DAIKIN contributes with fusion technology of oil hydraulics and inverter system for extreme environment and highly economical improvement.

DAIKIN introduced built-in magnet-type synchronous motors (IPM motor) into residential air conditioners first in the industry, and also into air conditioners for business use. We have been leading the industry as a top runner in energy-saving air conditioners. New hybrid systems equipped with variable speed motors based on this energy-saving motor technology and production capability can attain higher efficient factory.

Features of HYBRID SYSTEM

"Hybrid System", equipped with multi-functional software, is a fusion of the conventional hydraulic technology and the electrical technology (inverter control) for higher energy-saving efficiency.

1. Fusion of DAIKIN original high-efficiency IPM motor drive system and the hydraulic technology attains higher energy-saving effect and higher response than the conventional hydraulic system.

2. Advanced functions of the hybrid system as a fusion of hydraulic technology and electrical technology.

3. Compact design equipped with high-efficiency IPM motor drive system.

4. Low noise attained by motor torque control under pressure-retained condition.

Social responsibility for the industry.

Various activities are being proceeded all over the world for preservation of global environment. The industry has been sharply requested to reduce the environmental influence. It is an important theme for each enterprise to solve such a problem. In fact, some support systems were established to promote these activities. Actions to meet the requirement also include very beneficial things improvement in cost reduction, high productivity and to strengthen the radical reform of each enterprise.

Do you know?

Actual conditions of energy consumption in factory process lines.

<table>
<thead>
<tr>
<th>Power consumption of line in factory</th>
<th>Machining line 45%</th>
<th>Assembly 18%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total power consumption in factory</td>
<td>55% Air Conditioning</td>
<td>14%</td>
</tr>
<tr>
<td></td>
<td>18% Compressor</td>
<td>18%</td>
</tr>
<tr>
<td></td>
<td>5% Lighting and others</td>
<td>5%</td>
</tr>
</tbody>
</table>

45% of total power consumption in factory is consumed in machining line. 70% of machining line is the fixed consumption regardless of production volume.

Most of the fixed consumption consists of hydraulic unit, circulating, and coolant pump. Though it is important to reduce these three parts, nobody doubted these area because of direct influence on production.

Energy-Saving activity by improving machining facilities is indispensable to protect environment and improve productivity.
Energy-saving technology for hybrid systems
Advanced technology greatly improves energy efficiency.

Energy saving
The combination of DAKIN original inverter system and hydraulic technology greatly improves the energy saving effect.

Sophisticated control (Super Unit)
Pressure and flow rate (PQ) characteristics of 4 and 416 patterns are preset in the control unit. Select and adjust them on the main machine side, and multi-stage pressure and flow rate control can be easily attained.
Adjust sub-motor flow in changing PQ characteristics, and shutdown control can be attained.

The conventional valve control is replaced by pump control, and simple and low-cost systems can be produced for high-flow pressure speed select and multi-stage pressure control.

Compact design
High-efficiency IPM motor and inverter control reduce the pump discharge at standby. As a result, heat generation is suppressed and the tank capacity is reduced to be compact. (ECOHCH, Super Unit)
Smaller than 7 series, top-class in the industry. (Oil Cooling Unit)

New refrigerant (Oil Cooling Unit)
New refrigerant (R410A) does not destroy the ozone layer.
Production of old refrigerant greatly decreases in 20DA. New substitutes HFC (R410A) which does not destroy the ozone layer was adopted in new models.

Low noise
60 dB (A) (20.6 MPa at pressure retained)
The inverter-controlled motor can be rotated at the lowest speed required. The noise at pressure retained is greatly reduced. (Super Unit)

Corresponding values in air-cooled chiller (Oil Cooling Unit)
68dB (A) ⇒ 62dB (A)

Energy saving technology to supporting hybrid systems

DAKIN introduced built-in magnet-type synchronous motors (IPM motor) into residential air conditioners first in the industry, and also into air conditioners for business use. We have been leading the industry as a top runner in energy-saving all conditioners.

New hybrid systems equipped with variable speed motors based on this energy-saving motor technology and production capability can attain higher efficient factory.

"Double Torque, power of rotations" improves the energy saving effect.
In combination of two rotating forces of powerful "magnetic field" "magnet for field" and DAKIN's original "Variance torque field", higher power can be generated at lower electricity.

Key of the improved energy saving effect: powerful "magnetic field" "magnet for field".

The new system magnet has a much stronger power than the regular magnets.

Principle of IPM motor
A rare-earth permanent magnet deeply positioned in the rotor can generate magnetic torque (intraduction: difference between cold and permanent magnet) and resistance torque (cold attracts limit break). This electromagnetic structure attains high torque and the highest efficiency by heat generation.

Structure of IPM

Structure of conventional motor (AC servo)

Comparison of motor efficiency

Comparison of torque characteristic

General people can talk at the distance of 1m at the noise level of 60dB(A).
Fusion of Hydraulic and Motor/Inverter Technology

First in the world

**Energy saving**

Energy saving 50%
(Compared to our product, when pressure is retained)

- Static energy saving by reducing the motor rotating speed under pressure-retained condition.
- Our original 65kW motor control unit of high efficiency and compact fixed-displacement pump are applied.

**High-speed response**

- Special lift motor, which has low inertia and generates high torque at low speed, and high-speed response (water-cooled).
- Response equivalent to or higher than conventional variable displacement pump.
  (Pressure retained/operation at maximum flow rate: 0.1 sec or less)

**Compact design and resources saving**

- Resources-saving design with compact, lightweight and simple structure with no permanent magnet.
- Minimized fluid is supplied at low-speed rotation to improve the hydraulic oil in deterioration.

**Example of comparison with our motor pack (Type NDR151, NDR231) equivalent to motor**

**Specifications**

<table>
<thead>
<tr>
<th></th>
<th>0.75 kW</th>
<th>1.5 kW</th>
<th>2.2 kW</th>
<th>3.0 kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tank capacity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor capacity</td>
<td>6.0 MPa</td>
<td>7.0 MPa</td>
<td>8.0 MPa</td>
<td></td>
</tr>
<tr>
<td>Max. working pressure</td>
<td>4~14.4 MPa</td>
<td>6~25.4 MPa</td>
<td>6~25.6 MPa</td>
<td>6~29.5 MPa</td>
</tr>
<tr>
<td>Discharge volume</td>
<td>EHR161-04</td>
<td>EHR25-04</td>
<td>EHR25-07</td>
<td>EHR25-07</td>
</tr>
</tbody>
</table>

**System configuration**

- Only connect to 200V commercial power source to operate.
- Pressure and flow rate can be set on the touch panel.
- Pressure and flow rate are logically displayed in digital.

