

Optional parts

<table>
<thead>
<tr>
<th>Communication method</th>
<th>Type</th>
<th>Mounting position</th>
<th>Compatible model</th>
<th>Specification No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial communication only</td>
<td>AKZ8–OP–CS</td>
<td>Upper surface of Oil Cooling Unit control board</td>
<td>AKZ148, AKZ328, AKZ438, AKZJ188, AKZJ358, AKZJ458</td>
<td>SS08303</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Back of Oil Cooling Unit electrical equipment box front sheet metal</td>
<td>AKZ568, AKZ908, AKZJ568, AKZJ908</td>
<td></td>
</tr>
<tr>
<td>Serial or parallel communication</td>
<td>AKZ8–OP–CSP</td>
<td>Back of Oil Cooling Unit electrical equipment box front sheet metal</td>
<td>AKZ568, AKZ908, AKZJ568, AKZJ908</td>
<td>SS08370</td>
</tr>
</tbody>
</table>

Mounting procedure

**AKZ8–OP–CS**

1. Locking support (x4), Mounted to control board
2. To main machine or PC (Serial communication only)
3. Prepared by user
4. Supplied lead wire
5. Control board
6. Connection to [CN12] on Oil Cooling Unit control board via supplied lead wire.
7. Electrical equipment box front sheet metal
8. Locking support (x4), Mounted to sheet metal inner surface

**AKZ8–OP–CSP**

1. Locking support (x4), Mounted to control board
2. To main machine or PC (Serial communication only)
3. Prepared by user
4. Supplied lead wire
5. Inverter board
6. Connection to [CN14] on Oil Cooling Unit control board via supplied lead wire.
7. Electrical equipment box front sheet metal
8. Locking support (x4), Mounted to sheet metal inner surface
9. Connection to RS232C port of main machine or PC (D-SUB, 9-pin female connector)
10. Not used (No connection)
11. Connection to main machine PLC output port
Maintenance/Inspection

**Daily maintenance/inspection**

- Use thorough caution about operating liquid pollution control to maintain the pollution degree at NAS10 or lower level.
- Maintain the liquid level in the oil tank within the specified range. (See page [5].) Be sure not to allow liquid leak due to overflow. Never attempt to operate the unit without oil.
- Clean inside of the oil tank periodically to eliminate accumulated objects (cutting swarf etc.).
- Make sure that the power supply voltage is within the following range:
  - 50 Hz.............200 V ±10%
  - 60 Hz...........200/220 V ±10%
- Check if the compressor, fan or agitator does not abnormally sound during operation.
- Make sure that the Oil Cooling Unit does not abnormally shake during operation.

**Periodic maintenance/inspection**

**Return filter** (See page [6].)
- Clean the return filter at the tank return (liquid inlet) port periodically to prevent decrease in liquid level in the tank due to dust clogging.

**Air filter** (See page [15].)
- Be sure to wash the air filter with water at 40°C or lower temperature every two weeks.
  - If the air filter is clogged with dust, the wind volume reduces, resulting in capacity deterioration. Also, the compressor's protection device is activated, hindering smooth operation. Furthermore, it causes power consumption increase.
  - Operating the unit without the air filter causes a fault.
  - To remove the air filter, hold the bottom of the filter with both hands, and push it up while warping it forward.

**Condenser** (See page [15].)
- If the condenser becomes extremely dirty, clean it with a brush, air blower, etc.
  - (When cleaning the condenser fins, wear gloves. Otherwise, you may be injured by the sharp edges.)

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

**Cooling coil**
- If cutting swarf or chips accumulate on the OILCON cooling coil surface, it results in cooling capacity deterioration, and also causes a fault of the unit. Check and clean the cooling coil periodically.
  - Remove the OILCON unit from the tank, and clean the unit with a soft non-metal brush.
  - During cleaning, be careful not to apply strong impact or force to the cooling coil.

