



# Hybrid System

Inverter-controlled  
Hydraulic Power Units  
and Fluid Chillers

Industrial Solution by **DAIKIN**



Ecorich



Ecorich R



Super Unit



Oil Cooling Unit

**DAIKIN INDUSTRIES, LTD.**  
**Oil Hydraulic Division**  
**Oil Hydraulic Equipment**

# DAIKIN contributes with fusion technology of hydraulic and inverter system for 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 efficiency.



## 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.

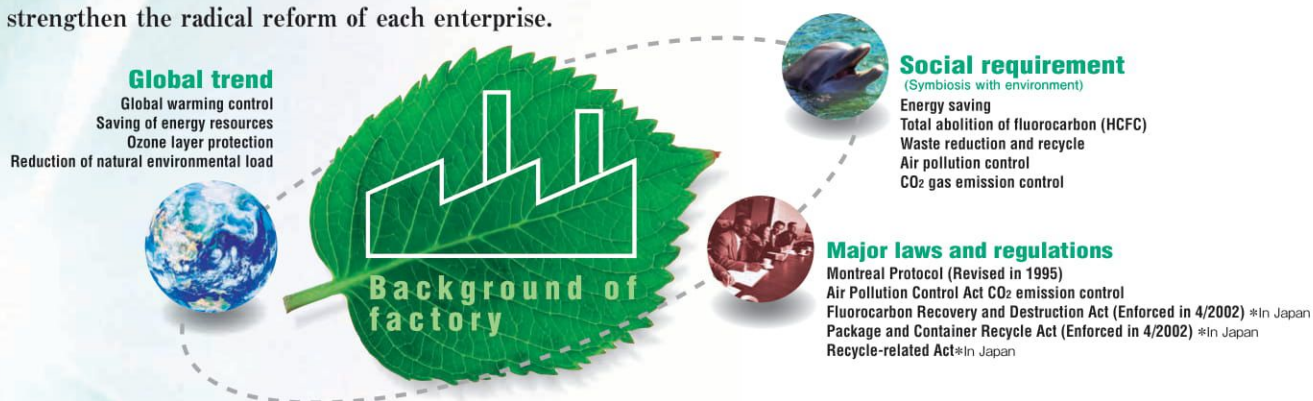
# Technology of extreme improvement.

# Hybrid System

Inverter-controlled energy-saving systems

## Social responsibility for the industry.

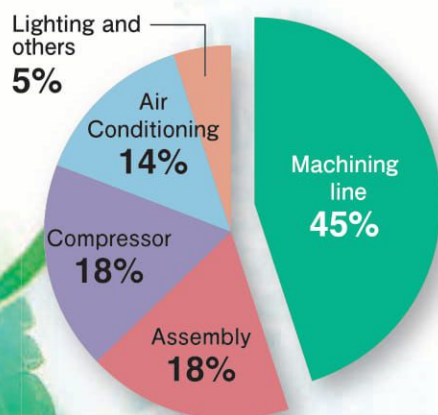
Various activities are being proceeded all over the world for preservation of global environment. The industry has been sharply requested to reduce the environmental influence. It is an important theme for each enterprise to solve such a problem. In fact, some support systems were established to promote 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.

### Power consumption of line in factory



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

## Contents

Concept	1
Energy-saving technology to support hybrid systems	3
ECORICH	5
ECORICH-R	7
SUPER UNIT	9
Oil Cooling Unit	13
Hybrid System Model List	17
Product Introduction	18
Optional Parts	26

# Energy-saving technology for hybrid systems

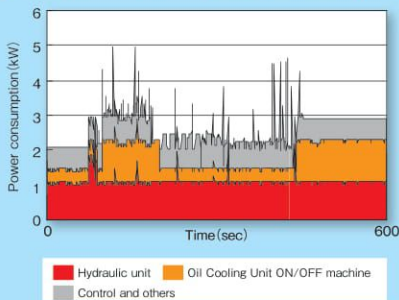
Advanced technology greatly improves energy efficiency.

## Energy saving

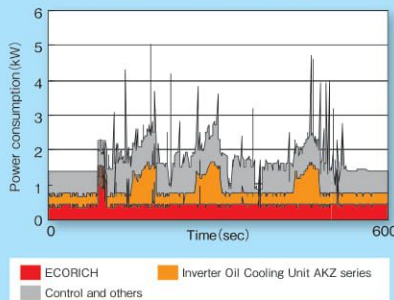
The combination of DAIKIN original inverter system and hydraulic technology greatly improves the energy saving effect. The high-speed response provides performance equivalent to or higher than the conventional variable displacement.

### Example of actual application of hybrid system (Our machining line)

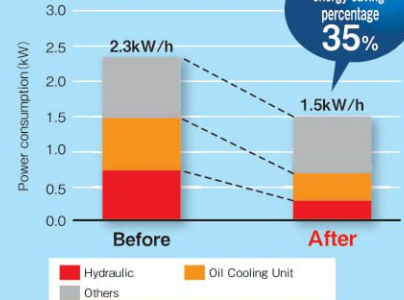
Power consumption with the conventional unit



Power consumption with Hybrid System



Comparison of power consumption per hour



## Sophisticated control (Super Unit)

- ◆ Pressure and flow rate (PQ) characteristics of 16 patterns are preset to the control unit. Select and input them on the main machine side, and multi-stage pressure and flow rate control can be easily attained.
- ◆ Adjust select rise/fall time in changing PQ characteristics, and shock-less control can be attained.
- ◆ The conventional valve control is replaced by pump control; and simple and low - cost systems can be produced for high/low press speed select and multi-stage pressure control.

## Compact design

- ◆ High-efficiency IPM motor and inverter control reduce the pump discharge at standby. As the result, heat generation is suppressed and the tank capacity is reduced to be compact. (ECORICH, Super Unit)
- ◆ Smaller than 8 series, top-class in the industry. (Oil Cooling Unit)

## Environmentally Conscious Design

- ◆ Responds to environmental regulations, e.g. by adopting printed circuit boards with lead-free solder.

## Low noise

Case of Super Unit

**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)

Case of Oil Cooling Unit

AKZ1.5HP class:

AKZ 8

AKZ 9

**59.5dB (A) → 58dB (A)** Corresponding value in anechoic chamber (Oil Cooling Unit)

- ◆ Noise level also reduced in line with load reduction.



\*Generally, people can talk at the distance of 1m at the noise level of 60dB(A).

## Energy-saving technology to support hybrid systems

### “Double Torque, power of rotations” improves the energy saving effect.

In combination of two rotating forces of powerful neodymium\*1 "magnet torque" and DAIKIN original "Reluctance torque\*2", higher power can be generated at lower electricity.

Key of the improved energy saving effect : Powerful neodymium magnet

(Ferrite magnet) (Neodymium magnet)



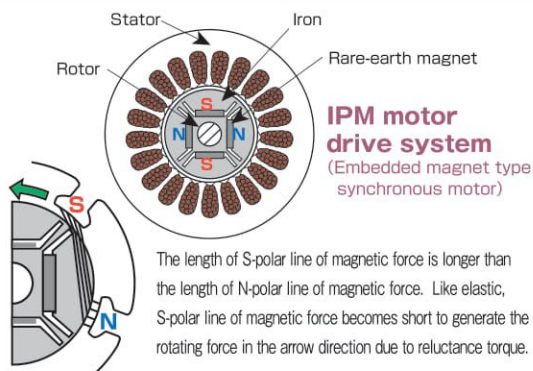
The neodymium magnet has a much stronger power than the popular ferrite magnet.

\*1: A compound of neodymium (Nd, rare-earth element), iron (Fe), and boron (B). Neodymium magnets are known to have superior magnetic properties.  
\*2: Rotational force generated by attractive force (reluctance = magnetic resistance) between iron and a magnet.

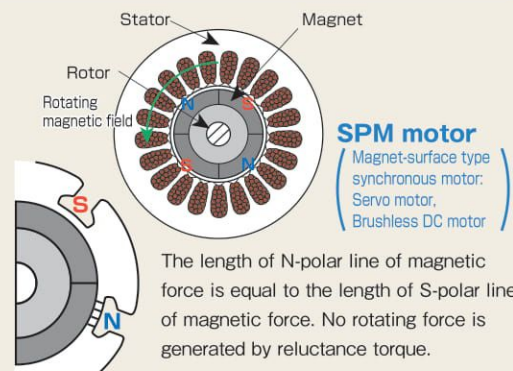
### Principle of IPM motor

A rare-earth permanent magnet deeply positioned in the rotor can generate magnet torque (attraction/repulsion between coil and permanent magnet) and reluctance torque (coil attracts iron) greatly. This electromagnetic structure attains high torque and the highest efficiency/low heat generation.

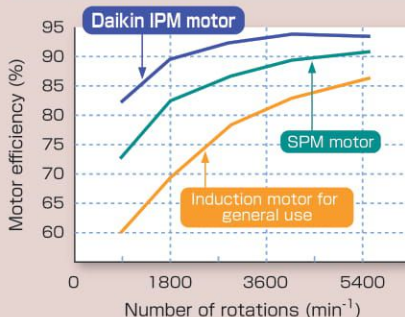
#### Structure of IPM



#### Structure of conventional motor (AC servo)

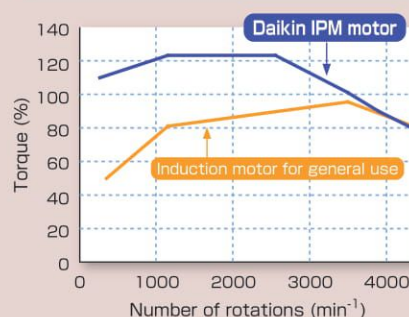


#### [1] Comparison of motor efficiency



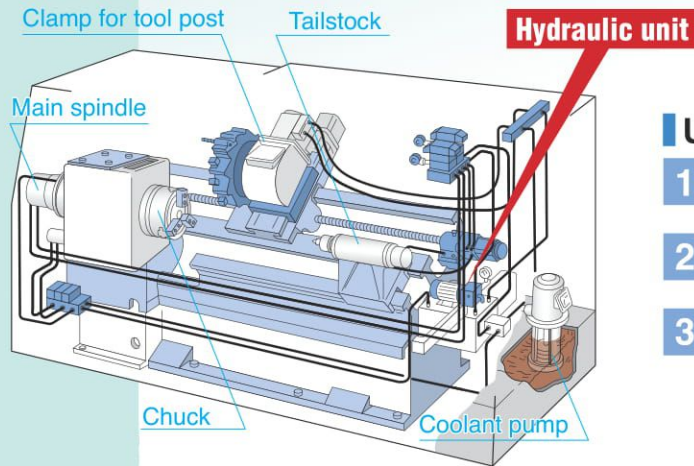
Daikin IPM motor keeps higher motor efficiency at the low rotation speed.

#### [2] Comparison of torque characteristic



DAIKIN IPM can output high torque at the low speed range. Though the inverter for general use may sometimes have a problem of short torque at low speed range, DAIKIN IPM is free of such a problem.