**Used to supply control power**

1. Chuck (chucking a work-piece)
2. Tail-stock (holding a work-piece)
3. Tool rest clamp (fastening tool rest)

**Principle of energy saving**

- Hydraulic operating pattern
- Principle of operation
- Electric motor efficiency
- Chart for hydraulic oil consumption
- Chart for conventional pump power consumption

**Hydraulic unit**

- Clamp for test-post
- Tailestock
- Main spindle
- Chuck
The technology of Eco-Rich has been evolved further. New IPM motor system achieved dramatic improvement of energy saving.

Developed energy saving with high-efficiency IPM motor drive system installed.

The system uses ultra energy-saving IPM motor*, featuring combination of magnet torque (radial and resistive force between coil and permanent magnet) and reluctance torque (radial force between coil and iron). It contributes to prolonging a product's life.

Monitoring proper amount of tank oil level.

Equipped with dry-run prevention function. This function stops operation automatically if oil level in the tank drops below a certain gauge, preventing idle run of a pump. This contributes to prolonging a product's life.

Extended hydraulic output area.

In addition to conventional EcoRich, horsepower output has been extended by approximately 30%. Pressure setting is allowed starting from 0.5 MPa.

Further reduction by 20% variation in EcoRich.

High torque and high efficiency thanks to unique structure with rare-earth magnet embedded in depth of rotor.

Shortened startup time upon turning on power.

The IPM motor has a reduced startup time into approximately 5 seconds, which used to be a maximum of 18 seconds in conventional system.

Extended variations of tank capacity

Variations of 10- and 20-RT tank capacity have been extended. Tank capacity can be selected according to specifications.

Employment of multi-step pressure-flow rate control

By inputting 4 patterns of pressure and flow volume settings and by selecting control signals on the machine, the multi-step pressure, and flow rate are controlled easily. Shock-less adjustment is possible upon switching.

CE Standard Specification

CE standard is applicable additionally.

Specification

<table>
<thead>
<tr>
<th></th>
<th>10 L</th>
<th>20 L</th>
<th>30 L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tank capacity</td>
<td>10 L</td>
<td>10 L</td>
<td>10 L</td>
</tr>
<tr>
<td>Motor capacity</td>
<td>2.2 kW</td>
<td>3.0 kW</td>
<td>4.0 kW</td>
</tr>
<tr>
<td>Max. working pressure</td>
<td>7.0 MPa</td>
<td>7.0 MPa</td>
<td>7.0 MPa</td>
</tr>
<tr>
<td>Gains pressure adjusting range</td>
<td>2.5~12.9 L/min</td>
<td>3.2~16.6 L/min</td>
<td>3.2~16.6 L/min</td>
</tr>
<tr>
<td>Model</td>
<td>EHS05A-B1702</td>
<td>EHS10A-B1701</td>
<td>EHS15A-B1702</td>
</tr>
</tbody>
</table>

Description of function

Operation of actuator (cylinder) with 4 patterns of pressures (P) and flow rate (Q) by multi-step pressure (force) and flow rate (speed) control.

No need for proportional valves and flow rate valves required in conventional actuator circuits. Required operation is only setting P and Q settings on control panel and selecting a parameter of maximum contact signals on a machine (main unit). Switching between flow rate control and pressure control is performed automatically in EcoRich R. (For example, switching between flow rate and pressure control at cylinder ends.)

Operation of turning on/off of load valves for cylinder is required on the machine.

Shock-less switching of flow rate (speed) and pressure (force).

Force or speed of the machine can be changed in a shockless manner when switching pressure or flow rate setting by setting optimal acceleration/deceleration time for the machine is set to the parameter in advance.
Fusion of DAIKIN original high-efficiency IPM motor Drive system and double pump switch control technology.

Multi-Step Pressure / Flow and shock-less control by pump / motor speed control.

High performance beyond the hydraulic meets wider demands. Tank-less type is now available. Make your unit special.

Features

1. The high-efficiency IPM motor drive system that utilizes the DAIKIN-original air conditioning motor and inverter technologies provides a high energy-saving ratio - 50%.
   (Double pump type in pressure holding mode at 20.6 MPa)
   - By controlling the motor rotation speed, the SUPER UNIT controls the flow rate and pressure of fixed capacity pumps. The system provides an energy-saving ratio that is at least 50% in pressure holding mode (compared with the conventional DAIKIN variable piston pump).
   - Using the high-efficiency motor, the SUPER UNIT can even provide an energy-saving effect for general industrial machinery in which actuators provide a high-duty ratio, as well as in pressure holding mode.
   - The single pump type is a high-functional series created to be more useful.
   - The double pump type uses the autonomous/shielding fixed capacity double pump system, which combines large and small capacity pumps in a low pressure, high flow rate range, and automatically switches to operate the high pressure small capacity pump only in the high pressure, low flow rate range. Thus, the double pump type ensures a higher energy-saving effect.

2. Four or sixteen pressure (P) - flow rate (Q) setting patterns are available for cylinder control.
   - The proportional control valve and proportional pressure control valves, which are utilized in conventional scissor type circuits, are not required.
   - The pressure and flow rate can be set using the controller panel.
   - You can select 4 or 16 pressure and flow rate setting patterns via an external input signal.
   - The SUPER UNIT automatically switches between the pressure control and flow rate control modes.

Reducing shock during flow rate or pressure changes
   - Depending on the acceleration time/deceleration time settings, the SUPER UNIT can reduce shock when the flow rate or pressure changes.

3. Low noise level: 60 dB (A) (Double pump type in pressure holding mode at 20.6 MPa)
   The noise level is 73 dB (A) or less even in full-operation areas.
   - With double pressure differential pumps, the SUPER UNIT can reduce pulsation and the noise level.

4. Multi-stage P-Q remote control by communication (Function: C)
   - Using a commercially available PLC with 100-300 communication capabilities and a touch panel display, P and Q parameters, acceleration time, deceleration time, and other parameters can be set and viewed from the machine operator’s desk. The SUPER UNIT enables multi-stage pressure/flow rate control through simple operation.

