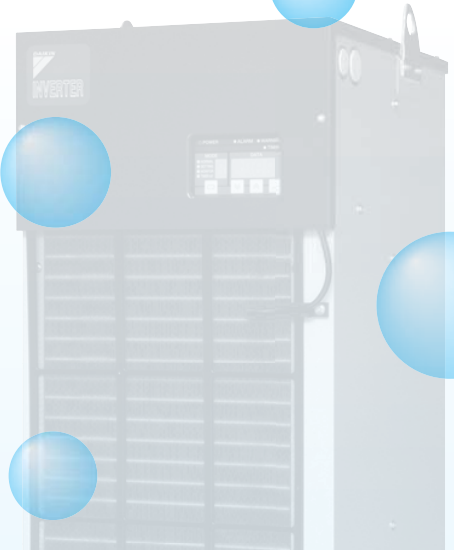


L

OIL COOLING EQUIPMENT



● Oil cooling unit, inverter controlled chiller (Air-cooled type)

| Product name | Model name | Range of cooling capacity at standard point kW | | | | | | | | | | Page | | | | | |
|--|--------------|--|--------------------|--------------------|--------------------|---|---|---|---|---|---|------|----|--|--|--|------|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | 10 | | | | |
| Circulating type oil cooling unit for machine tool spindles | AKZ9 Series | AKZ149 | Operation at 50 Hz | | Operation at 60 Hz | | | | | | | | | | | | L-3 |
| | | AKZ329 | Operation at 50 Hz | | Operation at 60 Hz | | | | | | | | | | | | |
| | | AKZ439 | Operation at 50 Hz | | Operation at 60 Hz | | | | | | | | | | | | |
| | | AKZ569 | Operation at 50 Hz | | Operation at 60 Hz | | | | | | | | | | | | |
| | | AKZ909 | Operation at 50 Hz | | Operation at 60 Hz | | | | | | | | | | | | |
| Immersion type oil cooling unit for coolant | AKZJ8 Series | AKZJ188 | Operation at 50 Hz | | Operation at 60 Hz | | | | | | | | | | | | L-19 |
| | | AKJZ358 | Operation at 50 Hz | | Operation at 60 Hz | | | | | | | | | | | | |
| | | AKJZ458 | Operation at 50 Hz | | Operation at 60 Hz | | | | | | | | | | | | |
| | | AKJZ568 | Operation at 50 Hz | | Operation at 60 Hz | | | | | | | | | | | | |
| | | AKJZ908 | Operation at 50 Hz | | Operation at 60 Hz | | | | | | | | | | | | |
| AKC9 Series Circulating type oil cooling unit for coolant | AKC359 | Operation at 50 Hz | | Operation at 60 Hz | | | | | | | | | | | | | L-26 |
| | AKC569 | Operation at 50 Hz | | Operation at 60 Hz | | | | | | | | | | | | | |
| AKW9 Series Inverter controlled chiller | AKW149 | Operation at 50 Hz | | Operation at 60 Hz | | | | | | | | | | | | | L-38 |
| | AKW329 | Operation at 50 Hz | | Operation at 60 Hz | | | | | | | | | | | | | |
| | AKW439 | Operation at 50 Hz | | Operation at 60 Hz | | | | | | | | | | | | | |
| | AKW189 | Operation at 50 Hz | | Operation at 60 Hz | | | | | | | | | | | | | |
| | AKW359 | Operation at 50 Hz | | Operation at 60 Hz | | | | | | | | | | | | | |
| | AKW459 | Operation at 50 Hz | | Operation at 60 Hz | | | | | | | | | | | | | |

● LT cooler (Water-cooled type)

| Product name | Model name | Range of cooling capacity kW | | | | | | | | | | Page | | | | | |
|--------------|------------|------------------------------|---|---|--------------------|---|----|--|--|--|--|------|-----|--|--|--|------|
| | | 1 | 2 | 3 | 4 | 5 | 10 | | | | | | 100 | | | | |
| LT cooler | LT0403 | Operation at 50 Hz | | | Operation at 60 Hz | | | | | | | | | | | | L-44 |
| | LT0504 | Operation at 50 Hz | | | Operation at 60 Hz | | | | | | | | | | | | |
| | LT0707 | Operation at 50 Hz | | | Operation at 60 Hz | | | | | | | | | | | | |
| | LT1010 | Operation at 50 Hz | | | Operation at 60 Hz | | | | | | | | | | | | |
| | LT1515 | Operation at 50 Hz | | | Operation at 60 Hz | | | | | | | | | | | | |
| | LT2020 | Operation at 50 Hz | | | Operation at 60 Hz | | | | | | | | | | | | |
| | LT3030 | Operation at 50 Hz | | | Operation at 60 Hz | | | | | | | | | | | | |
| | LT5060 | Operation at 50 Hz | | | Operation at 60 Hz | | | | | | | | | | | | |

Oil Cooling Unit

Inline type cooling unit for spindle/lubrication oil



AKZ9 Series
For lubrication oil
For hydraulic oil

Immersion type cooling unit for coolant



AKZJ 8 Series
For cutting oil (fluid)
For grinding oil (fluid)