**To leave the unit unused for a long period**

- Mount a cover to the Oil Cooling Unit to prevent dust or water from entering inside of the unit.
- Be sure to turn OFF the main power supply.
- Be careful to keep oily dust off the condenser surface of the Oil Cooling Unit.
### Troubleshooting

1. **When the Oil Cooling Unit does not work well, first check the following points.**

2. **If the problem persists, contact DAIKIN Contact Center with information on the following 1), 2) and 3) items.**
   - **1) Machine name (Full Model No.)**
   - **2) Manufacture No. (MFG. No.)**
   - **3) Condition of the Oil Cooling Unit (as closely as possible)**

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

#### When the unit operation seems abnormal although no alarm is activated

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
<th>Cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The unit does not run at all. (The POWER lamp on the control panel is unlit.)</td>
<td>1) The main power supply is OFF, or the power cable (L1, L2) is disconnected.</td>
<td>Check if the power cable is connected to the power supply terminal.</td>
</tr>
<tr>
<td>2</td>
<td>The agitator does not run.</td>
<td>1) The remote control input ([10]-[11]) is OFF.</td>
<td>Check the connection of the remote control input.</td>
</tr>
<tr>
<td>3</td>
<td>The agitator is running, but the compressor does not run.</td>
<td>1) The compressor is stopped under temperature control.</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2) The compressor restart prevention timer has been activated (for 30 seconds).</td>
<td>Check if the compressor starts after elapse of the timer preset time.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3) The low oil temperature protection device has been activated. (Inlet oil temperature is 2˚C or lower.)</td>
<td>Check if the compressor normally operates at 5˚C or higher tank liquid temperature.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4) The low ambient temperature protection device has been activated. (Room temperature is –2˚C or lower.)</td>
<td>Check if the compressor normally operates at 0˚C or higher room temperature.</td>
</tr>
<tr>
<td>4</td>
<td>Both the agitator and compressor are running, but the operating liquid cannot be cooled.</td>
<td>1) There is an obstacle near the air intake/exhaust port.</td>
<td>Remove the obstacle.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2) The air filter is clogged.</td>
<td>Clean the air filter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3) The unit is running under capacity suppressing control, because the room temperature is high.</td>
<td>Check the capacity in the operating temperature range with the catalog, and select a model with appropriate capacity.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4) Heat load is large.</td>
<td>Change the temperature setting to an appropriate temperature.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5) The temperature setting is high.</td>
<td>Change the temperature setting to an appropriate temperature.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6) If the exhaust air temperature is almost equal to the room temperature although the compressor is in operation, the refrigerant gas is running short.</td>
<td>Re-fill refrigerant.</td>
</tr>
<tr>
<td>5</td>
<td>Operation setting cannot be performed.</td>
<td>1) If “-” appears on the data display, the temperature sensor corresponding to the selected operation mode is not connected.</td>
<td>Connect the corresponding temperature sensor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2) If “-” instantaneously appears when the [ENT] key (at the right end of the control panel) is pressed, the erroneous operation prevention switch is set to Ons.</td>
<td>Turn OFF the erroneous operation prevention switch (SW1) on the control board.</td>
</tr>
<tr>
<td>6</td>
<td>Alarm output operation ([64] or [65]) is different from that of conventional signal output.</td>
<td>1) The alarm output signal connection has been partially changed.</td>
<td>The [60] to [63] outputs are compatible with conventional models (AN-K5 series). With the 8 series, however, signal operations and connections of the [64] and [65] outputs have been changed.</td>
</tr>
</tbody>
</table>
When an alarm is activated (To cancel the alarm, turn OFF the power supply, and then turn it ON again.)