5. The SUT series product lineup contains products with various capacities, from 7.0 MPa and 1.5 L/min to 20.6 MPa and 110 L/min. Furthermore, “pump & motor type” and “unit type” are selectable.
   - Thus, the SUPER UNIT can flexibly meet almost any user’s needs.
   - The SUPER UNIT offers wide applications for machine tools and general industrial machinery such as press,

High Performance

4 to 16 patterns pressure/flow set values with input signal selection from the main machine side make it easy to attain multi-step pressure and flow rate control. Shock-less control in selecting can be available.

- PQ characteristic 0
- PQ characteristic 1
- PQ characteristic 10
- PQ characteristic 16

- Multi-step pressure control
- Shock-less control

- High-efficiency IPM motor drive system
- Autonomous select type fixed tandem pump

- Flow combining/dividing selection can be autonomously controlled according to load pressure with tandem pump of fixed displacement (high and low) and selector. If high speed is needed, two high- and low-displacement pumps are combined to rotate at high speed to discharge at higher flow rate, while the pressure is retained. Only the low-displacement pump is selected to operate at low speed to save energy greatly.

Remote control of multi-step Pressure/flow by M-code (Function: C, D for SUT-S series)

- With commercial PLC(T) with RS232C communication function, touch panel display, and others on the machine side: Pressure/flow, acceleration/deceleration time, and other parameters can be set and displayed. Accordingly, remote control of Multi-step Pressure/flow, monitoring pressure, and others can be also available.
Super Unit Single & Double pump specification

Hybrid Unit

Simplification of system

- Pressure and flow rate (PQ) characteristics of 4 or 16 patterns are preset to the control unit. Dwell and input from the main machine side, and output of a control panel, and checkless control can be easily attained.
- Select and set a time in selecting PQ characteristics, and checkless control can be attained.
- The conventional control panel is replaced by pump control, and simple and low-cost systems can be produced for high flow pressure and high-speed operation. System configuration includes a controller, hydraulic circuit, and operation panel.

Energy saving

- Fusion of DAIKIN original high-efficiency IPM motor drive system and tandem pump selecting control technology provides speed-matching energy saving effects.

Fusion of DAIKIN original high-efficiency IPM motor drive system and tandem pump selecting control technology provides speed-matching energy saving effects.

- Energy saving of 50% (at pressure retained at 20.6 MPa) is attained to give high-cost performance.

Low noise 60 dB (A) (20.6 MPa at pressure retained)

- Low noise 60 dB (A) (20.6 MPa at pressure retained) attained. In all of the operation area, the noise is 70 dB (A) or less.
- The phase-differential tandem pump attains low pulsation and low noise.

Specifications

- Single pump specification

<table>
<thead>
<tr>
<th>Type</th>
<th>50ℓ</th>
<th>60ℓ</th>
<th>100ℓ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor capacity</td>
<td>4.5kW</td>
<td>5.5kW</td>
<td>7.5kW</td>
</tr>
<tr>
<td>Max working pressure</td>
<td>29.0 MPa</td>
<td>29.0 MPa</td>
<td>29.0 MPa</td>
</tr>
<tr>
<td>Flow rate</td>
<td>35.6 l/min</td>
<td>35.6 l/min</td>
<td>35.6 l/min</td>
</tr>
</tbody>
</table>

- Double pump specification

<table>
<thead>
<tr>
<th>Type</th>
<th>50ℓ</th>
<th>60ℓ</th>
<th>100ℓ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor capacity</td>
<td>9.0kW</td>
<td>11.0kW</td>
<td>15.0kW</td>
</tr>
<tr>
<td>Max working pressure</td>
<td>16.5 MPa</td>
<td>16.5 MPa</td>
<td>16.5 MPa</td>
</tr>
<tr>
<td>Flow rate</td>
<td>71.2 l/min</td>
<td>71.2 l/min</td>
<td>71.2 l/min</td>
</tr>
</tbody>
</table>

Hybrid System

Page 12

The SUPER UNIT and main machine can be remotely controlled with the same panel. This function eliminates complicated individual operations and installation space limitations.

- Remote operation and monitor display are enabled by serial communication (conforming to RS-232C).
- The SUPER UNIT controller is equipped with an operation panel allowing you to change parameter settings and maintain the machine in optimal condition.
- The system can be operated remotely from the machine main circuit, and the SUPER UNIT and main machine can be operated from the same panel.

- The pressure and flow rate can be constantly monitored.
- The communication function is not required.
- The communication is achieved using a commercially available touch panel and PLC with an RS-232C interface.

- Parameter settings can be changed.
- The communication function can be constantly monitored from the main machine main circuit. The parameters are easily set using a touch panel and PLC with an RS-232C interface.

For details about the communication function, refer to the communication function instruction manual.
Intelligent Coolant Pump

Optimum flow rate is given by controlling motor rotating speed

- Coolant pump is used to spay coolant oil on work and tools for cooling, lubrication and removing chips.

Breakdown of power consumption in machine tool

- High-pressure coolant pump 15%
- NC-related part 15%
- Oil-cooling unit 10%
- Hydraulic unit 10%
- Others 15%

Energy saving

- The power consumption cannot be sharply reduced only by matching with the valve to control the quantity of coolant.
- Adjust the rotating speed to reduce the quantity, and the power consumption can be reduced greatly. As shown in the right figure, reduce the quantity pumped up by 25%, and the power consumption can be reduced by 40%.

Specifications

- Rotating speed control
  - Motor input: 0.3 kW, 1.5 kW, 2.2 kW
  - Discharge: 20–75 l/min, 50–175 l/min, 100–300 l/min
  - Model: ECP6-4-6-10, ECP6-4-6-10, ECP6-4-6-10

- Pressure control
  - Motor input: 0.3 kW, 1.5 kW, 2.2 kW
  - Discharge: 10–30 l/min, 15–60 l/min, 20–100 l/min
  - Model: ECP6-4-4-10, ECP6-4-4-10, ECP6-4-4-10

Compact system and simple energy saving

- Multiple pumps can be integrated into a high-displacement pump with switching valves as a compact system.
- Pressure control automatically adjust the head range. When some oil supply points are selected, rotating speed is automatically adjusted to supply the required quantity. Energy saving can be attained easily.