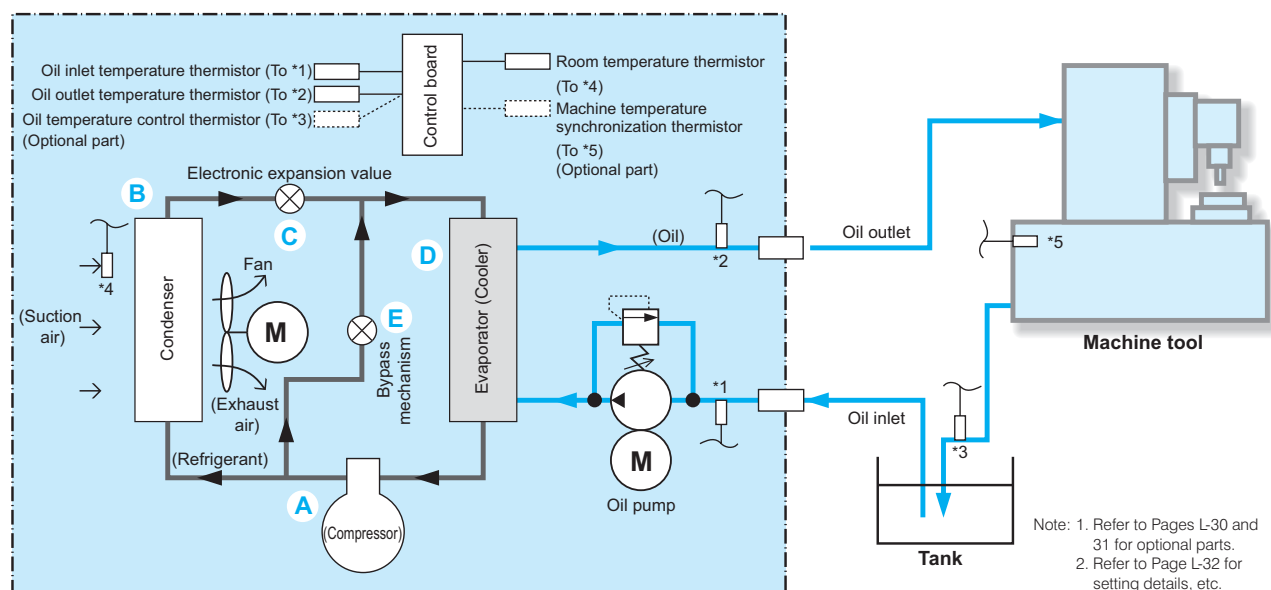
Inline type cooling unit for coolant



(Can be retrofitted to an existing tank)

AKC9 Series
For cutting oil (fluid)
For grinding oil (fluid)

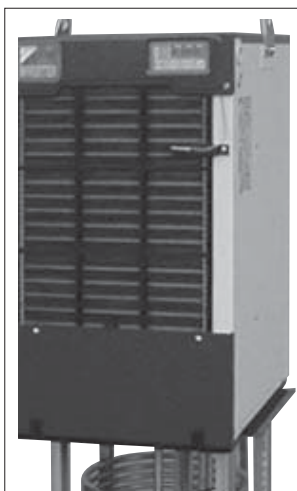
Principle of oil cooling unit and overall system diagram



[Refrigerating cycle]

- A:** Refrigerant gas is converted into compressed gas at high temperature and high pressure by a compressor so that the gas can be easily cooled and liquefied by a condenser.
- B:** In the condenser, the gas at high temperature and high pressure generated in the compressor is cooled with air and converted into liquid at high temperature and high pressure.
- C:** The electronic expansion valve reduces the pressure of the liquid at high temperature and high pressure and converts it into liquid at low temperature and low pressure by throttling it so that it can be easily vaporized in a cooler.
- D:** In the cooler, liquid at low temperature and low pressure generated by the electronic expansion valve absorbs heat from the oil, evaporates (cools the oil), and is converted into gas at low temperature and low pressure.
- E:** The bypass mechanism controls the cooling capacity by adjusting the volume of gas at high temperature and high pressure supplied to the cooler when heat load is low.

Oil Cooling Unit AKJ※※8 (Immersion Type for Cooling Coolant)



Features

- **Immersion type oil cooling unit for coolant**
(to be mounted directly on the tank, not provided with the circulating pump)
- **High energy-saving performance achieved**
Achieves high energy-saving performance with the adoption of a Daikin original IPM motor and R410A refrigerant.
- **Achieving high-accuracy temperature control**
Inverter control maintains machine tools at the optimum operating conditions at all times and improves the machining accuracy of the machine tools.
- **Low-noise operation achieved**
AKZJ 1.2 HP class:
Noise level with conventional model at 68 dB (A) → **62 dB (A)** (value equivalent to measurement in an anechoic chamber)

Nomenclature

| | | | | | | |
|------|----|---|---|---|---|------|
| AKZJ | 18 | 8 | - | C | - | ※※※※ |
| 1 | 2 | 3 | | 4 | | 5 |

1 Standard type (Basic type of oil cooling nit)

AKZJ: High-accuracy inverter controlled model, immersion open type
For cutting and grinding fluid (oil)

2 Cooling capacity (kW)

18: 1.8 kW
35: 3.5 kW
45: 4.5 kW
56: 5.6 kW
90: 9.0 kW

3 Symbol of series (Symbol to represent model change)

8: "8" series

4 Symbol of option type

Individual specifications for general purposes are set as a menu to avoid the need to design the individual specifications in each case and to enable shorter product delivery times.