## Hydraulic unit

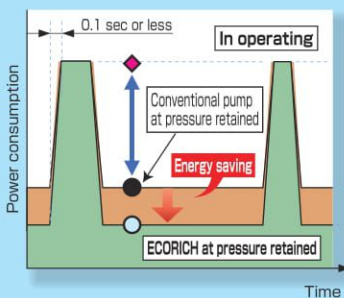


### Used to supply control power

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

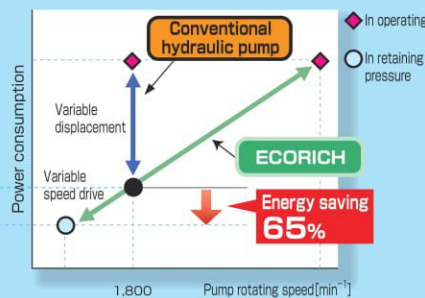
### Principle of energy saving

#### Hydraulic operating pattern and energy-saving



- ECORICH power consumption
- Conventional pump power consumption

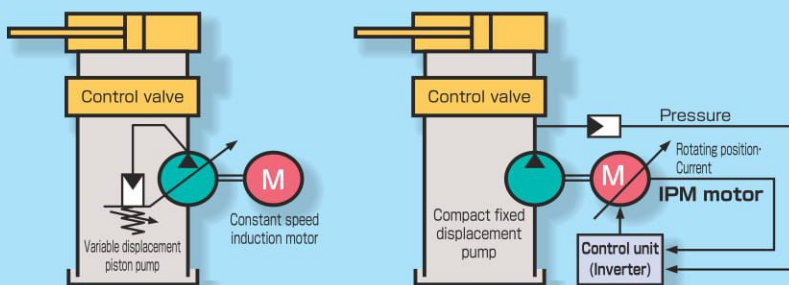
#### Principle of operation



### Autonomous energy-saving pressure-flow rate control

- ◆ Supplies required flow according to load condition by monitoring the pressure.
- ◆ Holds necessary pressure and operates at the minimum rotating speed required to compensate for leakage from circuit in retaining pressure. Rotates at high speed and supplies required flow when hydraulic actuator operates.

### System configuration



Conventional hydraulic system

ECORICH system

### Easy installation and easy operation

- ◆ 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 legibly displayed in digital.

ogy **First in the world**



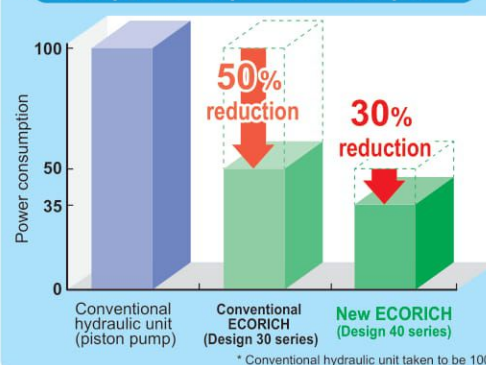
## Energy saving

### Energy saving 65%

(Compared to our product, when pressure is retained)

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

### Comparison of power consumption



## High-speed response

- ◆ Special IPM motor, which has low inertia and generates high torque at low speed, and high-speed response inverter.
- ◆ 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 rotor pack (Type NDR151, NDR231) equivalent to motor

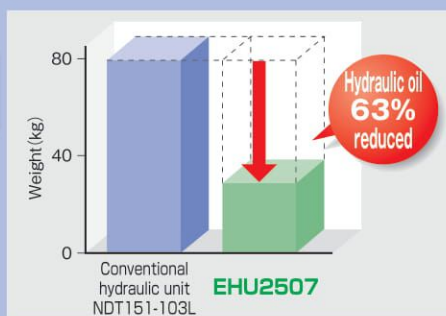
### EHU2507

Capacity comparison of installation area

NDR151-103L : **82%** (79kg)

NDR231-305 : **54%** (105kg)

Weight 29kg  
328×460×484



## Specifications

Model	EHU1404	EHU2504	EHU2507	EHU3007
Max. working pressure	4.0 MPa		7.0 MPa	
Discharge adjusting range	2.5~15.2 L/min	3.5~25.1 L/min		3.5~28.5 L/min
Motor capacity	Equivalent to 0.75 kW	Equivalent to 1.5 kW	Equivalent to 2.2 kW	Equivalent to 2.8 kW
Tank capacity	18 L			

# ECORICH-R

## Hydraulic unit

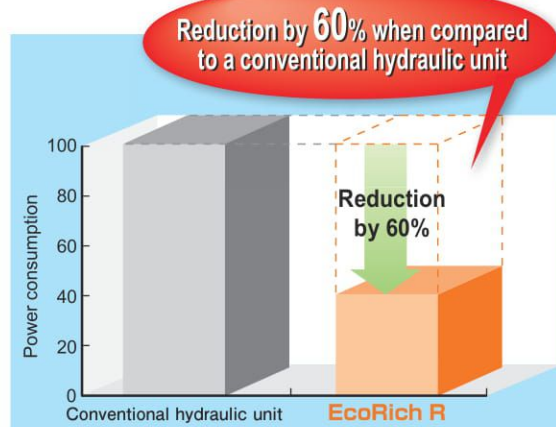
The technology of Eco-New IPM motor system dramatic improvement of

Daikin's EcoRich R is seeking energy saving and user-friendliness to the last extremity.

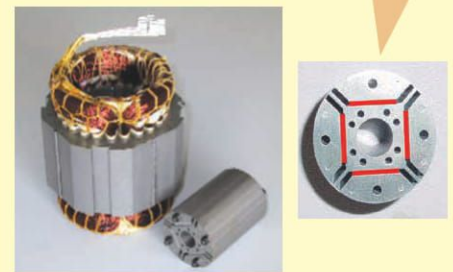
### Further energy savings with high-efficiency IPM motor installed.

The system uses an ultra energy-saving IPM motor\*, featuring a combination of magnet torque (pull-in and repulsive force between a coil and permanent magnet) and reluctance torque (pull-in force between a coil and iron).

\* IPM motor: Interior Permanent Magnet Synchronous Motor  
Refer to Page 4 for details on the IPM motor.



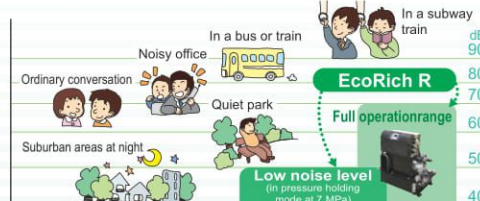
High torque and high efficiency due to a unique structure with rare-earth magnet embedded deep in the rotor



### Low noise level at 50 dB (A) achieved in the pressure holding mode

A low noise level in comparison with conventional hydraulic units is achieved. It is 50 dB (A) in the pressure holding mode at 7 MPa and to 70 dB (A) or lower even over the full operation range.

#### Examples of typical noise levels



It is generally known that ordinary conversation can be conducted with a person one meter away in an environment at a noise level of 60dB (A).

### EcoRich R is excluded from high-efficiency motor regulations

High-efficiency motor regulations will be enforced in Japan in April 2015. These regulations will apply to the hydraulic units equipped with general motors but the EcoRich R that incorporates a dedicated inverter driven motor will be excluded from them.

#### Advantages of adopting a hybrid hydraulic unit

- 1 Eliminates the need for replacement of motors for each destination
- 2 Eliminates the need for design changes in accordance with amendments to the regulations
- 3 Reduces design changes to spare parts, and the maintenance workload

### NEW All models conforming to CE standards

All models conform to the machinery directive, EMC directive, and low voltage directive to facilitate CE approval of the main machine.

### NEW Adoption of multi-step pressure/flow rate control

Multi-step pressure and flow rate control can be realized simply by inputting 16 patterns of pressure and flow rate settings and selecting a pattern using external input signals. Shockless adjustment upon switching can be achieved by changing the acceleration/deceleration time using parameters.

### Monitoring oil level drop in the tank

The unit incorporates a dry run error detection function. Operation automatically stops when the oil level in the tank drops lower than a certain level. This prevents the pump from running while dry and helps to extend the service life.

### Simple monitoring of operating status

The pressure, flow rate, motor speed and other internal data can be monitored and displayed in graph form at a personal computer using Hybrid-Win. This data can be displayed collectively, making it easy to grasp the operating status. (Refer to P25)



**Rich has been evolved further.  
achieved  
energy saving.**

**First in the world**



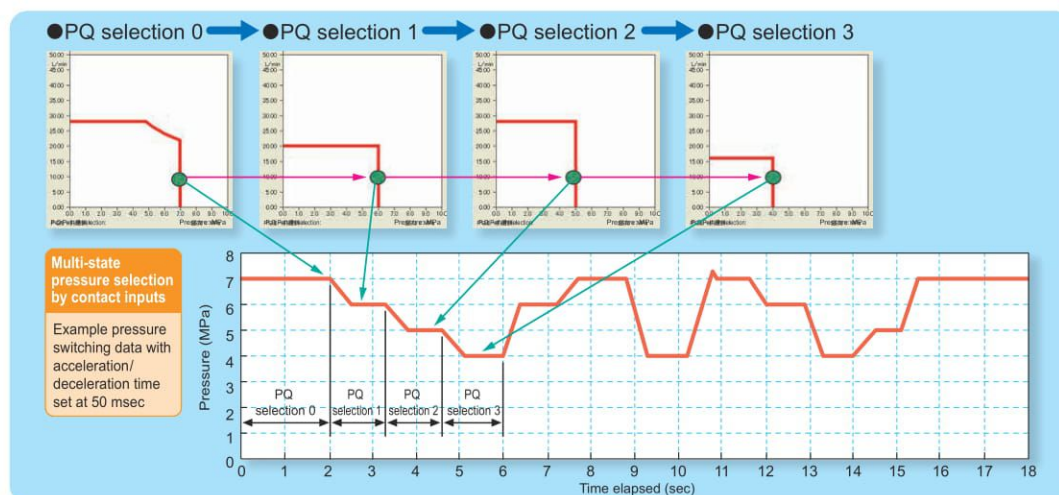
## Description of function

### 16 pressure (P) - flow rate (Q) setting patterns are available for cylinder control.

- The proportional control valve and proportional pressure control valve, which are utilized in conventional actuator circuits, can be omitted.
- The pressure and flow rate can be set using the control unit's operation panel.
- The pressure and flow rate settings can be selected from among the 16 patterns using external input signals.
- The EcoRich R autonomously switches between the pressure control and flow rate control modes.

### Shockless switching of flow rates and pressures

- Setting the acceleration/deceleration time can reduce shocks when flow rates and pressures are switched.



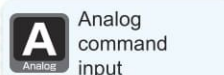
## Optional function

### Function Option



Communication function

◆ Remote control and setting changes are possible through RS232C serial communication. Using a commercially-available PLC or touch panel display with RS232C communication capabilities, parameters for the pressure, flow rate, acceleration time, deceleration time and so on can be set and viewed at the machine. This facilitates control of speeds and pressurizing forces and enables a wide variety of machine operations.



Analog command input

◆ Enables continuous control of pressures and flow rates as required.