Minimized flow change

- Needle tip pressure is controlled constantly. When cutting oil supply points to the work are selected, no supply positions are not changed. Accordingly, no process defective are detected.
Intelligent High-Pressure Coolant Pump

High-pressure Coolant Pump

Market demand

- Big end users, such as automobile manufacturers, automobile parts manufacturers, and electric parts manufacturers have increasingly requested to save energy at their process facilities.

Power consumption by coolant pump

- Generally, coolant pumps of middle- and high-pressure types occupy about half of the power consumption by machines. Fixed displacement pump is used as high-pressure coolant pump generally. All of the excessive flow is drained from the relief valve. Actually, only one coolant pump consumes 15% of the power consumption by process facilities. As a result, not only much energy is consumed but additional equipment cost is needed.

Energy saving effect

- New High Pressure Coolant Pump (ECPH series) reduces 40% power consumption compared with the conventional coolant pump, which shared 15% of the power consumption at process facilities. It contributes to energy saving at factories greatly.

Energy saving

The Pump is equipped with DAIKIN original high-efficiency IPM motor drive to attain the energy-saving effect of 40%.

Zero excessive flow from relief valve.

High-Pressure Coolant Pump (ECPH series) is first equipped with “autonomous type pressure-flow rate control system” which is proven actual results with ECPH-50A. The excessive flow from the relief valve is reduced to zero by controlling pump rotating speed. Power consumption is greatly reduced.

Power consumption (at 4 MPa)

- Energy saving effect resulting from reduced flow reduction

System configuration

With DAIKIN original high-efficiency IPM motor drive, optimum quantity of coolant can be supplied by controlling pump rotational speed. The excessive flow from the relief valve is reduced to zero, which results in great reduction of power consumption. The standby signal can select Start/Stop. If unnecessary, the motor can be stopped and the energy-saving effect can be much improved.

The discharge pressure can be set. The pump rotating speed is automatically controlled to keep the pressure at the set value if the selected diameter valve.

Specifications

<table>
<thead>
<tr>
<th>Flow rate</th>
<th>25 L/min</th>
<th>29 L/min</th>
<th>34 L/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressures</td>
<td>4.4 MPa</td>
<td>5.0 MPa</td>
<td>6.0 MPa</td>
</tr>
<tr>
<td>Model</td>
<td>ECPH10-060-10</td>
<td>ECPH15-060-10</td>
<td>ECPH15-075-10</td>
</tr>
</tbody>
</table>
Oil Cooling Unit

Amazingly improved energy-saving inverter Oil Cooling Unit, equipped with DAIKIN original high-efficient IPM motor for air conditioners.

Why machine tools require Oil Cooling Unit?

Latest machine tools demand

High-speed rotation; improving surface roughness and accuracy

- Heat is generated at headstock bearings and gears. The entire main spindle is warmed and the spindle deviates from the center of the column and the head, which results in poor accuracy.
- It is because there are differences in temperature among machine parts.
- Oil Cooling Unit can control temperature at the headstock, and the deviation can be corrected. Oil Cooling Unit lubricates the headstock gears and moves the heat generated. It is helpful to improve machine accuracy. (AKZ8 series)

Increased machining accuracy of work and extension of tool life

- High-accuracy processing can be attained by controlling temperature of cutting and grinding fluids. In addition, longer tool life can be achieved and deterioration of coolant can be reduced. Oil Cooling Unit contributes to improve machine operation efficiency. (AKZ8 series)

- Controlling oil temperature to optimum value according to heat generation of main machine

- Oil Cooling Unit (Temporarily) can pressurize and cool the cutting fluids in proportion to the generated heat on the main machine side to meet the operating condition. The fluid temperature can be controlled accurately depending on heat fluctuation from lowest to highest. Unlike the conventional non-warmer Oil Cooling Unit, the cooling capacity can be controlled in a wider range. Not only inlet fluid oil temperature control but outlet fluid oil temperature control, return fluid of temperature control, room temperature tuning, and other operation modes can be selected according to the conditions of main machine.

Main spindle motor

- High heat generation may cause spindle deviation from O to O.

Application

Application examples

Main machines (Machine tools, Industrial machinery) are as follows:

- Machine tools: Machining center, NC lathes, Grinding machine, NC special-purpose machine, NC electric discharge machine, etc.
- Industrial machinery: Molding machines, Presses, etc.

Application examples by types

- Peripheral cooling of cutting head
- Oil temperature control
- Lubricant cooling
- Cutting fluid cooling
- Cutting fluid circulation

Specifications

- Oil Cooling Unit installed temperature
  - Inlet: 1.5°C, 2°C, 2.5°C, 3°C
  - Outlet: 1°C, 1.5°C, 2°C

- Temperature control
  - Oil: 2°C, 2.5°C, 3°C
  - Water: 2°C, 2.5°C, 3°C

- Flow control
  - Inlet: 1.5°C, 2°C, 2.5°C, 3°C
  - Outlet: 1°C, 1.5°C, 2°C

- Flow rate
  - Inlet: 1.5°C, 2°C, 2.5°C, 3°C
  - Outlet: 1°C, 1.5°C, 2°C

- Voltage range
  - 0.5 HP: 1.5 - 2.2 kW
  - 1.0 HP: 2.2 - 3.7 kW
  - 1.2 HP: 3.7 - 5.5 kW

- Oil Cooling Unit models
  - AKZ4 series
  - AKZ5 series
  - AKZ6 series

- Application example of machining center
  - AKZ4 series
  - AKZ5 series
  - AKZ6 series

- Application example of press
  - AKZ4 series
  - AKZ5 series
  - AKZ6 series
Oil Cooling Unit

High-accuracy temperature control

- Conventional ON/OFF controlled (AKES series)
- New Inverter controlled (AKZ series)

- The first class energy saving
  - DAIKIN original IPM motor and new refrigerant R410A provide the first class energy saving.
  - Energy saving: 20%

- New refrigerant
  - New refrigerant (R410A) adopted, which may not destroy the ozone layer.

- New useful functions added to current oil temperature warning functions
  - Auto tuning function
    - Only operate main machine at no load for 10 - 20 minutes, and temperature control gain is set automatically. The tuning time during test run can be greatly shortened.
  - Refrigerant gas leakage detection function
    - Alarm signal is output at the time of refrigerant gas leak (cooling failure). Run-out of spindle can be indirectly prevented.
  - 99-hour timer function
    - Max. 99-hour warming up can be easily performed.