* For the combination of menus, please consult us about detailed information.

5 Non-standard number (4 alphanumeric characters)

Non-standard type satisfying individual specifications not incorporated in the menu.

* Please consult us about special specifications, such as compliance with UL, or processing for tropical regions.

Specifications of standard, optional, and non-standard types

■ AKZJ8 (Immersion type)

| | Standard specifications | Option | Non-standard | Remarks |
|--|-------------------------|--------|--------------|---|
| Use of low-viscosity oil (fluid) | ✓ | | | Viscosity of oil used: 0.5 to 200 mm ² /s |
| With timer | ✓ | | | 99-hour timer |
| With breaker | | B | | |
| Compliance with CE | | C | | European Safety Standard |
| Different voltages (With transformer) | | E* | | The type "E" marked with *** includes three voltage types (E1, E2, E3) as listed to the right. E1: AC 220, 230 V, 50/60 Hz E2: AC 380, 400, 415 V, 50/60 Hz E3: AC 440, 460, 480 V, 50/60 Hz |
| With heater | | H | | |
| Specified paint color | | | ✓ | |
| With additional PC board for serial communication | | | ✓ | Standard types (AKZJ188, AKZJ358 and AKZJ458), and -C, -E* types |
| With additional PC board for serial/parallel communication | | | ✓ | Standard types (AKZJ568 and AKZJ908), and -C, -E* types |

Applications

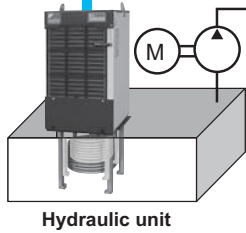
Examples of major applications

Machine tools: Machining centers, NC lathes, grinding machines, NC specialized machines, NC electric discharge machines, etc.
 Industrial machines: ... Molding machines, presses, etc.

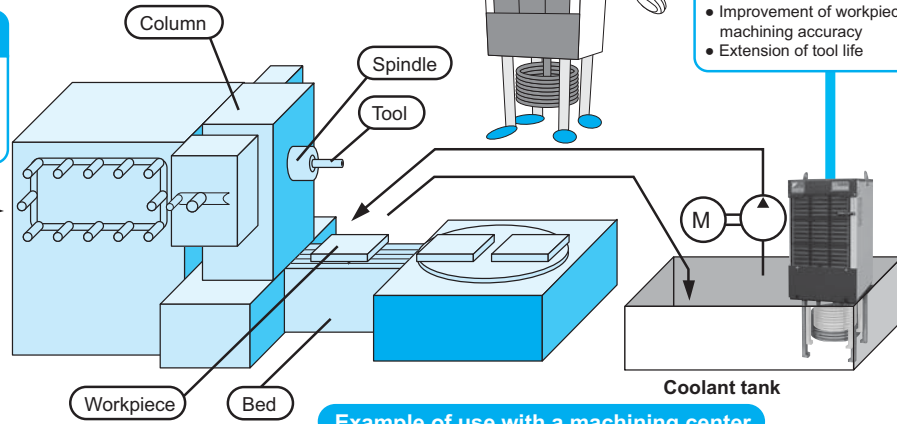
Cooling of hydraulic oil

Temperature (viscosity) control

- Prevention of deterioration of hydraulic oil (Longer life)
- Stabilized operation of actuators



Hydraulic unit



Example of use with a machining center

Cooling of cutting oil

Cooling of workpiece and tool

- Improvement of workpiece machining accuracy
- Extension of tool life

Specifications (AKZJ188/358/458)