The pressure and flow rate can be controlled continuously at the desired values by inputting the pressure command voltage (0 to 10 V) and flow rate command voltage (0 to 10 V) from the machine side. This achieves a control system with a simple configuration for machinery that requires variable speed control or continuity of pressurizing forces.

### Hardware Option

#### ◆ Built-in DC reactor

- Appropriate when it is necessary to improve the power factor or reduce the harmonics of the power supply.

#### ◆ Separate power supplies for power system and control system

- When an error occurs, only the main power supply is shut down and control power supply continues to carry current, thereby enabling the alarm code and internal status on occurrence of an error to be checked on the operation panel or through serial communication.

## Specifications

Model	EHU15R-M0701	EHU30R-M0701	EHU15R-M0702	EHU30R-M0702
Max. working pressure	7.0 MPa			
Discharge adjusting range	2.5~15.2 L/min	3.5~28.5 L/min	2.5~15.2 L/min	3.5~28.5 L/min
Motor capacity	Equivalent to 2.2 kW	Equivalent to 2.8 kW	Equivalent to 2.2 kW	Equivalent to 2.8 kW
Tank capacity	10 L		20 L	

# Super Unit

Single & Double pump specification

## Hybrid Unit

### Fusion of DAIKIN original drive system and double

Multi-step Pressure / Flow and shock-less High performance beyond the hydraulic Tank-less type is now available. Make your

### Features

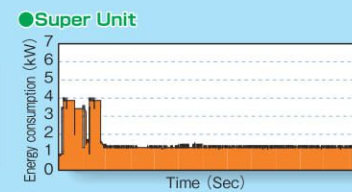
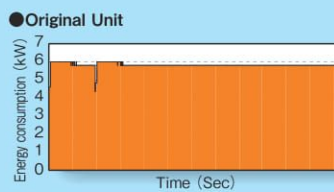
POINT  
1

#### 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)

- ◆ Air conditioning motor inverter technology and tandem pump selecting control technology are used to attain high energy saving effects.
- ◆ Not only at pressure retained but in the field of general industrial machinery where actuators are frequently operated, such a high-efficiency motor can save energy greatly.
- By controlling the motor rotation speed, the SUPER UNIT controls the flow rate and pressure of fixed-capacity pumps. This 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 highly-functional series created to be more useful.
- The double pump type uses the autonomously-switching, fixed-capacity double pump system, which combines large- and small-capacity pumps in a low pressure, high flow rate range, and autonomously 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.

#### Fusion of DAIKIN original high-efficiency IPM motor drive system and double pump switch control technology provides epoch-making energy saving effects.



POINT  
2

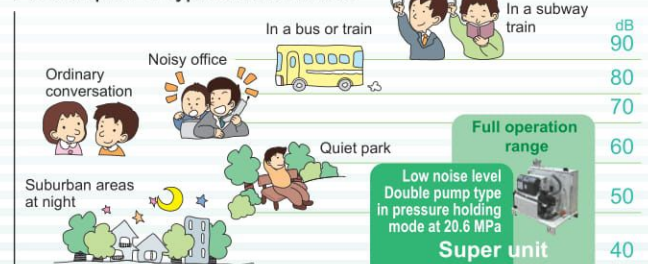
#### Low noise level-60 dB (A) (Double pump type in pressure holding mode at 20.6 MPa)

The noise level is 73 dB (A) or less even in full-operation areas.

- Running the motor at the minimum required rotation speed through inverter control achieves a remarkable noise level reduction in pressure holding mode.

It is generally known that ordinary conversation can be conducted with a person one meter away in an environment at a noise level of 60 dB (A).

#### Examples of typical noise levels



POINT  
3

#### Excluded from high-efficiency motor regulations

- High-efficiency motor regulations will be enforced in Japan in April 2015. These regulations will apply to the hydraulic units equipped with general motors but the Super Units that incorporate a dedicated inverter driven motor will be excluded from the regulation.

#### Advantages of using hybrid hydraulic units

- ◆ Eliminates the need for replacement of motors for each destination
- ◆ Eliminates the need for design changes in accordance with amendments to the regulations
- ◆ Reduces design changes to spare parts, and the maintenance workload

# high-efficiency IPM motor pump switch control technology.

First in the world

control by pump / motor speed control.  
meets wider demands.  
unit special.



POINT  
4

## Reduce oil temperature rise

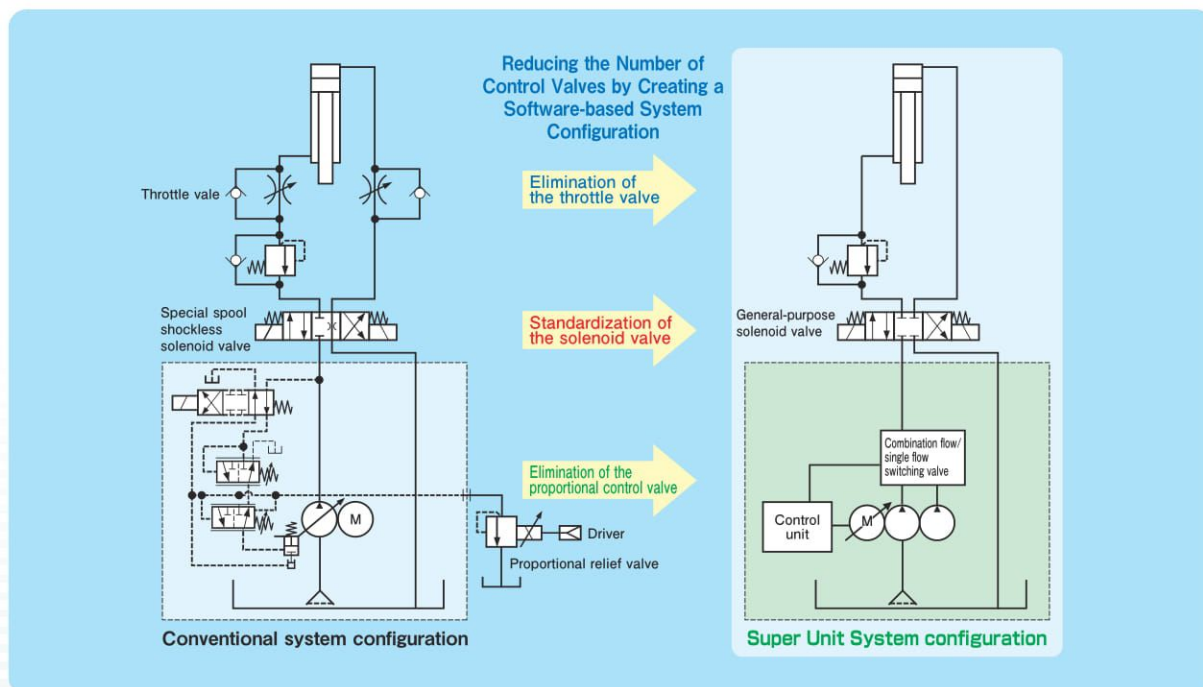
Reduction of the temperature rise of the hydraulic fluid is one of the effects achieved by adopting Super Units. This generates the following advantages.

- **Improved machining accuracy**  
Reduced thermal distortion improves the machining accuracy.
- **Reduced air-conditioning heat load**  
The reduced heat load on the air conditioner achieves further energy savings.

- **Extended service life of packing and other sealing materials**  
Improved maintainability  
Deterioration of the packing and other sealing materials that are made of rubber, used for hydraulic valves and hydraulic cylinders, is restricted.
- **Extended service life of the hydraulic fluid**  
Reduced environmental load and improved maintainability  
Less deterioration of the hydraulic fluid extends its replacement interval.

POINT  
5

## Simplification of system



- Pressure and flow rate (PQ) characteristics of 16 patterns are preset to the control unit. Select and input them on the main machine side, and Multi-step pressure and flow rate can be easily controlled.
- Adjust select rise/fall time in selecting PQ characteristics, and shockless transition can be controlled.
- The conventional valve control is replaced by pump control; and simple and low-cost systems can be produced for high/low press speed select and Multi-step pressure control.

POINT  
6

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.

SUPER UNIT

# Super Unit Single & Double pump specification

## Hybrid Unit

### Functions

**16**  
PQ

#### Multi-stage pressure/flow rate control (16 PQ control setting patterns)

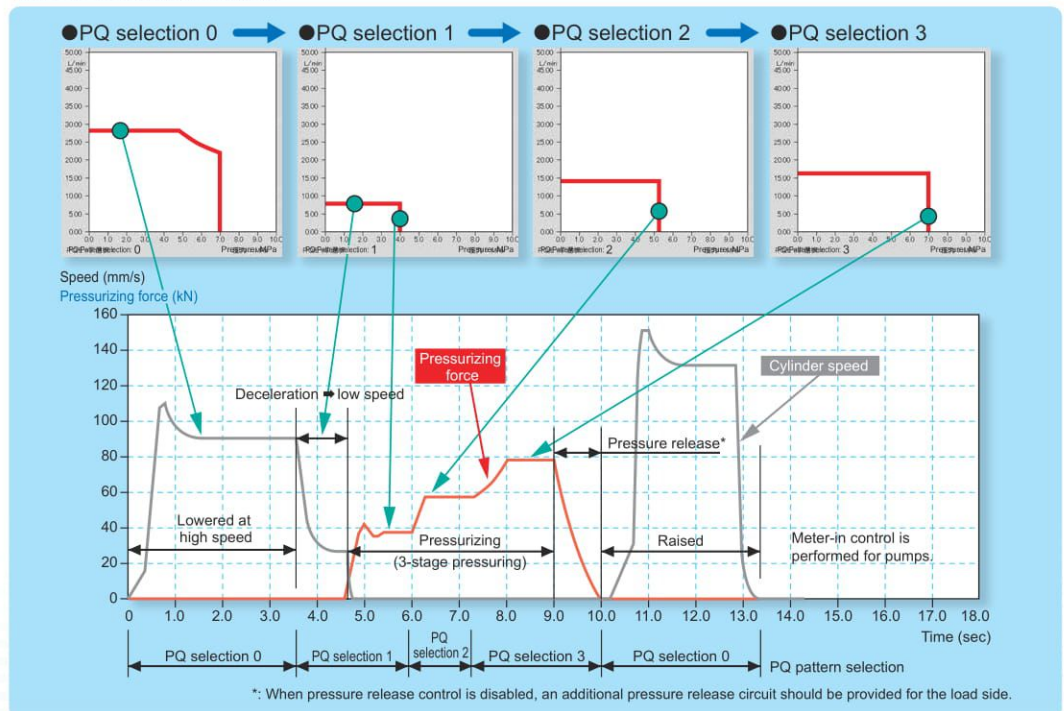
Featured with standard models

- ◆ The force (pressure) and speed (flow rate) of the actuator (cylinder) can be controlled with 16 pressure (P) and flow rate (Q) setting patterns.

The proportional control valve and proportional pressure control valve, which are utilized in conventional actuator circuits, are not required. Once the pressure and flow rate have been set at the controller's operation panel, you can select 16 preset patterns using external input signals. The Super Unit autonomously changes the control mode from flow rate control to pressure control (example: flow rate control is changed to pressure control at the cylinder stroke end). The solenoid valve that actuates the cylinder must be turned ON/OFF at the machine.