- The smallest size in the industry
  - 750 x 460 x 1,170
  - AKZ series (Unit: mm)

- Low noise
  - 68dB (A) → 62dB (A)
  - with AKZ1.2HP class, corresponding value in anechoic chamber

- The shortest delivery, 4-5 type specifications available in addition to the standard model

All optional specifications are listed as semi-standard.
## Capacity Chart

### Hydraulic Unit

<table>
<thead>
<tr>
<th>Model (Unit Type)</th>
<th>Model (Pump &amp; Motor Type)</th>
<th>Max. operating pressure (MPa)</th>
<th>Max. flow rate (l/min)</th>
<th>Tank capacity (l)</th>
<th>Select function</th>
</tr>
</thead>
<tbody>
<tr>
<td>EORICH-RL64-5.0A</td>
<td></td>
<td>4.0 6.0 8.0 10.0 15.0 18.0 20.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>14 17.2 25.6 28.5 30 40 50 60 80 100 120</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit...</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Super Unit

<table>
<thead>
<tr>
<th>Model (Unit Type)</th>
<th>Model (Pump &amp; Motor Type)</th>
<th>Max. operating pressure (MPa)</th>
<th>Max. flow rate (l/min)</th>
<th>Tank capacity (l)</th>
<th>Select function</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Intelligent Coolant Pump

<table>
<thead>
<tr>
<th>Model</th>
<th>Total head (m)</th>
<th>Pressure (MPa)</th>
<th>Flow rate (l/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECP02-6-3-10.F/RL.R</td>
<td>35-10</td>
<td>6, 10</td>
<td>2, 6, 10, 14, 20, 25, 30</td>
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<td></td>
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</tr>
<tr>
<td>ECP02-6-6-10.F/RL.R</td>
<td>35-10</td>
<td>6, 10</td>
<td>2, 6, 10, 14, 20, 25, 30</td>
</tr>
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<td>75-27</td>
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</tbody>
</table>

### Intelligent High-Pressure Coolant Pump

<table>
<thead>
<tr>
<th>Model</th>
<th>Total head (m)</th>
<th>Pressure (MPa)</th>
<th>Flow rate (l/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECP1120-045-10</td>
<td>4.4</td>
<td>6, 9</td>
<td></td>
</tr>
<tr>
<td>ECP1180-045-10</td>
<td>6, 9</td>
<td>6, 9</td>
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<tr>
<td>ECP1120-070-10</td>
<td>4.4</td>
<td>6, 9</td>
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<tr>
<td>ECP1180-070-10</td>
<td>6, 9</td>
<td>6, 9</td>
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</tr>
</tbody>
</table>

**Notes:**
- Unit...: boil DC motor and motor
- 21 Hybrid System
### ECORICH Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>EN14-LOD4</th>
<th>EHS-LOD4</th>
<th>EHS-LOD7</th>
<th>EHS-LOD7A</th>
<th>EHS20-M07</th>
<th>EHS20-M07A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tank capacity (L)</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Motor capacity (kW)</td>
<td>4.0</td>
<td>7.0</td>
<td>7.0</td>
<td>7.0</td>
<td>7.0</td>
<td>7.0</td>
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<tr>
<td>Max operating pressure (MPa)</td>
<td>1.8 ~ 3.5</td>
<td>1.8 ~ 3.5</td>
<td>1.8 ~ 3.5</td>
<td>1.8 ~ 3.5</td>
<td>1.8 ~ 3.5</td>
<td>1.8 ~ 3.5</td>
</tr>
<tr>
<td>Discharge pipe diameter (inch)</td>
<td>4 ~ 1/4</td>
<td>9 ~ 3/8</td>
<td>9 ~ 3/8</td>
<td>9 ~ 3/8</td>
<td>9 ~ 3/8</td>
<td>9 ~ 3/8</td>
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<tr>
<td>Weight (kg)</td>
<td>43</td>
<td>56</td>
<td>46</td>
<td>46</td>
<td>46</td>
<td>46</td>
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<tr>
<td>Number of fan motors for all models</td>
<td>1-4/7</td>
<td>1-4/7</td>
<td>1-4/7</td>
<td>1-4/7</td>
<td>1-4/7</td>
<td>1-4/7</td>
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<tr>
<td>Number of fan motors for other models</td>
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<td>1-4/7</td>
<td>1-4/7</td>
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<tr>
<td>Number of fan motors for optional models</td>
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<td>1-4/7</td>
<td>1-4/7</td>
<td>1-4/7</td>
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<tr>
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<td>1-4/7</td>
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<td>1-4/7</td>
<td>1-4/7</td>
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<tr>
<td>Number of fan motors for ECORICH-ECORICH-R</td>
<td>1-4/7</td>
<td>1-4/7</td>
<td>1-4/7</td>
<td>1-4/7</td>
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<tr>
<td>Number of fan motors for ECORICH-ECORICH-R</td>
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<td>1-4/7</td>
<td>1-4/7</td>
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<td>1-4/7</td>
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<td>1-4/7</td>
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### ECORICH-R Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>ENR16-M074</th>
<th>ENR16-M075</th>
<th>EHSR-LOD7A</th>
<th>EHSR20-M07A</th>
<th>EHSR20-M07B</th>
<th>EHSR20-M07C</th>
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</thead>
<tbody>
<tr>
<td>Tank capacity (L)</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Motor capacity (kW)</td>
<td>Equivalent to 2.2 kW</td>
<td>Equivalent to 2.2 kW</td>
<td>Equivalent to 2.2 kW</td>
<td>Equivalent to 2.2 kW</td>
<td>Equivalent to 2.2 kW</td>
<td>Equivalent to 2.2 kW</td>
</tr>
<tr>
<td>Max operating pressure (MPa)</td>
<td>7.0</td>
<td>7.0</td>
<td>7.0</td>
<td>7.0</td>
<td>7.0</td>
<td>7.0</td>
</tr>
<tr>
<td>Discharge pipe diameter (inch)</td>
<td>2.3 ~ 19.2</td>
<td>2.3 ~ 19.2</td>
<td>2.3 ~ 19.2</td>
<td>2.3 ~ 19.2</td>
<td>2.3 ~ 19.2</td>
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<tr>
<td>Weight (kg)</td>
<td>38.1</td>
<td>41.1</td>
<td>57.5</td>
<td>61.9</td>
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<tr>
<td>Number of fan motors for optional models</td>
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<td>1-4/7</td>
<td>1-4/7</td>
<td>1-4/7</td>
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</tr>
<tr>
<td>Number of fan motors for non-standard models</td>
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<td>1-4/7</td>
<td>1-4/7</td>
<td>1-4/7</td>
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<td>Number of fan motors for ECORICH-ECORICH-R</td>
<td>1-4/7</td>
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<td>1-4/7</td>
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<tr>
<td>Number of fan motors for ECORICH-ECORICH-R</td>
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<tr>
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<td>1-4/7</td>
<td>1-4/7</td>
</tr>
<tr>
<td>Number of fan motors for ECORICH-ECORICH-R</td>
<td>1-4/7</td>
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<td>1-4/7</td>
<td>1-4/7</td>
<td>1-4/7</td>
<td>1-4/7</td>
</tr>
<tr>
<td>Number of fan motors for ECORICH-ECORICH-R</td>
<td>1-4/7</td>
<td>1-4/7</td>
<td>1-4/7</td>
<td>1-4/7</td>
<td>1-4/7</td>
<td>1-4/7</td>
</tr>
</tbody>
</table>