### Alarm list

<table>
<thead>
<tr>
<th>Alarm code</th>
<th>Alarm level</th>
<th>Description</th>
<th>Cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA 2</td>
<td>2</td>
<td>Heater overheat ([S4B1:CN4]) (For built-in heater model only)</td>
<td>1) AKZJ type: Insufficient oil level in tank</td>
<td>Refill the operating liquid.</td>
</tr>
<tr>
<td>A6 2</td>
<td>2</td>
<td>DC fan motor lock error</td>
<td>1) Fault of the DC fan motor</td>
<td>Replace the DC fan motor.</td>
</tr>
<tr>
<td>E1 1</td>
<td>1</td>
<td>System error</td>
<td>1) Internal parameter setting is invalid.</td>
<td>Replace the control board.</td>
</tr>
<tr>
<td>E3 2</td>
<td>2</td>
<td>High pressure error (High-pressure pressure switch ([S3P1:CN6]), Activated at 4.1 MPa)</td>
<td>1) The tank liquid temperature or room temperature is higher than the specified range.</td>
<td>Use the unit within the specified operating range.</td>
</tr>
<tr>
<td>E5 2</td>
<td>2</td>
<td>Compressor high temperature error (Discharge pipe thermostatic TH6, Activated at approx. 120°C)</td>
<td>1) The tank liquid temperature or room temperature is higher than the specified range.</td>
<td>Use the unit within the specified operating range.</td>
</tr>
<tr>
<td>E6 2</td>
<td>2</td>
<td>Compressor (M2C) lock</td>
<td>1) Fault of the compressor (Replace the compressor.)</td>
<td>Replace the compressor.</td>
</tr>
<tr>
<td>EH 1</td>
<td>1</td>
<td>Agitator motor inner thermistor ([S1B:CN3]) is activated at 135°C.</td>
<td>1) Because high-viscosity of oil is used, the motor is overloaded.</td>
<td>Use a coolant liquid that provides 0.5 to 200 mm²/s viscosity at an oil temperature within the specified operating range.</td>
</tr>
<tr>
<td>EJ 1 or 2</td>
<td>1</td>
<td>Optional protection device is activated.</td>
<td>1) The optionally-connected protection device (or factory-connected device, if it is incorporated in the unit) has been activated.</td>
<td>Check the condition detected with the relevant protection device.</td>
</tr>
<tr>
<td>H1 2</td>
<td>2</td>
<td>Air temperature thermistor error ([SH1:CN3]) (TH2: Room temperature thermistor)</td>
<td>1) The air temperature thermistor required for control is disconnected or short-circuited.</td>
<td>Identify the thermistor that indicates the error in the monitor mode on the operation panel (99.9” is displayed), and check the thermistor wiring.</td>
</tr>
<tr>
<td>FH 2</td>
<td>2</td>
<td>The tank liquid temperature is higher than 60°C.</td>
<td>1) The heating value of the main machine has exceeded the cooling capacity of the Oil Cooling Unit (Improper model selection)</td>
<td>If the unit is properly installed and the compressor runs at 100% capacity (capacity setting can be checked in the monitor mode), select a model that provides larger cooling capacity.</td>
</tr>
</tbody>
</table>