- ◆ Smooth changing of force (pressure) and speed (flow rate)

Once acceleration time and deceleration time parameters are registered, the force or speed can be changed gradually during a pressure/flow rate setting change.



PC tool  
**Hybrid-Win**  
Supported  
(Refer to P25)

#### Maintenance/Management function (Hybrid-Win)

Featured with standard models

- This PC utility reads data from Daikin hybrid systems (Super Unit, EcoRich, oil cooling unit, etc.) and manages it. Parameter setting and monitoring can be accomplished efficiently using the Windows application.

Main  
features

- ◆ Displaying graphs

The pressure, flow rate, and other internal data of the inverter can be monitored and displayed in the form of graphs. This facilitates operation checks during test runs, adjustment of parameters such as time constants, and troubleshooting.

- ◆ Reading, writing, editing, and saving parameters

The time required for setting can be slashed by editing the parameter settings on the PC and writing them to the unit in a batch. The ability to read and save settings facilitates management.

- ◆ Reading and saving the alarm history

This function enables quick identification of the parts that require maintenance and reduction of the downtime. The operating time display can serve as the guide for the timing to replace consumable parts or to conduct maintenance. Troubleshooting information including the diagnosis results of the cause of an alarm and action to take can be displayed.



# Function Option



## Communication function

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

◆ Enabling remote operation to change the operation conditions setting of the Super Unit

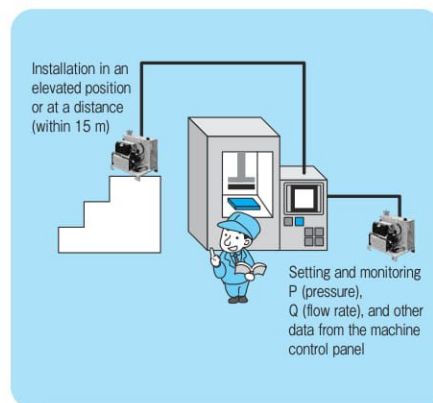
Various settings such as acceleration/deceleration time and pressure switch settings, as well as the pressure and flow rate, can be set remotely. This makes it possible to control the hydraulic pressure operating conditions in synchrony with the control of the machine.

◆ Managing the pressure and flow rate at the machine

The capability to read the operating conditions of the Super Unit makes it possible to display information such as the current pressure and flow rate on the screen at the machine.

\*: The serial communication interface conforms to the RS232C standard. Prepare a control unit such as a PLC or touch panel display with the RS232C communication function at the machine side.

\*: For details on the communication procedure, refer to the communication/remove control function instruction manual.



## Analog command input

■ The capability to specify the pressure and flow rate with voltage ranging from 0 to 10 V enables continuous hydraulic control as required. Real-time variation in response to commands facilitates condition settings at the machine side.

◆ A hydraulic control system for machinery that requires variable speed control or continuity of pressurizing forces can be realized with a simple configuration.

◆ A joystick or trimmer can be connected for real-time control.

## Specifications

### ● Single pump specification

Unit Type	SUT03S1507	SUT03S1510	SUT03S3007	SUT03S4007	SUT03S3010	SUT03S1516	SUT06S3016	SUT06S6007	SUT10S8007
Pump & Motor Type	SUT00S1507	SUT00S1510	SUT00S3007	SUT00S4007	SUT00S3010	SUT00S1516	SUT00S316	SUT00S6007	SUT00S8007
Max working pressure	7.0 MPa	10.0 MPa	7.0 MPa	7.0 MPa	10.0 MPa	16.0 MPa		7.0 MPa	
Discharge adjusting range (L/min)	2.5~15.2		3.5~28.5	5.3~39.7	3.4~25.6	2.4~15.2	3.4~25.6	8.7~61.1	11.6~83.0
Motor capacity	Equivalent to 2.2kW	Equivalent to 2.8kW		Equivalent to 3.7kW			Equivalent to 5.0kW		Equivalent to 7.0kW
Tank capacity	30L						60L		100L

### ● Double pump specification

Unit Type	SUT06D4016	SUT06D6021	SUT10D6021	SUT10D8021	SUT16D8021	P-SUT20D11KW
Pump & Motor Type	SUT00D4016	SUT00D6021		SUT00D8021		SUT00D11021
Max working pressure	15.7 MPa	20.6 MPa				
Discharge adjusting range (L/min)	5.4~41.0	8.7~61.1		11.6~83.0		13.3~110
Motor capacity	Equivalent to 3.7kW	Equivalent to 5.0kW		Equivalent to 7.0kW		Equivalent to 11.0kW
Tank capacity	60L			100L		160L 200L

# Oil Cooling Unit

Amazingly improved  
Oil Cooling Unit, equ  
high-efficient IPM m

## 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.

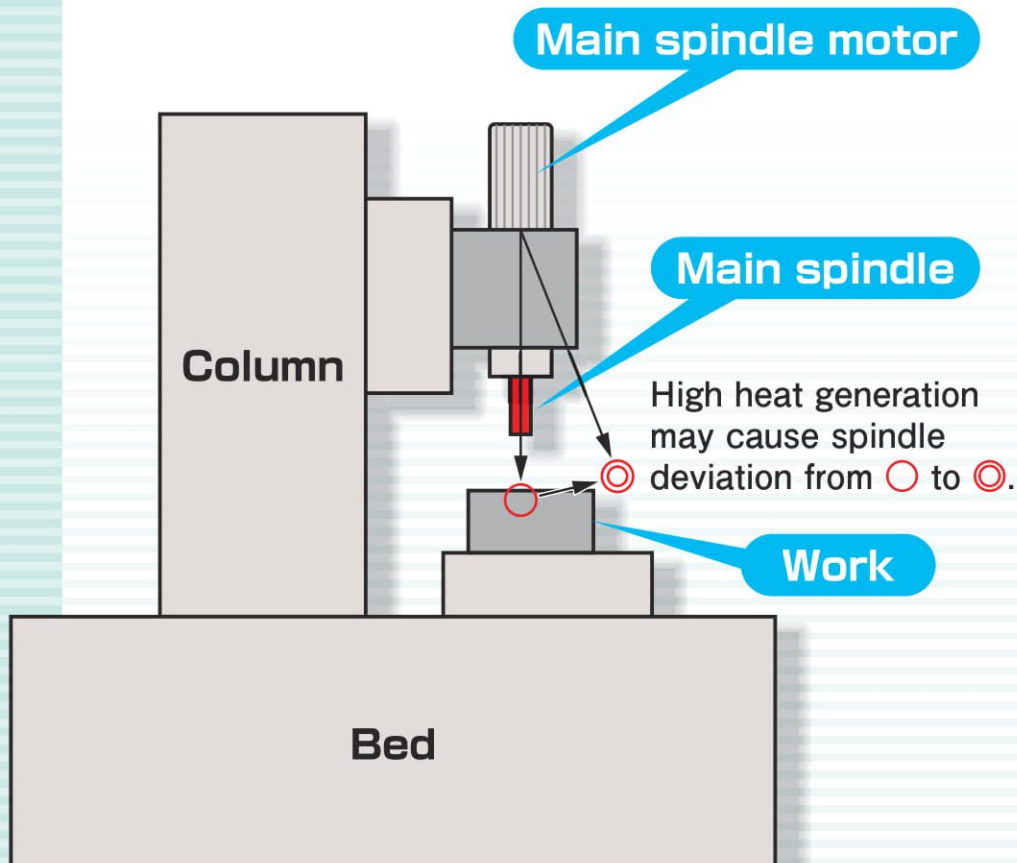
Oil Cooling Unit can control temperature at the headstock, and the deviation can be corrected. Oil Cooling Unit lubricates the headstock gears and removes the heat generated. It is helpful to improve machine accuracy. (AKZ 9 series)

#### Increased machining accuracy of work and extension of tool life

- Highly accurate processing can be attained by controlling temperature of cutting and grinding fluids. In addition, longer tool life can be attained and deterioration of coolant can be reduced. Oil Cooling Unit contributes to improve machine operation efficiency. (AKJ 9 series)

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

- Oil Cooling Unit compressor frequency valuable control gives appropriate cooling capacity according to the heat generated on the main machine side to meet the operating condition. The fluid temperature can be controlled accurately depending on load fluctuation from lowest to highest. Unlike the conventional non-inverter 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 oil temperature control, room temperature tuning, machine temperature tuning, and other operation modes can be selected according to the conditions of main machine.



# energy-saving inverter equipped with DAIKIN original motor used on DAIKIN air conditioners.



AKZ 9 series  
(Circulation Type)



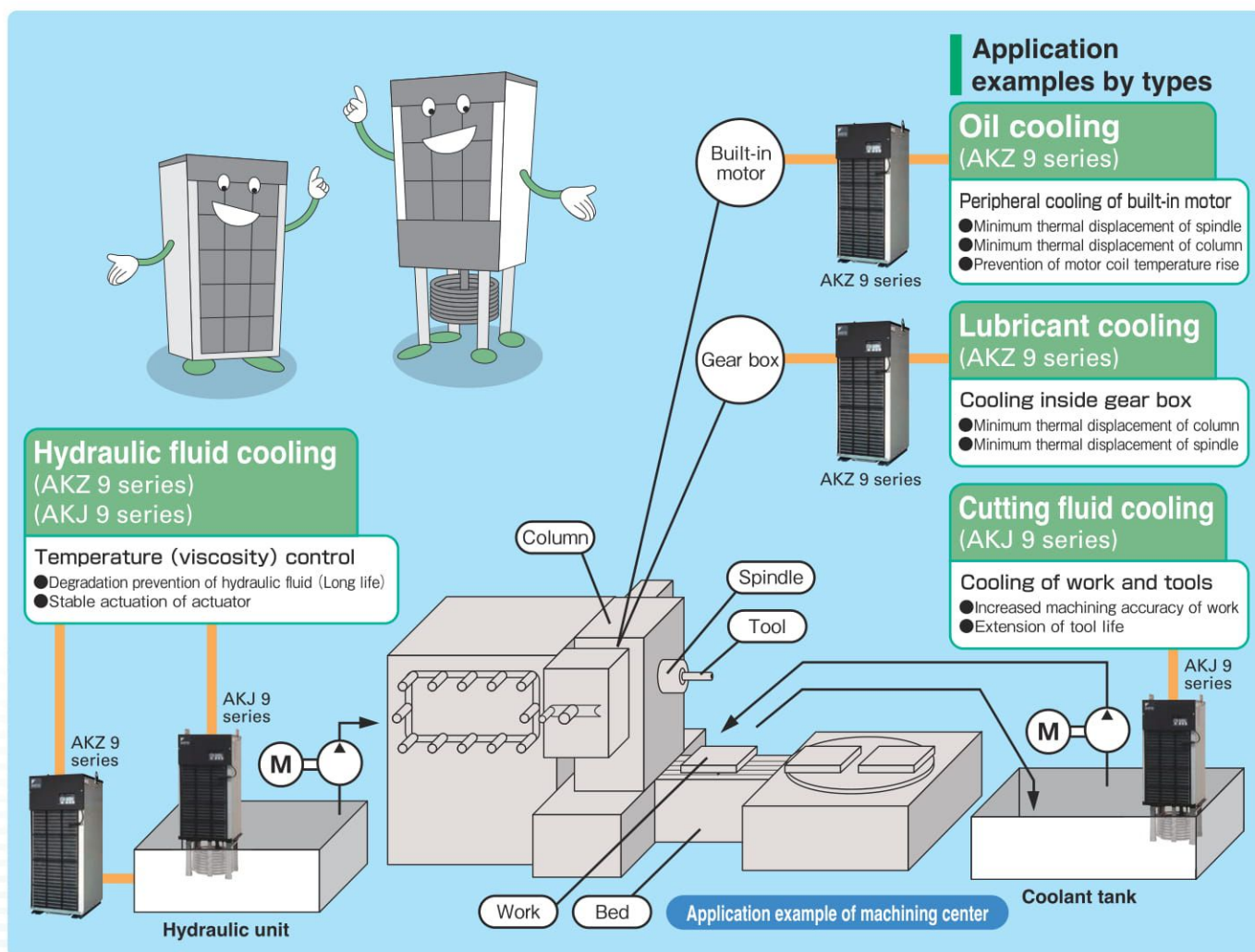
AKJ 9 series  
(Immersion Open Type)

## Application

### Application examples

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

- ◆ Machine tools : Machining center, NC lathe, Grinding machine, NC special-purpose machine, NC electric discharge machine, etc.
- ◆ Industrial machinery : Molding machine, Press, etc.