| Oil cooling unit horsepower | HP | 0.5 | | | | | 1.2 | | | | | 1.5 | | | | | | | |
|--|---|---|---|---------------|-----------------|-------|-----------------------|-------------------|---------|-----|-------------------|---------------------------------------|---------|-------------------|----|-------|-------------------|--|--|
| | | AKZJ188 | | | | | AKZJ358 | | | | | AKZJ458 | | | | | | | |
| Model name | | Standard | -B | -C | -H | -E *3 | Standard | -B | -C | -H | -E *3 | Standard | -B | -C | -H | -E *3 | | | |
| Cooling capacity (50/60 Hz) *1 | kW | 1.6/1.8 | | | | | 3.2/3.5 | | | | | 4.2/4.5 | | | | | | | |
| Heater | kW | - | | | | | 1 | | | | | - | | | | | | | |
| Power supply *2 | | Three-phase AC 200/200·220 V 50/60 Hz | | | | | *3 | | | | | Three-phase AC 200/200·220 V 50/60 Hz | | | | | | | |
| Power voltage | Main circuit | Three-phase AC 200/200·220 V 50/60 Hz | | | | | | | | | | | | | | | | | |
| | Operation circuit | DC 12/24 V | | | | | | | | | | | | | | | | | |
| Max. power consumption Max. current consumption | When cooling | 200 V 50 Hz | 1.07 kVA/3.1 A | | | *9 | 1.76 kVA/5.2 A | | | *9 | 1.94 kVA/5.7 A | | | | | | | | |
| | | 200 V 60 Hz | 1.09 kVA/3.2 A | | | | 1.78 kVA/5.2 A | | | | 1.96 kVA/5.7 A | | | | | | | | |
| | | 220 V 60 Hz | 1.07 kVA/2.8 A | | | | 1.79 kVA/4.9 A | | | | 1.98 kVA/5.3 A | | | | | | | | |
| | When heating *8 | 200 V 50 Hz | - | 1.1 kVA/5.7 A | | | - | 1.2 kVA/5.9 A | | | - | 1.2 kVA/5.9 A | | | | | | | |
| | | 200 V 60 Hz | - | 1.1 kVA/5.6 A | | | - | 1.2 kVA/5.8 A | | | - | 1.2 kVA/5.8 A | | | | | | | |
| | | 220 V 60 Hz | - | 1.3 kVA/6.1 A | | | - | 1.4 kVA/6.3 A | | | - | 1.4 kVA/6.3 A | | | | | | | |
| Transformer capacity | | - | | | 2.2 kVA | - | | | 2.2 kVA | - | | | 2.2 kVA | | | | | | |
| External paint color | | White | | | | | | | | | | | | | | | | | |
| External dimensions (H × W × D) | mm | 980 × 360 × 440 | | | 980 × 450 × 630 | | | 1,120 × 360 × 440 | | | 1,120 × 450 × 630 | | | 1,320 × 360 × 440 | | | 1,320 × 450 × 630 | | |
| Compressor (Hermetic DC swing type) | | Equivalent to 0.4 kW | | | | | Equivalent to 0.75 kW | | | | | Equivalent to 1.1 kW | | | | | | | |
| Evaporator | | Open coil type | | | | | | | | | | | | | | | | | |
| Condenser | | Cross-fin-coil type | | | | | | | | | | | | | | | | | |
| Propeller fan | Motor | φ300, 75 W | | | | | | | | | | | | | | | | | |
| Agitator | Motor | 1-phase, 50 W, 4-pole motor | | | | | | | | | | | | | | | | | |
| Temperature control (Selectable) | Synchronization type | Standard | Room temperature or machine temperature ** (Set to room temperature by default) | | | | | | | | | | | | | | | | |
| | | Controlled object | Tank fluid temperature | | | | | | | | | | | | | | | | |
| | Fixed type | Synchronization range K | -9.9 to +9.9 against the reference temperature (Set at 0.0 by default) | | | | | | | | | | | | | | | | |
| | | Controlled object | Tank fluid temperature | | | | | | | | | | | | | | | | |
| Refrigerant control | | Rotation speed control of compressor by inverter + Opening rate control of electric expansion valve | | | | | | | | | | | | | | | | | |
| Refrigerant (R410A) *5 Filling volume | kg | 0.58 | | | | | 0.81 | | | | | 0.99 | | | | | | | |
| Protection devices | | A set of internal thermistor (for agitator), reverse-phase protection device, restart prevention timer, low room temperature protection thermistor, high fluid temperature protection thermistor, low fluid temperature protection thermistor, discharge pipe temperature thermistor, condenser temperature thermistor, refrigerant leakage detector, inverter protection device, non-fuse breaker (-B type only), High-pressure switch (-C type only), compressor thermal protector (-C type only), overheat prevention temperature thermistor (-H type only), fuse (-H type only) | | | | | | | | | | | | | | | | | |
| Operation range | Room temperature | °C | | | | | | | | | | | | | | | | | |
| | Tank fluid temperature | °C | | | | | | | | | | | | | | | | | |
| | Oil viscosity | mm ² /s | | | | | | | | | | | | | | | | | |
| Acceptable oils | | Water-soluble cutting/grinding fluid, cutting/grinding oil, lubrication oil, hydraulic oil, industrial water (Cannot be used for chemicals, food products or fuel) | | | | | | | | | | | | | | | | | |
| Noise level (Value equivalent to measurement in an anechoic chamber) (Front 1 m, height 1 m) | dB (A) | 62 | | | | | | | | | | | | | | | | | |
| Permissible transport vibration | | Up and down vibration 14.7 m/S ² (1.5 G) × 2.5 hr (10 to 100 Hz sweep/5 min.) | | | | | | | | | | | | | | | | | |
| Mass | kg | 38 | 41 | 103 | 44 | 47 | 109 | 53 | 56 | 118 | | | | | | | | | |
| Molded-case circuit breaker (Rated current) | A | - | 10 | - | - | 10 | - | 10 | - | - | 10 | - | - | - | - | | | | |
| Items prepared by the customer | Molded-case circuit breaker (Rated current) | A | | | | | | | | | | | | | | | | | |
| | Device other than molded-case circuit breaker | 10 (Required for types other than -B type) Tank (400 mm or more in depth), supply pump, float switch, return filter | | | | | | | | | | | | | | | | | |

Refer to Page L-21 for explanatory notes.