### Nomenclature

**EHU**

- Basic
- Pump maximum flow rate: 14.14 l/min
- 39.6 l/min
- Maximum operating pressure: 0.13 ~ 1.63 MPa
- Maximum operating pressure: 0.17 ~ 2.03 MPa

**EHR**

- Basic
- Pump maximum flow rate: 15.12 l/min
- Maximum operating pressure: 0.13 ~ 1.63 MPa
- Maximum operating pressure: 0.17 ~ 2.03 MPa

**EHU-R**

- Basic
- Pump maximum flow rate: 14.7 l/min
- Maximum operating pressure: 0.13 ~ 1.63 MPa
- Maximum operating pressure: 0.17 ~ 2.03 MPa

**EHU-ECORICH**

- Basic
- Pump maximum flow rate: 14.14 l/min
- Maximum operating pressure: 0.13 ~ 1.63 MPa
- Maximum operating pressure: 0.17 ~ 2.03 MPa

**ECORICH**

- Basic
- Pump maximum flow rate: 14.14 l/min
- Maximum operating pressure: 0.13 ~ 1.63 MPa
- Maximum operating pressure: 0.17 ~ 2.03 MPa

**ECORICH-ECORICH-R**

- Basic
- Pump maximum flow rate: 14.14 l/min
- Maximum operating pressure: 0.13 ~ 1.63 MPa
- Maximum operating pressure: 0.17 ~ 2.03 MPa

**ECORICH-ECORICH-R**

- Basic
- Pump maximum flow rate: 14.14 l/min
- Maximum operating pressure: 0.13 ~ 1.63 MPa
- Maximum operating pressure: 0.17 ~ 2.03 MPa

**ECORICH-ECORICH-R**

- Basic
- Pump maximum flow rate: 14.14 l/min
- Maximum operating pressure: 0.13 ~ 1.63 MPa
- Maximum operating pressure: 0.17 ~ 2.03 MPa

**ECORICH-ECORICH-R**

- Basic
- Pump maximum flow rate: 14.14 l/min
- Maximum operating pressure: 0.13 ~ 1.63 MPa
- Maximum operating pressure: 0.17 ~ 2.03 MPa

**ECORICH-ECORICH-R**

- Basic
- Pump maximum flow rate: 14.14 l/min
- Maximum operating pressure: 0.13 ~ 1.63 MPa
- Maximum operating pressure: 0.17 ~ 2.03 MPa

**ECORICH-ECORICH-R**

- Basic
- Pump maximum flow rate: 14.14 l/min
- Maximum operating pressure: 0.13 ~ 1.63 MPa
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**ECORICH-ECORICH-R**

- Basic
- Pump maximum flow rate: 14.14 l/min
- Maximum operating pressure: 0.13 ~ 1.63 MPa
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**ECORICH-ECORICH-R**

- Basic
- Pump maximum flow rate: 14.14 l/min
- Maximum operating pressure: 0.13 ~ 1.63 MPa
- Maximum operating pressure: 0.17 ~ 2.03 MPa
**Super Unit** Single pump specification

**Single pump specification**

<table>
<thead>
<tr>
<th>Model</th>
<th>Motor power (kW)</th>
<th>Motor torque (kNm)</th>
<th>Motor speed (rpm)</th>
<th>Motor current (A)</th>
<th>Motor voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUT-06D60L21-10</td>
<td>7.5</td>
<td>10.0</td>
<td>29.0</td>
<td>10.0</td>
<td>16.0</td>
</tr>
</tbody>
</table>

**Tank capacity (l)**
- 50
- 60
- 100

**Power consumption (kW)**
- 7.5
- 10.0
- 16.0
- 25.0

**Nomenclature**

**Basic**
- SUT: SUT series

**Tank capacities**
- 0: Pump & motor type
- 5: 50
- 2: 20

**Unit layout**
- No symbol

**Kind of pump**
- 0: Tension gear pump
- 1: Single stage pump

**Maximum pressure**
- 0.7 MPa
- 1.0 MPa
- 1.5 MPa
- 2.5 MPa

**Design No.**
- Number is progressed by model changes.

**Function option**
- No symbol
- No: DC motor, no index
- F: With control, with index

**Non-standard No.**
- No symbol

---

**Super Unit** Double pump specification

**Double pump specification**

<table>
<thead>
<tr>
<th>Model</th>
<th>Motor power (kW)</th>
<th>Motor torque (kNm)</th>
<th>Motor speed (rpm)</th>
<th>Motor current (A)</th>
<th>Motor voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUT-06D60L21-10</td>
<td>7.5</td>
<td>10.0</td>
<td>29.0</td>
<td>10.0</td>
<td>16.0</td>
</tr>
</tbody>
</table>