Oil Cooling Unit

## Specifications

Circulation type	AKZ149	—	AKZ329	—	AKZ439	—	AKZ569	AKZ909	—
Immersion type	—	AKJ189	—	AKJ359	—	AKJ459	AKJ569	AKJ909	AKJ1509
Oil Cooling Unit equivalent horsepower	0.5 HP		1.2 HP		1.5 HP		2.0 HP	3.0 HP	5.0 HP
Cooling capacity (50/60 Hz)	1.3/1.4 kW	1.6/1.8 kW	2.8/3.2 kW	3.2/3.5 kW	3.8/4.3 kW	4.2/4.5 kW	5.0/5.6 kW	8.0/9.0 kW	15.0/15.0 kW

# Oil Cooling Unit

## Further evolution high-accuracy temperature control

Precise oil temperature control such as  $\pm 0.1^\circ\text{C}$  is available at wider range.

The cooling capacity resolution in the low-load range has been improved through optimal control of the compressor and electronic expansion valve.

## Expansion of cooling capacity control range

High-accuracy temperature control from no heat load to high heat load.



### AKZ 9 series Oil temperature control



Note) Pattern diagram with the heating load stabilized at 0 - 100% (Comparison with Daikin unit)

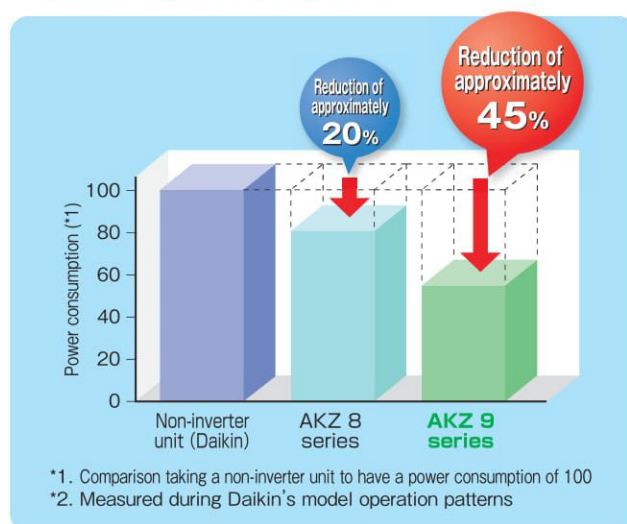
## Environmentally Conscious Design

Responds to environmental regulations, e.g. by adopting printed circuit boards with lead-free solder.

## Achieve high energy-saving performance

Achieve high energy-saving performance with the adoption of a Daikin original IPM motor and R410A refrigerant for high COP characteristics.

Power consumption can be checked on the operation panel.



## The smallest size in the industry



## Achieve low-noise operation in the low-load range

AKZ 8 **59.5dB (A)** → AKZ 9 **58dB (A)\***

Corresponding value in anechoic chamber (with AKZ 439 class)

■ Noise level also reduced in line with load reduction

\*At room temperature of 25 and thermal load of 1 kW



AKZ 9 series  
(Circulation Type)

AKJ 9 series  
(Immersion Open Type)

## Reinforce durability for mist or dust in the severe condition of factory

The ingress protection of the control box has been upgraded (equivalent to IP54).

Electronic components resistant to sulfidization have been adopted.

## Higher durability for long-distance transportation

The specifications for withstanding vibration during transport have been upgraded to reflect actual transportation conditions.

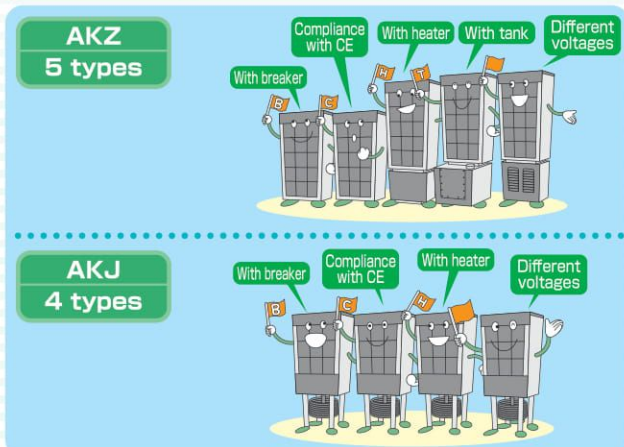
## Easy monitoring of operating status

The room temperature, inlet and outlet oil temperatures and other internal data can be monitored at a personal computer using Hybrid-Win\*. This data can be displayed collectively, making it easy to grasp the operating status.

\*Hybrid-Win is a software tool for monitoring the internal status of the unit using a personal computer. You can download the tool and its instruction manual free of charge from the website (<http://www.daikinpmc.com>) after registering as a user.  
\*The communications cable and the monitor harness must be purchased separately.

## Minimised product delivery term, 4-5 type specifications available in addition to the standard model

All optional specifications are listed as semi-standard.



## Functions featured

### Refrigerant gas leakage detection alarm function

- ◆ An alarm signal is output when the refrigerant gas would be leaked (as cooling circuit failure).

### Oil temperature warning function

- ◆ A warning signal can be output when the oil temperature or air temperature strays outside arbitrarily setting range.

### Auto tuning function

- ◆ This function substantially cuts the time taken for adjustment during trial operation by automatically setting the gain when oil temperature control is not stable in the factory setting status or when optimization is required.

### 999-hour timer function (ON timer)

- ◆ The operation start time can be set from 0 to 999 hours in one-hour units.

## New functions for easy operation

### Preventive maintenance function

- ◆ A warning signal is output to notify that maintenance is required when the air filter or condenser becomes clogged.
- ◆ If the thermistor fails (out of control), emergency operation is possible by selecting another operation mode. This function minimizes the factors of line stoppages.

## Improved operability / maintainability

The control panel has been revamped. Data is now displayed in an easier-to-understand format with more digits space. Power consumption is also displayed (new function).

The newly adopted plug-in terminal block has enabled tool-less connection of signal cables (simple connection).

The increased pitch of the condenser's fins suppresses clogging and makes cleaning easier. (1.5 mm previously → 1.8 mm)

# Model list



16-pattern PQ control



Communication function



Analog command input  
\*Only apply to a single pump.



Hybrid-Win Supported

Various specifications for each model. DAIKIN's lineup provides a variety of functions and capacities depending on the machine type.

(Examples of 200V model.)

Rated capacity		0.75kW	1.5kW	2.2kW	2.8kW	3.7kW	5.0kW	7.0kW	11.0kW	15.0kW or more
For machine tools	EcoRich	EHU1404 	EHU2504 	EHU2507 	EHU3007 	3.7	5.0	7.0	11.0	15.0~
	EcoRich R	0.75	1.5	EHU15R-M07 	EHU30R-M07 	3.7	5.0	7.0	11.0	15.0~
For general industrial machines	Unit type	0.75	1.5	SUT03S1507 	SUT03S3007 SUT03S1510 	SUT03S4007 SUT03S3010 SUT03S1516 SUT06D4016 	SUT06S6007 SUT06S3016 SUT06D6021 SUT10D6021 	SUT10S8007 SUT10D8021 SUT16D8021 	P-SUT20D11KW 	15.0~
		Super Unit	0.75	1.5	SUT00S1507 	SUT00S3007 SUT00S1510 	SUT00S4007 SUT00S3010 SUT00S1516 SUT00D4016 	SUT00S6007 SUT00S3016 SUT00D6021 	SUT00S8007 SUT00D8021 	SUT00S11007 SUT00D11021 
	Tankless type	0.75	1.5	2.2	2.8	3.7	5.0	SUT00S3018 SUT00D3021 	SUT00S5021 SUT00S8018 SUT00D8021 	SUT00S5025 SUT00S15018 SUT00D13021 SUT00D15021 SUT00D20021 SUT00D30028 
High-accuracy analog input/output type	Tankless type	0.75	1.5	2.2	2.8	3.7	5.0	SUT00S3018 SUT00D3021 	SUT00S5021 SUT00S8018 SUT00D8021 	SUT00S5025 SUT00S15018 SUT00D13021 SUT00D15021 SUT00D20021 SUT00D30028 

(Examples of 200V model.)