Specifications (AKZJ568/908)

| Oil cooling unit horsepower | | HP | 2.0 | | | | | 3.0 | | | | | | |
|---|---|--|---|----|-----------------------------|-------------------|----------------|--|----|-----------------------------|-------------------|----------------|----|----|
| Model name | | | AKZJ568 | | | | | AKZJ908 | | | | | | |
| | | | Standard | -B | -C | -H | -E *3 | Standard | -B | -C | -H | -E *3 | | |
| Cooling capacity (50/60 Hz) *1 | kW | | | | | 5.0/5.6 | | | | | 8.0/9.0 | | | |
| Heater | kW | | - | | | 2 | | - | | | 4 | | | |
| Power supply *2 | | | Three-phase AC 200/200·220 V 50/60 Hz | | | | | Three-phase AC 200/200·220 V 50/60 Hz | | | | | | |
| Power voltage | Main circuit | | Three-phase AC 200/200·220 V 50/60 Hz | | | | | Three-phase AC 200/200·220 V 50/60 Hz | | | | | | |
| | Operation circuit | | DC 12/24 V | | | | | DC 12/24 V | | | | | | |
| Max. power consumption Max. current consumption | When cooling | 200 V 50 Hz | | | | 3.3 kVA/9.4 A | *9 | | | | | 3.9 kVA/11.2 A | *9 | |
| | | 200 V 60 Hz | | | | 3.3 kVA/9.4 A | | | | | | 4.1 kVA/11.7 A | | |
| | | 220 V 60 Hz | | | | 3.4 kVA/9.0 A | | | | | | 4.3 kVA/11.2 A | | |
| | When heating *8 | 200 V 50 Hz | | - | | | 2.3 kVA/11.4 A | | - | | | 4.3 kVA/21.6 A | | |
| | | 200 V 60 Hz | | - | | | 2.3 kVA/11.4 A | | - | | | 4.3 kVA/21.6 A | | |
| | | 220 V 60 Hz | | - | | | 2.7 kVA/12.5 A | | - | | | 5.2 kVA/23.7 A | | |
| Transformer capacity | | | | | | 5 kVA | | | | | 6 kVA | | | |
| External paint color | | | | | | White | | | | | | | | |
| External dimensions (H × W × D) | mm | | | | 1,450 × 470 × 500 | 1,450 × 560 × 710 | | | | 1,630 × 560 × 620 | 1,630 × 655 × 830 | | | |
| Compressor (Hermetic DC swing type) | | | | | Equivalent to 1.5 kW | | | | | Equivalent to 2.2 kW | | | | |
| Evaporator | | | | | Open coil type | | | | | Open coil type | | | | |
| Condenser | | | | | Cross-fin-coil type | | | | | Cross-fin-coil type | | | | |
| Propeller fan | Motor | | | | φ400, 90 W, 4-pole motor | | | | | φ450, 150 W, 4-pole motor | | | | |
| Agitator | Motor | | | | 1-phase, 50 W, 4-pole motor | | | | | 1-phase, 50 W, 4-pole motor | | | | |
| Temperature control (Selectable) | Synchronization type | Standard | Room temperature or machine temperature *4 (Set to room temperature by default) | | | | | | | | | | | |
| | | Controlled object | Tank fluid temperature | | | | | | | | | | | |
| | | Synchronization range K | -9.9 to +9.9 against the reference temperature (Set at 0.0 by default) | | | | | | | | | | | |
| | Fixed type | Controlled object | Tank fluid temperature | | | | | | | | | | | |
| Range °C | | 5 to 50 | | | | | | | | | | | | |
| Refrigerant control | | Rotation speed control of compressor by inverter + Opening rate control of electric expansion valve | | | | | | | | | | | | |
| Refrigerant (R410A) *5 Filling volume | kg | | | | | 1.25 | | | | | 1.65 | | | |
| Protection devices | | A set of internal thermistor (for fan motor), internal thermistor (for agitator), reverse-phase protection device, restart prevention timer, low room temperature protection thermistor, high fluid temperature protection thermistor, low fluid temperature protection thermistor, discharge pipe temperature thermistor, condenser temperature thermistor, refrigerant leakage detector, inverter protection device, non-fuse breaker (-B type only) High-pressure switch (-C type only), compressor thermal protector (-C type only), overheat prevention temperature thermistor (-H type only), fuse (-H type only) | | | | | | | | | | | | |
| Operation range | Room temperature | °C | 5 to 45 | | | | | | | | | | | |
| | Tank fluid temperature | °C | 5 to 50 | | | | | | | | | | | |
| | Oil viscosity | mm ² /s | 0.5 to 200 | | | | | | | | | | | |
| Acceptable oils | | Water-soluble cutting/grinding fluid, cutting/grinding oil, lubrication oil, hydraulic oil, industrial water (Cannot be used for chemicals, food products or fuel) | | | | | | | | | | | | |
| Noise level (Value equivalent to measurement in an anechoic chamber) (Front 1 m, height 1 m) | dB (A) | | | | | 65 | | | | | 68 | | | |
| Permissible transport vibration | | Up and down vibration 14.7 m/S ² (1.5 G) × 2.5 hr (10 to 100 Hz sweep/5 min.) | | | | | | | | | | | | |
| Mass | kg | | 83 | | | 86 | 160 | | | 132 | 140 | 220 | | |
| Molded-case circuit breaker (Rated current) | A | | - | 15 | | - | | | - | 20 | | - | | |
| Items prepared by the customer | Molded-case circuit breaker (Rated current) | A | 15 (Required for types other than the -B type) | | | | | 20 (Required for types other than the -B type) | | | | | 30 | 20 |
| | Device other than molded-case circuit breaker | | Tank (400 mm or more in depth), supply pump, float switch, return filter | | | | | | | | | | | |

Note: *1 The cooling capacity indicates the value at the standard point (inlet oil temperature: 35°C, room temperature: 35°C, oil used: ISO VG32).