**Tank capacity (l)**
- 60
- 100
- 100
- 200

**Power consumption (kW)**
- 7.5
- 10.0
- 25.0

**Nomenclature**

**Basic**
- SUT: SUT series

**Tank capacities**
- 0: Pump & motor type
- 5: 50
- 2: 20

**Unit layout**
- No symbol

**Kind of pump**
- 0: Tension gear pump
- 1: Single stage pump

**Maximum pressure**
- 0.7 MPa
- 1.0 MPa
- 1.5 MPa
- 2.5 MPa

**Design No.**
- Number is progressed by model changes.

**Function option**
- No symbol
- No: DC motor, no index
- F: With control, with index

**Non-standard No.**
- No symbol

---
### Intelligent Coolant Pump Specifications

#### Rotating speed control

<table>
<thead>
<tr>
<th>Model</th>
<th>ECPBH2-045</th>
<th>ECPBH1E-060</th>
<th>ECPBH1-070</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of casing stages</td>
<td>0</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Number of impellers</td>
<td>3</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Motor capacity (W)</td>
<td>3.6</td>
<td>3.6</td>
<td>3.6</td>
</tr>
<tr>
<td>Discharge (l/min)</td>
<td>70~100</td>
<td>70~100</td>
<td>70~100</td>
</tr>
<tr>
<td>Total head (m)</td>
<td>15~50</td>
<td>15~50</td>
<td>15~50</td>
</tr>
<tr>
<td>Rated current (A)</td>
<td>5.5</td>
<td>5.5</td>
<td>5.5</td>
</tr>
<tr>
<td>Thermal set value (°C)</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>35</td>
<td>35</td>
<td>35</td>
</tr>
</tbody>
</table>

**Applicable fluid:** Water-miscible coolant

**Atmospheric temperature:** 0~40°C

**Ambient humidity:** 20~85% RH

**Matching body and devices:** Lathes, Monitoring tools, Special machines, etc.

#### Pressure control function

<table>
<thead>
<tr>
<th>Model</th>
<th>ECPBH2-045</th>
<th>ECPBH1E-060</th>
<th>ECPBH1-070</th>
</tr>
</thead>
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<td>6</td>
</tr>
<tr>
<td>Number of impellers</td>
<td>3</td>
<td>6</td>
<td>6</td>
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<tr>
<td>Motor capacity (W)</td>
<td>3.6</td>
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<td>Discharge (l/min)</td>
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</tr>
<tr>
<td>Thermal set value (°C)</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>35</td>
<td>35</td>
<td>35</td>
</tr>
</tbody>
</table>

**Applicable fluid:** Water-miscible coolant

**Atmospheric temperature:** 0~40°C

**Ambient humidity:** 20~85% RH

**Matching body and devices:** Lathes, Monitoring tools, Special machines, etc.

### Nomenclature

- **ECP**
  - 1 to 2: Series name (Basic model)
  - 3: Max. pump discharge
  - 4: Max. pressure
  - 5: Pressure control function

- **ECPBH2-045**
  - Series name (Basic model)
  - Max. pump discharge: 21.6 m³/hr
  - Max. pressure: 0.45, 0.6 MPa
  - Pressure control function: Pressure control

- **Design No.**
  - 1: Numbered automatically every model range
  - 2: Symbol
  - 3: Symbol
  - 4: Symbol
  - 5: Symbol

- **Non-Standard No.**
  - 6: Digits following a non-standard model
### Oil Cooling Unit (Circulating type)

#### Specification List

<table>
<thead>
<tr>
<th>Model No.</th>
<th>AKZ14B</th>
<th>AKZ20B</th>
<th>AKZ26B</th>
<th>AKZ32B</th>
<th>AKZ38B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil inlet temperature (°C)</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Oil cooling capacity (kW)</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Oil pressure (bar)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Oil flow rate (l/min)</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

#### Nomenclature

- **AKZ**: Basic (Standard type oil Cooling Unit)
- **14, 18, 20, 26, 32, 38**: Nominal cooling capacity (kW) x 10

### Oil Cooling Unit (Immersion type)

#### Specification List

<table>
<thead>
<tr>
<th>Model No.</th>
<th>AKZ14B</th>
<th>AKZ20B</th>
<th>AKZ26B</th>
<th>AKZ32B</th>
<th>AKZ38B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil inlet temperature (°C)</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Oil cooling capacity (kW)</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Oil pressure (bar)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Oil flow rate (l/min)</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

#### Nomenclature

- **AKZ**: Basic (Standard type oil Cooling Unit)
- **14, 18, 20, 26, 32, 38**: Nominal cooling capacity (kW) x 10

### Rotating speed control

#### Table

<table>
<thead>
<tr>
<th>Model No.</th>
<th>AKZ14B</th>
<th>AKZ20B</th>
<th>AKZ26B</th>
<th>AKZ32B</th>
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<tr>
<td>Oil inlet temperature (°C)</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Oil cooling capacity (kW)</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Oil pressure (bar)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Oil flow rate (l/min)</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

### Standard, Semi-standard, Non-standard Models

#### AKZ@ (Circulating type)

- **Low-temperature pump**: Standard | Non-standard | Remarks
- **Pump relief valve**: Yes
- **Duty of oil temperature sensor**: No
- **Circuit breaker**: B
- **Low oil flow rate (l/min)**: 10
- **Different voltage specifications (Transformer)**: E
- **Oil filter**: X
- **Low oil level control specifications**: X
- **Nominal oil circuit resistance**: 0.03

#### AKZ@ (Immersion type)

- **Low-temperature pump**: Standard | Non-standard | Remarks
- **Pump relief valve**: Yes
- **Duty of oil temperature sensor**: No
- **Circuit breaker**: C
- **Low oil flow rate (l/min)**: 10
- **Different voltage specifications (Transformer)**: E
- **Oil filter**: X
- **Low oil level control specifications**: X
- **Nominal oil circuit resistance**: 0.03

### Nomenclature

- **AKZ**: Basic (Standard type oil Cooling Unit)
- **14, 18, 20, 26, 32, 38**: Nominal cooling capacity (kW) x 10

---

### Nomenclature

- **AKZ**: Basic (Standard type oil Cooling Unit)
- **14, 18, 20, 26, 32, 38**: Nominal cooling capacity (kW) x 10

### Design Note

- **Nominal cooling capacity (kW)**: 10
- **Oil pressure (bar)**: 1
- **Oil flow rate (l/min)**: 2
- **Duty of oil temperature sensor**: Yes

### Nomenclature

- **Design No.**: (Model change No.)
- **AKZ14B**: Basic (Standard type oil Cooling Unit)
- **AKZ20B**: Basic (Standard type oil Cooling Unit)
- **AKZ26B**: Basic (Standard type oil Cooling Unit)
- **AKZ32B**: Basic (Standard type oil Cooling Unit)
- **AKZ38B**: Basic (Standard type oil Cooling Unit)