Series	Rated capacity (kW)	Maximum operating pressure (MPa)	Maximum flow rate (L/min)													Tankless type	Unit type	Tank capacity (L)	PQ Pattern
			10	20	30	40	50	60	70	80	90	100	110						
EcoRich	0.75	4.0														—	EHU1404-40	18	1
	1.5	4.0														—	EHU2504-40		
	2.2	7.0														—	EHU2507-40		
	2.8	7.0														—	EHU3007-40		
EcoRich R	2.2	7.0														—	EHU15R-M0701-30	10	16
	2.2	7.0														—	EHU15R-M0702-30	20	
	2.8	7.0														—	EHU30R-M0701-30	10	
	2.8	7.0														—	EHU30R-M0702-30	20	
Super Unit	2.2	7.0														SUT00S1507-30	SUT03S1507-30	30	16
	2.8	7.0														SUT00S3007-30	SUT03S3007-30		
	3.7	7.0														SUT00S4007-30	SUT03S4007-30		
	5.0	7.0														SUT00S6007-30	SUT06S6007-30		
	7.0	7.0														SUT00S8007-30	SUT10S8007-30		
	11.0	7.0														SUT00S11007-30	—		
	2.8	10.0														SUT00S1510-30	SUT03S1510-30		
	3.7	10.0														SUT00S3010-30	SUT03S3010-30		
	3.7	16.0														SUT00S1516-30	SUT03S1516-30		
	5.0	16.0														SUT00S3016-30	SUT06S3016-30		
Double pump type	3.7	15.7														SUT00D4016-30	SUT06D4016-30	60	
	5.0	20.6														SUT00D6021-30	SUT06D6021-30		
	7.0	20.6														SUT00D8021-30	SUT10D8021-30		
	11.0	20.6														SUT00D11021-30	P-SUT20D11KW-30		
Super Unit (High-accuracy analog input/output type)	7.0	17.6														SUT00S3018 (200V)	—	Analog Signal	
	11.0	20.6														SUT00S5021 (200/400V)	—		
	11.0	17.6														SUT00S8018 (200/400V)	—		
	15.0	24.5														SUT00S5025 (200V)	—		
	15.0	17.6														SUT00S15018 (200/400V)	—		
	7.0	17.6	20.6												SUT00D3021 (200/400V)	—			
	11.0	17.6	20.6												SUT00D8021 (200/400V)	—			
	15.0	20.6	20.6												SUT00D13021 (200/400V)	—			
	15.0	17.6	20.6												SUT00D15021 (200/400V)	—			
	15.0	11.5	25.0												SUT00D20021 (200V)	—			
37.0	9.0	28.0												SUT00D30028 (200V)	—				

# Product introduction

## ECORICH

Excluded from high-efficiency motor regulations



**PC tool**  
**Hybrid-Win**  
Supported  
(Refer to P25)

● “ECORICH”, a hybrid hydraulic system that realized the world’s first fusion of hydraulics technology with Daikin’s exceptional air conditioning motor/inverter technology, has been a trend setter for energy savings in the hydraulics field.

● “ECORICH” has now undergone a model change involving incorporation of highly efficient IPM motors. The significant improvement in energy savings and low heat generation contribute to greater plant energy savings.

### ● Energy savings / low heat generation

**Power consumption:**  
**Reduced by additional 30%**

◆ The highly efficient IPM motor surpassing IE4 class further improves the energy-saving effect of the unit.

**Oil Temperature:**  
**Reduced by additional 5°C**

◆ The user-friendly hydraulic unit realized by suppressing oil temperature rise reduces thermal influence on the machine, improves the environment at the machining site, and prevents degradation of hydraulic oil, extending the oil replacement interval.

### ● Compact / lightweight

◆ A more compact and lightweight unit offers a reduced footprint for easier installation.

**Footprint:**  
**Reduced by 9%** (all models)

**Mass:**  
**Reduced by 40%** (EHU1404/2504)

### ● All models CE standard compliant

◆ This facilitates CE approval of the machines.

\* Figures compared to conventional ECORICH design 30 series models

## Specifications

Model code		EHU1404-40	EHU2504-40	EHU2507-40	EHU3007-40	EHU3007-40-Y	
Maximum operating pressure (MPa)		4.0			7.0		
Operating pressure adjustment range (MPa)		1.5~4.0			1.5~7.0		
Maximum flow rate <sup>1</sup> (L/min)		15.2	25.1		28.5		
Operating flow rate adjustment range (L/min)		2.5~15.2	3.5~25.1		3.5~28.5		
Motor capacity (equivalent kW)		0.75	1.5	2.2	2.8		
Tank capacity (L)		18					
Power supply voltage		3-phase, AC 200 V (50 Hz), 200 V (60 Hz), 220 V (60 Hz) (Permissible voltage fluctuation: ±10%)				3-phase, AC 380 V (50 Hz) / AC 400 V (60 Hz) / AC 480 V (60 Hz) (Permissible voltage fluctuation: ±10%)	
Rated current	200V/50Hz (A)	6.0	7.0	4.7	10.3	380V/50Hz	7
	200V/60Hz (A)	5.9	7.0	4.5	10.3	400V/60Hz	6.5
	220V/60Hz (A)	5.5	6.7	4.3	9.7	460V/60Hz	6
No-fuse breaker capacity (A)		15				10	
External input signal		3 channels, photo coupler insulation, DC 24 V, (maximum of DC 27 V), 5 mA per channel					
External output signal	Digital output	1 channel, photo coupler insulation, open collector output, DC 24 V, 50 mA maximum per channel					
	Contact output	1 channel, relay output, contact capacity: DC 30 V, 1 A (resistance load), 1 common contact					
Usable oil <sup>2</sup>		General petroleum-based hydraulic oil (R&O) / Wear-resistant hydraulic oil •Viscosity grade: ISO VG32 to 68 •Viscosity range: 15 to 400 mm <sup>2</sup> /s •Contamination: Within NAS class 10					
Tank oil temperature		0 to 60°C (Recommended operating temperature range: 15 to 50°C)					
Operating ambient temperature		0~40°C					
Storage ambient temperature		-20~60°C					
Operating ambient humidity		85% RH maximum (no condensation)					
Waterproof protection rating		IP44					
Installation site		Indoors (Be sure to secure with bolts, etc.)					
Altitude		1,000 m maximum					
Standard coating color		Black					
Mass (hydraulic oil excluded) (kg)		26			29		

Note) \*1. • The maximum flow rate is the theoretical value, not the guaranteed value.

• This hydraulic unit is equipped with built-in safety valves.

\*2. • Use of hydraulic oils other than mineral-oil base type (e.g. hydrous/synthetic), water-glycol hydraulic oil for example, is prohibited.

# Product introduction

## ECORICH-R

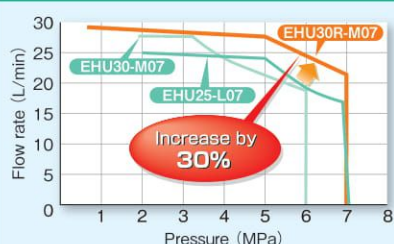
Excluded from high-efficiency motor regulations

Pursued thoroughly further energy saving and easy operation

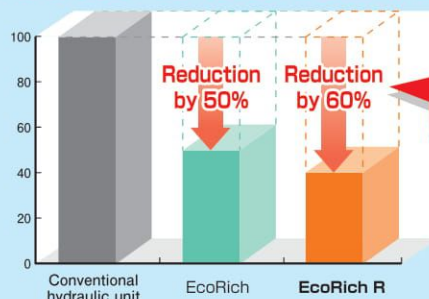


PC tool  
Hybrid-Win  
Supported  
(Refer to P25)

### Comparison of PQ characteristic between EcoRich and EcoRich R



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



Reduction by 60% when compared to a conventional hydraulic unit

● CE standard specification

◆ All models apply to CE standard.

● 16-patterns PQ selection function

◆ 16 patterns of pressure (P) and flow (Q) rate setting at the operation panel on the unit. P & Q rate setting can be changed from a machine side with an external input signal.

◆ Shock less operation at the patterns sift with acceleration or deceleration time changed by parameter.

● Dry run prevention function when oil level is low

◆ The dry run prevention function can stop the unit operation automatically when the oil level in the tank drops lower than a certain level. Dry run of the pump can be protected and it lead to the long life of the pumps.

● Enhancement of pressure control performance

◆ Pressure setting at 0.5 MPa is available now.

## Specifications

Model code	EHU15R-M0701	EHU15R-M0702	EHU30R-M0701	EHU30R-M0702
Maximum operating pressure (MPa)	7.0			
Operating pressure adjustment range (MPa)	0.5~7.0			
Maximum flow rate *1 (L/min)	15.2		28.5	
Operating flow rate range *1 (L/min)	2.5~15.2		3.5~28.5	
Motor capacity (kW)	Equivalent to 2.2		Equivalent to 2.8	
Tank capacity (L)	10	20	10	20
Power supply	3-phase, 200 V (50 Hz), 200 V (60 Hz), 220 V (60 Hz) (Permissible voltage fluctuation: ±10%) *Be sure to use a commercial power supply for the power source. The use of Inverter power supply may casue burn damage to the unit.			
Rated current	200V/50Hz (A)	11.5	15.4	
	200V/60Hz (A)	11.3	15.1	
	220V/60Hz (A)	10.5	13.8	
No-fuse breaker capacity (A)	15		20	
External input signal	5 channels, photo coupler insulation, DC 24 V (maximum of DC 27 V), 5 mA per channel			
External output signal	Digital output	2 channels, photo coupler insulation, FET output, DC 24 V, 50 mA maximum per channel		
	Contact output	1 channel, relay output, Contact capacity: DC 30 V, 0.5 A (resistance load), 1 common contact		
Usable oil *2	General petroleum-based hydraulic oil (R&O) / Wear-resistant hydraulic oil (Refer to Daikin "Oil hydraulic brochure" for the oil in detail.) · Viscosity grade: ISO VG32 to 68 · Viscosity range: 15 to 400 mm <sup>2</sup> /s · Contamination: Within NAS class 10			
Tank oil temperature	0 to 60°C (Recommended operating temperature range: 15 to 50°C)			
Operating ambient temperature	0~40°C			
Storage ambient temperature	-20~60°C			
Humidity	85% RH maximum (no condensation)			
Installation site	Indoors (Be sure to secure with bolts, etc.)			
Altitude	1,000 m maximum			
Standard coating color	Black (Munsell code N1)			
Mass (hydraulic oil excluded) (kg)	37	38	39	40
Others	· Be sure to connect a circuit breaker for all(three)poles and the earth leakage breaker. · Make sure that the electrical wiring meets the requirements of European Standard EN60204-1. · Be sure to connect the ground terminal.			

Note) \*1. The maximum flow rate is the theoretical value, not the guaranteed value.

\*2. Consult Daikin about the use of hydraulic oils other than mineral oil base type (e.g. hydrous/synthetic) such as water-glycol hydraulic oil and Fatty acid ester oil.

# Super Unit

Excluded from high-efficiency motor regulations

## Evolved super unit with a variety of high-performance



PC tool  
Hybrid-Win  
Supported

(Refer to P25)

### ● CE standard specification

◆ All models apply to CE standard.

● Daikin's original high-efficiency IPM motor drive system with inverter technologies provides a high energy-saving ratio of 50%.  
(Compared to Daikin's conventional variable piston pump)

● Sixteen pressure (P) - flow rate (Q) setting patterns are available for cylinder control.

● Shock less operation at the patterns sift  
◆ with a setting of celeration or deceleration time changed by parameter setting.

### ● Low noise level of 60 dB (A)

(In the pressure retained operation at 20.6 MPa, with the double pump type unit)

Even over the full operation range,  
noise is less than 73 dB (A).

## Function Option

### ● Communication function

(Available as an option with all models)

Remote control and setting changes are possible through RS232C serial communication.

### ● Analog command input

(Available as an option with single pump type models)

Enables continuous control of pressures and speeds as required.