*Alarm level 1: Compressor, agitator and fan stop. Alarm level 2: Only compressor stops.*
<table>
<thead>
<tr>
<th>Alarm code</th>
<th>Alarm level</th>
<th>Description</th>
<th>Cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>JH</td>
<td>2</td>
<td>Liquid temperature thermistor error (TH4: Tank liquid temperature thermistor)</td>
<td>1) The tank liquid temperature thermistor required for control is disconnected or short-circuited.</td>
<td>Identify the thermistor that indicates the error in the monitor display mode on the operation panel (“99.9” is displayed), and check the wiring of the thermistor.</td>
</tr>
<tr>
<td>J3</td>
<td>2</td>
<td>Discharge pipe temperature thermistor error</td>
<td>1) The discharge pipe temperature thermistor is disconnected or short-circuited.</td>
<td>Check the wiring of the relevant thermistor.</td>
</tr>
<tr>
<td>J5</td>
<td>2</td>
<td>EV valve outlet temperature thermistor error</td>
<td>1) The EV valve outlet temperature thermistor is disconnected or short-circuited.</td>
<td>Check the wiring of the relevant thermistor.</td>
</tr>
<tr>
<td>J6</td>
<td>2</td>
<td>Condenser temperature thermistor error</td>
<td>1) The condenser temperature thermistor is disconnected or short-circuited.</td>
<td>Check the wiring of the relevant thermistor.</td>
</tr>
<tr>
<td>L0</td>
<td>2</td>
<td>Inverter/compressor error</td>
<td>1) The compressor or inverter has a fault.</td>
<td>Replace the control board or compressor.</td>
</tr>
<tr>
<td>LC</td>
<td>2</td>
<td>INV-temperature control CPU communication error</td>
<td>1) Communication failure between the temperature control microprocessor and the inverter microprocessor.</td>
<td>Replace the control board, or improve the power supply environment. (Take noise suppressing measures.)</td>
</tr>
<tr>
<td>P3</td>
<td>2</td>
<td>Electrical equipment box temperature thermistor error</td>
<td>1) The electrical equipment box temperature thermistor is disconnected or short-circuited.</td>
<td>Check the wiring of the relevant thermistor.</td>
</tr>
<tr>
<td>P4</td>
<td>2</td>
<td>Radiator fin temperature thermistor error</td>
<td>1) The radiator fin temperature thermistor is disconnected or short-circuited.</td>
<td>Check the wiring of the relevant thermistor.</td>
</tr>
<tr>
<td>U0</td>
<td>2</td>
<td>Gas shortage</td>
<td>1) The refrigerant piping is damaged by excess vibration during transportation, resulting in refrigerant gas leak.</td>
<td>Repair the refrigerant pipe, and refill refrigerant.</td>
</tr>
<tr>
<td>U1</td>
<td>1</td>
<td>Power supply reverse-phase connection</td>
<td>1) The power supply is connected in reverse phase.</td>
<td>Exchange any phase of the power supply wiring.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2) The L3 phase is open.</td>
<td>Make sure that the L3 phase is properly connected to the power supply terminal block.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3) The fuse in the control board has blown.</td>
<td>Contact DAIKIN Contact Center.</td>
</tr>
<tr>
<td>U2</td>
<td>2</td>
<td>Momentary power failure or voltage drop</td>
<td>1) The power supply voltage is lower than approx. 170 V.</td>
<td>Make sure that the power supply voltage conforms to the rating. Check for instantaneous voltage drop at startup of peripheral equipment.</td>
</tr>
<tr>
<td>U9</td>
<td>2</td>
<td>Other system communication error (Slave communication error)</td>
<td>1) An error occurred in communication with a slave.</td>
<td>Make sure that the slave communication line is properly connected. (This error occurs only when the slave does not make response in master-slave communication.)</td>
</tr>
<tr>
<td>UH</td>
<td>2</td>
<td>System failure (EEPROM error)</td>
<td>1) The parameter stored in the control board is invalid.</td>
<td>Replace the control board.</td>
</tr>
<tr>
<td>UJ</td>
<td>1 or 2</td>
<td>Optional protection device is activated. (OP2)</td>
<td>1) The optionally-connected protection device (or factory-connected device, if it is incorporated in the unit) has been activated.</td>
<td>Check the condition detected with the relevant protection device.</td>
</tr>
<tr>
<td>1E</td>
<td></td>
<td>Temperature range warning 1</td>
<td>1) The monitor temperature has exceeded the preset temperature. (It does not mean a fault of the Oil Cooling Unit.)</td>
<td>Check the preset warning condition.</td>
</tr>
<tr>
<td>2E</td>
<td></td>
<td>Temperature range warning 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3E</td>
<td></td>
<td>Temperature range warning 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4E</td>
<td></td>
<td>Temperature range warning 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5E</td>
<td></td>
<td>Temperature range warning 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>