This unit has about ±5% of product tolerance.

*2 Use a commercial power supply for the power source. The use of an inverter power supply may cause burn damage to the machine.

The voltage fluctuation range should be within ±10%. If it is more than ±10%, please consult us.

*3 There are three types of different voltage specifications depending on the power source: the -E1, -E2 and -E3 units. (Refer to Page L-19 for details.)

*4 The machine temperature synchronization thermistor available as an option is required for this function.

*5 The MSDS (Material Safety Data Sheet) of refrigerant R410A is attached to the -C type.

*6 The molded-case circuit breaker is not supplied with this product. Please prepare it yourself.

*7 Conventional models of the 1 HP class such as AKJ106 and AKZJ287 were unified with AKZJ358 in the 1.2 HP class.

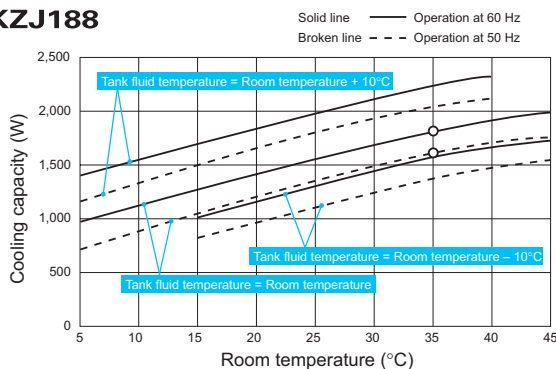
*8 A 1-phase power supply is used for the heater.

*9 The maximum power consumption/maximum current consumption of different voltage specifications are shown in the tables below.

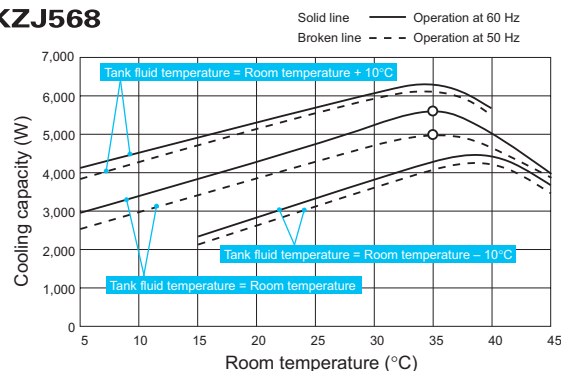
| ■ AKZJ188 | | | ■ AKZJ358 | | | ■ AKZJ458 | | | ■ AKZJ568 | | | ■ AKZJ908 | | |
|--------------|---------------|-------|--------------|---------------|-------|--------------|---------------|-------|--------------|---------------|-------|--------------|---------------|-------|
| Supply power | Power/current | | Supply power | Power/current | | Supply power | Power/current | | Supply power | Power/current | | Supply power | Power/current | |
| 380 V | | 1.9 A | 380 V | | 3.0 A | 380 V | | 3.3 A | 380 V | | 5.4 A | 380 V | | 6.8 A |
| 400 V | | 1.8 A | 400 V | | 2.9 A | 400 V | | 3.1 A | 400 V | | 5.2 A | 400 V | | 6.4 A |
| 415 V | | 1.7 A | 415 V | | 2.8 A | 415 V | | 3.0 A | 415 V | | 5.0 A | 415 V | | 6.2 A |
| 440 V | 50/60 Hz | 1.6 A | 440 V | 50/60 Hz | 2.6 A | 440 V | 50/60 Hz | 2.9 A | 440 V | 50/60 Hz | 4.7 A | 440 V | 50/60 Hz | 5.9 A |
| 460 V | | 1.5 A | 460 V | | 2.5 A | 460 V | | 2.7 A | 460 V | | 4.5 A | 460 V | | 5.6 A |
| 480 V | | 1.5 A | 480 V | | 2.4 A | 480 V | | 2.6 A | 480 V | | 4.3 A | 480 V | | 5.4 A |