## Specifications (Single pump)

Model code	SUT03S 1507	SUT03S 3007	SUT03S 4007	SUT06S 6007	SUT10S 8007	SUT03S 1510	SUT03S 3010	SUT03S 1516	SUT06S 3016	
Maximum operating pressure (MPa)	7.0					10.0		16.0		
Operating pressure adjustment range (MPa)	1.5~7.0					1.5~10.0		1.5~16.0		
Maximum flow rate *1 (L/min)	15.2	28.5	39.7	61.1	83.0	15.2	25.6	15.2	25.6	
Operating flow rate range *1 (L/min)	2.5~15.2	3.5~28.5	5.3~39.7	8.7~61.1	11.6~83.0	2.5~15.2	3.4~25.6	2.4~15.2	3.4~25.6	
Motor capacity (kW)	Equivalent to 2.2	Equivalent to 2.8	Equivalent to 3.7	Equivalent to 5.0	Equivalent to 7.0	Equivalent to 2.8	Equivalent to 3.7	Equivalent to 3.7	Equivalent to 5.0	
Tank capacity (L)	30		60		100	30		60		
Power supply	3-phase, 200 V (50 Hz), 200 V (60 Hz), 220 V (60 Hz) (Permissible voltage fluctuation: ±10%) *Be sure to use a commercial power supply for the power source. The use of Inverter power supply may cause burn damage to the unit.									
Rated current	200V/50Hz (A)	11.5	15.4	16.1	22.1	25.5	8.0	18.4	15.2	21.4
	200V/60Hz (A)	11.3	15.1	15.8	21.7	24.8	7.8	18.4	15.2	21.4
	220V/60Hz (A)	10.6	13.8	14.8	20.2	22.7	7.5	16.9	14.6	20.2
No-fuse breaker capacity (A)	15	20	20	30	50	15	20	20	30	
External input signal	5 channels, photo coupler insulation, DC 24 V (maximum of DC 27 V), 5 mA per channel									
External output signal	Digital output	2 channels, photo coupler insulation, FET output, DC 24 V, 50 mA maximum per channel								
	Contact output	1 channel, relay output, Contact capacity: DC 30 V, 0.5 A (resistance load), 1 common contact								
Usable oil *2	General petroleum-based hydraulic oil (R&O) / Wear-resistant hydraulic oil (Refer to Daikin "Oil hydraulic brochure" for the oil in detail.) · Viscosity grade: ISO VG32 to 68 · Viscosity range: 15 to 400 mm <sup>2</sup> /s (Recommendation is from 20-200 mm <sup>2</sup> /s) · Contamination: Within NAS class 9 (Within Nas class class 10 at 7 MPa or less pressure) · Volumetric water content: 0.1% maximum									
Tank oil temperature	0 to 60°C (Recommended operating temperature range: 15 to 50°C)									
Operating ambient temperature	0~40°C									
Storage ambient temperature	-20~60°C									
Humidity	85% RH maximum (no condensation)									
Installation site	Indoors (Be sure to secure with bolts, etc.)									
Altitude	1,000 m maximum									
Standard coating color	Ivory white (Munsell code 5Y7.5/1)									
Mass (hydraulic oil excluded) (kg)	59	59	64	97	131	59	64	68	60	
Others	· Be sure to connect a circuit breaker for all(three)poles and the earth leakage breaker. · Make sure that the electrical wiring meets the requirements of European Standard EN60204-1. · Be sure to connect the ground terminal.									

Note) \*1. The maximum flow rate is the theoretical value, not the guaranteed value.

\*2. Consult Daikin about the use of hydraulic oils other than mineral oil base type (e.g. hydrous/synthetic) such as water-glycol hydraulic oil and Fatty acid ester oil.

# Product introduction

## Super Unit Double pump specification

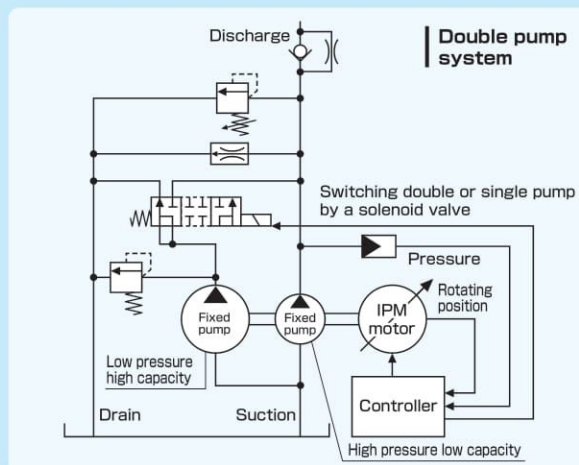
Excluded from high-efficiency motor regulations

First in the world

### Combined system of high efficiency IPM motor drive system and double pump switching control technology

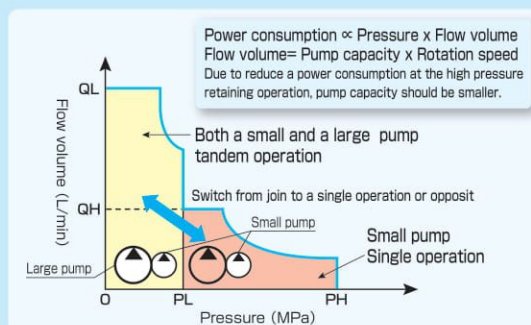


PC tool  
Hybrid-Win  
Supported  
(Refer to P25)



### ● Saving energy and low noise with a double pump system

- ◆ Double pump system with a combination of pumps and a flow control valve.
- ◆ Automatically change of the pumps combinations which is consist of a single or tandem operation depending on a load condition.
- ◆ At the pressure retained operation, only the low displacement pump is operated to save energy greatly.
- ◆ Low noise level at a 60dB(A) ( pressure retained at 20.6MPa) Adopt double phase-differential pumps to make noise lower.



### Specifications (Double pump)

Model code	SUT06D 4016	SUT06D 6021	SUT10D 6021	SUT10D 8021	SUT16D 8021	P-SUT20D 11KW	
Maximum operating pressure (MPa)	15.7	20.6		20.6		20.6	
Operating pressure adjustment range (MPa)	1.5~15.7	1.5~20.6		1.5~20.6		1.5~20.6	
Maximum flow rate *1 (L/min)	41.0	61.1		83.0		110	
Operating flow rate range *1 (L/min)	5.4~41.0	8.7~61.1		11.6~83.0		13.3~110	
Motor capacity (kW)	Equivalent to 3.7		Equivalent to 5.0		Equivalent to 7.0		Equivalent to 11.0
Tank capacity (L)	60	60	100	100	160	200	
Power supply	3-phase, 200 V (50 Hz), 200 V (60 Hz), 220 V (60 Hz) (Permissible voltage fluctuation: ±10%) *Be sure to use a commercial power supply for the power source. The use of inverter power supply may casue burn damage to the unit.						
Rated current	200V/50Hz (A)	17.9	22.7		25.5		38.3
	200V/60Hz (A)	17.7	21.7		24.8		37.8
	220V/60Hz (A)	16.5	20.2		22.7		34.9
No-fuse breaker capacity (A)	20	30		50		75	
External input signal	5 channels, photo coupler insulation, DC 24 V (maximum of DC 27 V), 5 mA per channel						
External output signal	Digital output	2 channels, photo coupler insulation, FET output, DC 24 V, 50 mA maximum per channel					
	Contact output	1 channel, relay output, Contact capacity: DC 30 V, 0.5 A (resistance load), 1 common contact					
Usable oil *2	General petroleum-based hydraulic oil (R&O) / Wear-resistant hydraulic oil (Refer to Daikin "Oil hydraulic brochure" for the oil in detail.) · Viscosity grade: ISO VG32 to 68 · Viscosity range: 15 to 400 mm <sup>2</sup> /s (Recommendation is from 20-200 mm <sup>2</sup> /s) · Contamination: Within NAS class 9 (Within Nas class class 10 at 7 MPa or less pressure) · Volumetric water content: 0.1% maximum						
Tank oil temperature	0 to 60°C (Recommended operating temperature range: 15 to 50°C)						
Operating ambient temperature	0~40°C						
Storage ambient temperature	-20~60°C						
Humidity	85% RH maximum (no condensation)						
Installation site	Indoors (Be sure to secure with bolts, etc.)						
Altitude	1,000 m maximum						
Standard coating color	Ivory white (Munsell code 5Y7.5/1)						
Mass (hydraulic oil excluded) (kg)	94	99	112	133	145	360	
Others	<ul style="list-style-type: none"> <li>· Be sure to connect a circuit breaker for all(three)poles and the earth leakage breaker.</li> <li>· Make sure that the electrical wiring meets the requirements of European Standard EN60204-1.</li> <li>· Be sure to connect the ground terminal.</li> </ul>						

Note) \*1. The maximum flow rate is the theoretical value, not the guaranteed value.

\*2. Consult Daikin about the use of hydraulic oils other than mineral oil base type (e.g. hydrous/synthetic) such as water-glycol hydraulic oil and Fatty acid ester oil.

# Super Unit Analog Command Input, High-accuracy Type

Excluded from high-efficiency motor regulations



**PC tool Hybrid-Win Supported**  
(Refer to P25)

## High Voltage/High Flow Rate

◆ The analog command input / high-accuracy type SUPER UNITS have operating ranges extended to include high pressure and high flow rate ranges, enabling PQ control with even greater accuracy than conventional SUPER UNITS (high-functionality type).

## Energy Saving

◆ Superior energy-saving hydraulic systems suited to applications with industrial machinery such as presses and general industrial machines while offering high performance, easy operation and reasonable prices.

## High Accuracy

◆ Achieving stable servo control in response to analog input voltages over a range from low pressure (1%)/flow rate (1%) to the maximum pressure/flow rate. The double pump type units enable low-pressure / high-flow-rate control in the combination flow mode, and high-pressure holding (continuous) control over a prolonged period in the individual flow mode.

## Two Types of Operation Commands

◆ As an alternative to directly specifying command values for pressure and flow rate with analog voltage inputs, the operation conditions can be selected easily by using 3-bit ON/OFF digital signals that can call eight different preset pressure/flow rate patterns. (8-PQ type: Selectable using a parameter)

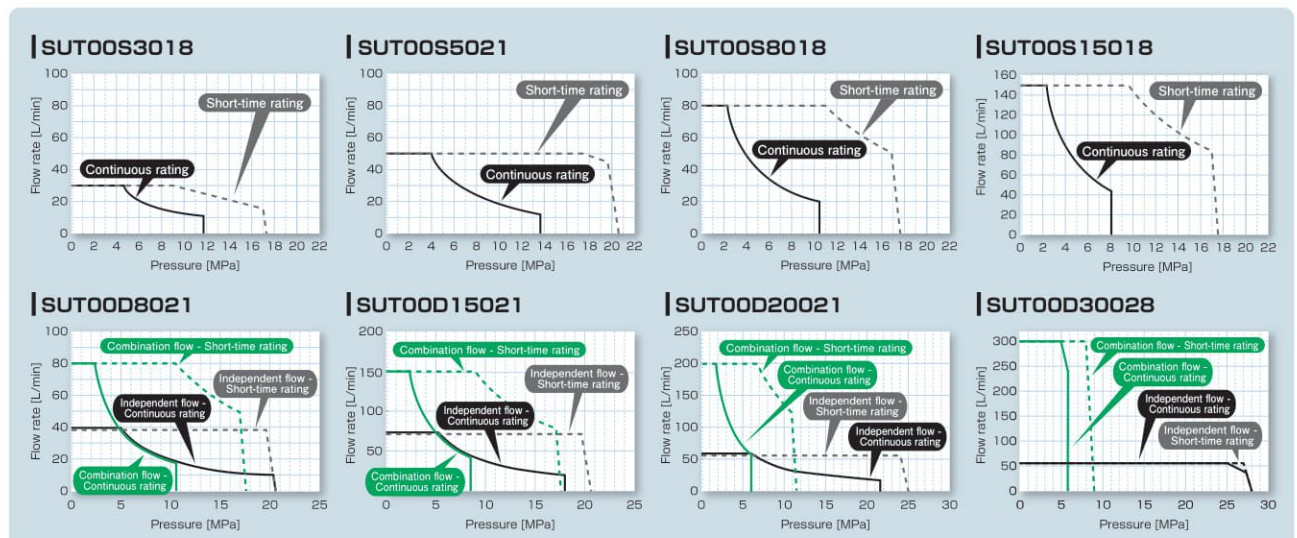
## Model List by Pressure/Flow Rate

Flow rate/pressure combinations other than those given in the model list above are also available. Please consult us when considering adoption.