### Nomenclature

- **Design No.**: (Model change No.)
- **AKZ14B**: Basic (Standard type oil Cooling Unit)
- **AKZ20B**: Basic (Standard type oil Cooling Unit)
- **AKZ26B**: Basic (Standard type oil Cooling Unit)
- **AKZ32B**: Basic (Standard type oil Cooling Unit)
- **AKZ38B**: Basic (Standard type oil Cooling Unit)
**Optional parts for ECORICH**

<table>
<thead>
<tr>
<th>Name</th>
<th>Model</th>
<th>Material</th>
<th>Weight (g)</th>
<th>Price</th>
<th>CE Marking</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature switch</td>
<td>EHT-106-05</td>
<td>2.05</td>
<td>52</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Level switch</td>
<td>EL-S8-100</td>
<td>1.56</td>
<td>50</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Model applicable**

- **Temperature switch**
  - 24V/AC or 24V/DC
  - Optional: CE Marking, etc.

- **Level switch**
  - Optional: CE Marking, etc.

---

**Optional parts for Oil Cooling Unit -1 (AKZ8 and AKZ8J series)**

**Nomenclature and application of thermistor**

This optional thermistor is installed on the main machine and its piping to sense the temperature to control the oil-piping and application of optional machine. The thermistor and temperature control thermistor are shown as below. These are not standard accessories to the Oil Cooling Unit main body. If needed, separately place an order.

**Available Models**

- **AKZ4-40-A05**
- **AKZ A-04-A10**
- **AKZ4-40-A15**
- **AKZ A-04-A18**
- **AKZ4-40-A15**
- **AKZ A-04-A18**

**Installation and connection**

For **AKZ B-0P-K**

- Connect to Oil Cooling Unit X-terminal 
- N.O. and N.C.

For **AKZ B-0P-A**

- Connect to Oil Cooling Unit X2, terminal 
- N.O. and N.C.

For **AKZ B-0P-V**

- Connect to Oil Cooling Unit X-terminal 
- N.O. and N.C.

---

**Optional parts for Intelligent Coolant Pump**

**Name**

- Relay box: ECP-DY000-015
- Cable clamp for power: EWW-DY000-15
- Cable clamp for control signal: EWW-DY000-15
Optional parts

Optional parts for Oil Cooling Unit -2 (AKZ8 and AKZ8J series)

- Main machine communication extension board
  Install this optional board to Oil Cooling Unit to connect with the main machine, and
  operation mode and setting can be selected on the main machine side, and
  2.0 mm Cooling Unit alarm and temperature data (machine surface temperature, room temperature, input temperature, output temperature difference in temperature between input and output, input current frequency) can be read on the main machine side.

<table>
<thead>
<tr>
<th>Communication method</th>
<th>Board</th>
<th>Position</th>
<th>Models applicable</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial communication only</td>
<td>AKZ8-OP-CS</td>
<td>On the surface of Oil Cooling Unit control board</td>
<td>AKZ2J8A, AKZ2J8B, AKZ2J8C</td>
<td>5539333</td>
</tr>
<tr>
<td></td>
<td>AKZ8-OP-CS</td>
<td>Back side of front sheet metal of Oil Cooling Unit electric component box</td>
<td>AKZ2J8A, AKZ2J8B, AKZ2J8C</td>
<td>5539570</td>
</tr>
<tr>
<td>Serial/parallel communication</td>
<td>AKZ8-OP-CS</td>
<td>Back side of front sheet metal of Oil Cooling Unit electric component box</td>
<td>AKZ2J8A, AKZ2J8B, AKZ2J8C</td>
<td>5539570</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1) Subject to change without prior notice.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note:
1. For AKZ16, AKZ216, and AKZ2J8, 4G and 4S cannot use AKZ2J8A, AKZ2J8B, and AKZ2J8C. Therefore, use AKZ2J8A, AKZ2J8B, and AKZ2J8C. (Contact 1. W.E. for details.)
2. In case of parallel communication, the AKZ8-OP-CS board is not valid.
3. For communication procedures and specifications, refer to the separate specifications.

Installation position of AKZ8-OP-CS (serial communication only)

- AKZ8A, 216, and 216B
  - D-SUB 8pin connector
  - Connect to CN12 on the control board

Installation position of AKZ8-OP-CS (parallel communication)

- Back side of front sheet metal of electric component box
  - AKZ8-OP-CS board
  - D-SUB 8pin connector
  - Connect to CN14 on the control board
  - Note: The male D-SUB 8pin connectors are included as accessories.

Characteristics

ECORICH

Output characteristics (P-Q characteristics)

<table>
<thead>
<tr>
<th>EHUB 1.04-A-10</th>
<th>EHUB 1.04-A-10</th>
<th>EHU25-07-E-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 to 10.0</td>
<td>0.0 to 10.0</td>
<td>0.0 to 7.0</td>
</tr>
<tr>
<td>0.0 to 10.0</td>
<td>0.0 to 10.0</td>
<td>0.0 to 7.0</td>
</tr>
<tr>
<td>0.0 to 10.0</td>
<td>0.0 to 10.0</td>
<td>0.0 to 7.0</td>
</tr>
</tbody>
</table>

ECORICH-R

EHU15A-M0701/EHU15V-M0702

EHU10R-M0702/EHU10R-M0702

EHU10R-M0702

Pressure (MPa)

Flow rate (l/min)
Characteristics

Super Unit

Max. output characteristics (Pressure-Flow rate characteristics)

- At continuous supply of flow, should be less than following flow rate:
  - SUT = S15 = 07: less than 2.6 mm
  - SUT = S30 = 07: less than 2.4 mm
  - SUT = S40 = 07: less than 2.2 mm

- At continuous supply of flow, should be less than following flow rate:
  - SUT = S15 = 10: less than 2.8 mm
  - SUT = S30 = 10: less than 2.6 mm

- At continuous supply of flow, should be less than following flow rate:
  - SUT = S15 = 16: less than 2.0 mm
  - SUT = S30 = 16: less than 1.8 mm
Characteristics

Intelligent Coolant Pump

- Rotating speed control

- Pressure control

Intelligent High-Pressure Coolant Pump

- Output Characteristics

Oil Cooling Unit AKZ8 (Circulating type)

- Characteristic curve

Oil Cooling Unit AKZ8 (Immersion type)

- Characteristic curve