Cooling capacity characteristic chart

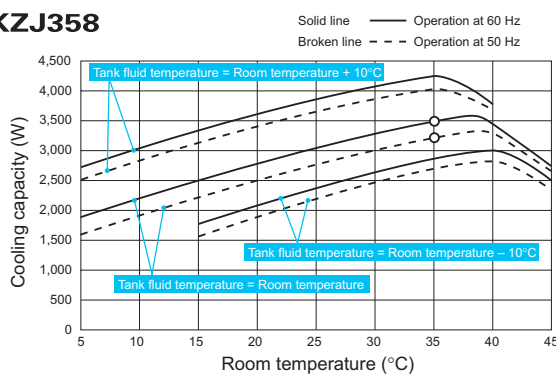
AKZJ188



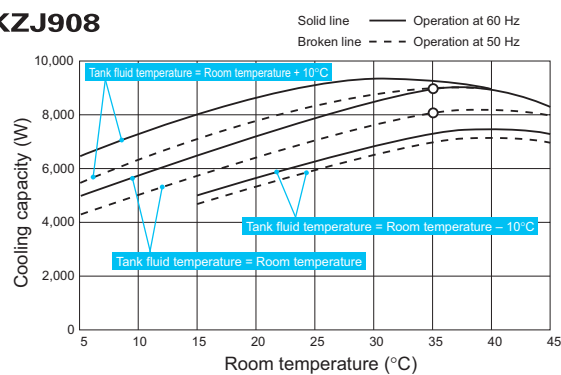
AKZJ568



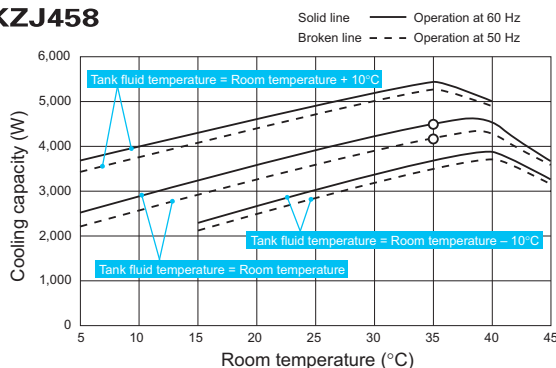
AKZJ358



AKZJ908



AKZJ458

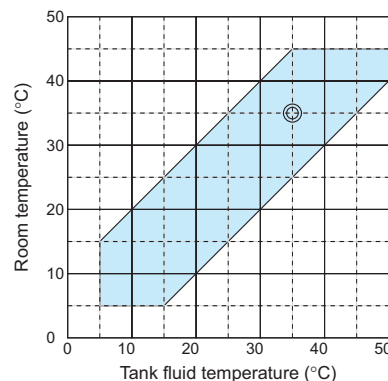


1. The mark "O" shows the standard point.
(Room temperature: 35°C/Oil inlet temperature: 35°C/Oil used: ISO VG32)
2. The cooling capacity varies depending on conditions such as the room temperature, tank fluid, oil dynamic viscosity and other factors.

Operation range

Note: 1. The mark © shows the standard point.

2. Be sure to use the unit within the range of use specified in
(Use outside this range may cause unit failure.)



Notes to be observed at the main machine side (AKZ9/AKZJ8 series)

• Important notes to be observed regarding the main machine side (machine tools and industrial machinery)

- When rough transport conditions are expected while transporting the machine overseas or elsewhere, special precautions should be taken in the packaging and transportation method so as to avoid the application of excessive force on the oil cooling unit (this unit).
- The oil cooling unit (this unit) does not have a flow switch for checking the oil supply or a temperature switch for abnormal temperature of supplied oil (high temperature or low temperature). So, please provide a protective device such as a flow switch and a temperature switch at the main machine side.

Notes on operation and cooling capacity

- Do not use the oil cooling unit to chill a fluid from 50°C or higher. Start to operate the oil cooling unit at the same time as the main machine or before the fluid temperature rises to 40°C.
- Do not place an object that hinders ventilation within 500 mm of the air-intake or exhaust.
- If the air filter is clogged, the cooling capacity should be diminished. Clean the air filter (wash with warm water or clean with air) periodically once every two weeks to prevent clogging.
- If cutting chips and powder-like chips deposit on and adhere to the cooling coil (evaporator) in the AKZJ8 series, the cooling capacity should be diminished and it could cause failure. To avoid the adherence of deposits on the cooling coil, install an efficient return filter on the return side (fluid inlet) of the tank and periodically clean the tank inside.

Notes on usable fluids with oil cooling units

- The fluid usable with the oil cooling unit is listed in the table below for each series.
- Do not use fluid listed below as “unusable”

| | Description | AKZ9 Series | AKZJ8 series |
|---|--|-------------|--------------|
| Lubrication oil Mineral hydraulic oil | <ul style="list-style-type: none"> Oil that is classified as third class petroleum or fourth class petroleum of the fourth group hazardous materials stipulated in the Fire Defense Law and that corresponds to discoloration No. 1 in the copper corrosion test method (JIS K 2513) of petroleum products Oil that satisfies pollution level NAS 10 | ✓ | ✓ |
| Nonflammable hydraulic oil <ul style="list-style-type: none"> Ester phosphate series Chlorinated hydrocarbon series Water - Glycol series W/O • O/W emulsion series (High-aqueous hydraulic oil) | — | Unusable | Unusable |
| Coolant fluid <ul style="list-style-type: none"> Water-soluble cutting and grinding fluid Non water-soluble cutting and grinding oil | — | Unusable | ✓ |
| Ethylene glycol (Antifreeze liquid) | Fluid not including any ingredient that corrodes the SUS304 material used for the evaporator coil | Unusable | ✓ |
| Water (Industrial water) | | Unusable | ✓ |
| Inflammable liquids like fuel | Liquids that are classified as special flammables, alcohol, third class petroleum or fourth class petroleum of the fourth group hazardous materials stipulated in the Fire Defense Law | Unusable | Unusable |
| Chemicals | — | Unusable | Unusable |
| Liquids for food products | Drinking water, water for cooling food products, etc. | Unusable | Unusable |

Selection method for oil cooling units (AKZJ8/AKC9 series)

(2) In the case of cooling of cutting and grinding fluid

1. Since the tank capacity and pump flow rate are generally large the heat load from the cutting and grinding fluid system should be roughly estimated according to the following formula. After rough estimation, the heat load should be determined by conducting tests on the actual machine to select the oil cooling unit.
2. Formula for rough calculation of heat load.

$$Q = Q_1 + Q_2 + Q_3$$

Q: Heat load of the entire machine tool system

Q₁: Heat load during machining on a machine tool

Q₂: Heat load of the pump motor for coolant pump (Amount of heat transferred to coolant)

$$Q_2 = \text{Pump motor output (kW)} \times \frac{\eta}{100}$$

Q₃: Heat balance between coolant and room temperature via coolant tank

$$Q_3 = K \cdot A \cdot \Delta T$$

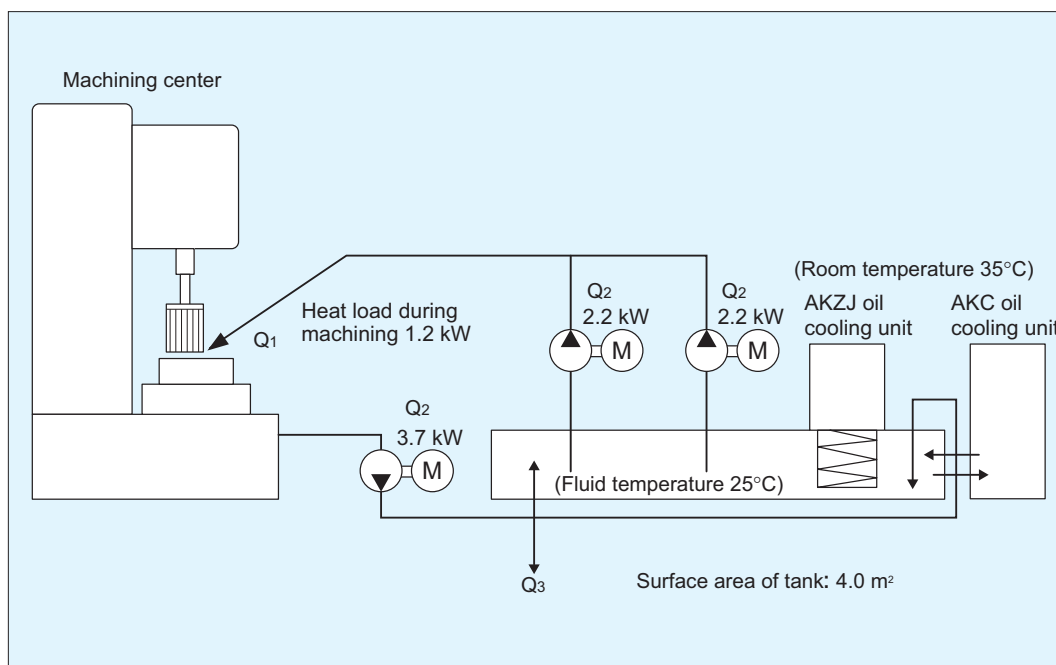
K: Heat transfer coefficient (W/m² · °C), K = 11.6 to 23.2 in general

A: Surface area of tank in contact with fluid (m²)

ΔT: Room temperature - Controlled fluid temperature in tank (°C)

3. Refer to Page L-34 and determine the heat load according to Method 1 or Method 2.

General guide for heat load



E.g.) In the diagram above,

When Q₁ = 1.2 kW

$$Q_2 = (2.2 + 2.2 + 3.7) \times \frac{50}{100} \approx 4.1 \text{ kW (For a coolant pump, "}\eta\text{" is generally 50%.)}$$

$$Q_3 = 20 \times 4 \times (35 - 25) / 1000 = 0.8 \text{ kW}$$

$$\begin{aligned} \therefore Q &= Q_1 + Q_2 + Q_3 \\ &= 1.2 + 4.1 + 0.8 \\ &= 6.1 \text{ kW} \end{aligned}$$

DAIKIN INDUSTRIES, LTD.

Oil Hydraulic Equipment

Osaka Office

YODOGAWA PLANT

1-1, Nishi-Hitotsuya, Settsu, Osaka 566-8585, Japan

Indian Representative

Technocrats Alliance Engineering Pvt. Ltd.

Works/Correspondence Office : 11/23, TIL Compound, Site-IV,
Sahibabad Industrial Area, Ghaziabad - 201010 (UP) INDIA

Registered Office : C - 12 / 333, Yamuna Vihar, Delhi - 110053 INDIA

Tel: +91-11- 42448311, 22448312 Fax: +91-11-4248312

E-mail : info@tca.co.in website : www.tca.co.in