Maximum discharge rate	18MPa	21MPa	25MPa	28MPa
330 L/min				SUT00D33028 200/400V <sup>(*)5</sup> 37
300 L/min	Inside ○ showing motor Cap. as kW			SUT00D30028 200V 37
260 L/min				
220 L/min				
200 L/min	SUT00S20018 400V 22	SUT00D20021 200V 15	S-SUT00D20021 400V 15	S-SUT00D20025 400V 22
150 L/min	SUT00S15018 200/400V 15	SUT00D15021 200/400V 15		
130 L/min	SUT00S13018 200/400V 15	SUT00S13021 200V 15	SUT00D13021 200/400V 15	S-SUT00D13025 400V 15
80 L/min	SUT00S8018 200/400V 11	SUT00D8021 200V 11		S-SUT00D8025 400V 11
50 L/min		SUT00S5021 200/400V 11		SUT00S5025 200/400V 15
30 L/min	SUT00S3018 200V 7	SUT00D3021 200V 7		
Maximum operating pressure	18MPa	21MPa	25MPa	28MPa

- Note) \*1. All models allow selection of the input type as the analog command input type or 8-PQ digital command input type using a parameter. (Factory default is the analog command input type).  
 \*2. All models are tankless units with a split type controller (electrical components).  
 \*3. When a discharge rate higher than 300 L/min is required, it can be achieved by combining multiple SUPER UNITS. Please consult us for detailed information.  
 \*4. Consult Daikin for usage Hydrated or Synthetic oil such as Water Glycol oil.  
 \*5. Ask to Daikin about release timing.

## Main Characteristics (Pressure - Flow Rate Characteristics) Example of 200V types



# Product introduction

## Oil Cooling Unit (Circulating type)

Inverter Oil Cooling unit with high precise temperature control,  
Energy saving, Compact size and environmentally friendly



PC tool  
**Hybrid-Win**  
Supported

(Refer to P25)

● Enhancement of Highly Accurate Temperature Control

● Achieving high energy-saving performance

● Extension of cooling capacity control range

● Environmentally Conscious Design

◆ Responds to environmental regulations, e.g. by adopting printed circuit boards with lead-free solder.

● Achieving low-noise operation in the low-load range

AKZ8 series → AKZ9 series  
**59.5dB (A) → 58dB (A)\***

Anechoic greenhouse conversion value (AKZ439 class)

\* Room temperature 25deg.C Heat load at 1kW

### Specifications

Model name	AKZ149	AKZ329	AKZ439	AKZ569	AKZ909	
Oil Cooling Unit horsepower (HP)	0.5	1.2	1.5	2.0	3.0	
Cooling capacity (50/60Hz)*1 (kW)	1.3/1.4	2.8/3.2	3.8/4.3	5.0/5.6	8.0/9.0	
Compressor (Hermetic DC swing type)	Equivalent to 0.4kW	Equivalent to 0.75kW	Equivalent to 1.1kW	Equivalent to 1.5kW	Equivalent to 2.2kW	
Oil pump theoretical discharge rate (50/60Hz) (L/min)	12/14.4	24/28.8	30/36			
Refrigerant	R410A					
Power voltage*2	Main circuit	3-phase AC 200/200-220V 50/60Hz				
	Operation circuit	DC12/24V				
Max. power consumption Max. current consumption	200V 50Hz	0.90kW/3.9A	1.36kW/4.9A	1.80kW/6.6A	2.22kW/7.6A	4.25kW/13.5A
	200V 60Hz	0.91kW/3.6A	1.43kW/4.8A	1.88kW/6.4A	2.30kW/7.5A	4.30kW/13.4A
	220V 60Hz	0.91kW/3.5A	1.43kW/4.6A	1.88kW/6.1A	2.30kW/7.2A	4.28kW/12.9A
External dimensions (H×W×D) (mm)	650×360×440	775×360×440	875×360×440	1,110×470×560	1,220×560×680	
Mass (kg)	51	56	64	82	97	
Items prepared by the customer	Molded-case circuit breaker (Rated current) (A)	10			15	20

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.

### ● Variety of standard and optional

	Standard type	Menu	Remarks
Use of low-viscosity oil	○		Viscosity of oil for use : 1.4 – 200 mm <sup>2</sup> /S
Discharge pressure (oil) : 0.5 MPa	○		
With timer	○		999-hour timer
With outlet temperature sensor	○		
With breaker		B	
Compliance with CE		C	European Safety Standard
Different voltages	Without transformer	046	AC220,230V 50/60Hz
	With transformer	047	AC380,400,415V 50/60Hz
		048	AC440,460,480V 50/60Hz
With heater		H	
With tank		T	

Note) Followings are optional parts. Refer to P26 for more information.

- Machine temperature synchronous thermistor (Lead wire length: 5m, 10m, 15m)
- Oil temperature control thermistor (Lead wire length: 5m, 10m)
- Expansion board for main machine communication (Serial communication)



## Oil Cooling Unit (Immersion Type for Cooling Coolant)



PC tool  
Hybrid-Win  
Supported  
(Refer to P25)

- 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
- Further downsizing a compact design of the top class in the industry
- Enhanced support for shallow tanks with the reduced cooling coil depth
- Extension of cooling capacity control range

### Specifications

Model name	AKJ189	AKJ359	AKJ459	AKJ569	AKJ909	AKJ1509	
Oil Cooling Unit horsepower (HP)	0.5	1.2	1.5	2.0	3.0	5.0	
Cooling capacity (50/60Hz)*1 (kW)	1.6/1.8	3.2/3.5	4.2/4.5	5.0/5.6	8.0/9.0	15.0/15.0	
Compressor (Hermetic DC swing type)	Equivalent 0.4kW	Equivalent 0.75kW	Equivalent 1.1kW	Equivalent 1.5kW	Equivalent 2.2kW	Equivalent 3.7kW	
Refrigerant	R410A						
Power voltage*2	Main circuit	3-phase AC 200/200-220V 50/60Hz					
	Operation circuit	DC12/24V					
Max. power consumption Max. current consumption	200V 50Hz	0.82kW/3.3A	1.37kW/5.2A	1.46kW/5.6A	2.77kW/9.4A	3.38kW/10.8A	5.40kW/17.3A
	200V 60Hz	0.83kW/3.2A	1.38kW/5.1A	1.48kW/5.4A	2.72kW/9.2A	3.43kW/10.7A	5.37kW/16.9A
	220V 60Hz	0.83kW/3.0A	1.39kW/4.8A	1.48kW/5.1A	2.83kW/8.9A	3.43kW/10.2A	5.40kW/15.7A
External dimensions (H×W×D) (mm)	920×360×440	1,045×360×440	1,200×360×440	1,440×470×500	1,615×560×620	1,960×735×725	
Mass (kg)	38	44	50	72	89	140	
Items prepared by the customer	Molded-case circuit breaker (Rated current) (A)	10		15	20	30	

Note) \*1. The cooling capacity indicates the value at the standard point (oil Temperature in the tank: 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.

## Oil Cooling Unit (Inline Type Cooling Unit for Coolant)



PC tool  
Hybrid-Win  
Supported  
(Refer to P25)

- Inline type cooling unit for coolant
- Highly accurate temperature control model by inverter control
- Excellent energy savings
- Environmentally Conscious Design
  - ◆ Responds to environmental regulations, e.g. by adopting printed circuit boards with lead-free solder.
- Easy maintenance
- Greater durability against oil mist and dust

### Specifications

Model name	AKC359	AKC569	
Oil Cooling Unit horsepower (HP)	1.2	2.0	
Cooling capacity (50/60Hz)*1 (kW)	3.5/3.5	5.6/5.6	
Compressor (Hermetic DC swing type)	Equivalent 0.75kW	Equivalent 1.5kW	
Refrigerant	R410A		
Power voltage*2	Main circuit	3-phase AC 200/200-220V 50/60Hz	
	Operation circuit	DC12/24V	
Max. power consumption Max. current consumption	200V 50Hz	1.17kW/4.2A	1.78kW/6.2A
	200V 60Hz	1.22kW/4.3A	1.87kW/6.3A
	220V 60Hz	1.21kW/4.1A	1.86kW/6.1A
External dimensions (H×W×D) (mm)	995×450×560	1,200×470×670	
Mass (kg)	83	100	
Molded-case circuit breaker (builtin) (A)	10	15	

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.

# Product introduction

## Inverter Controlled Chiller



PC tool  
Hybrid-Win  
Supported

(Refer to the bottom)

Inverter Water Cooling unit with high precise temperature control, Energy saving, Compact size and environmentally friendly

- Enhancement of highly accurate temperature control
- Extension of cooling capacity control range
- Environmentally Conscious Design
  - ◆ Responds to environmental regulations, e.g. by adopting printed circuit boards with lead-free solder.
- Environment friendly unit, countering global warming
- Achieves 30% energy savings compared to the AKW 8 series (measured by Daikin)
- Low noise level for a better working environment

### Specifications

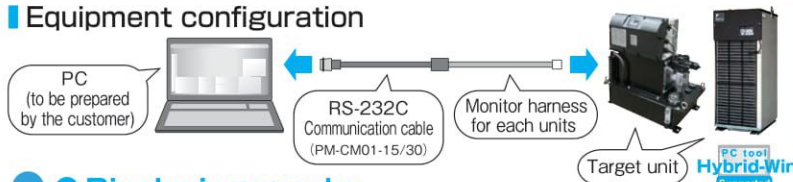
		With pump/tank				
Model name		AKW149(-171)	AKW329(-171)	AKW439(-171)	AKW569	AKW909
Chiller horsepower(HP)		0.5	1.2	1.5	2.0	3.0
Cooling capacity (50/60Hz)*1 (kW)		1.4/1.4	3.2/3.2	4.3/4.3	5.6/5.6	9.0/9.0
Compressor (Totally enclosed DC swing type)		Equivalent 0.4kW	Equivalent 0.75kW	Equivalent 1.1kW	Equivalent 1.5kW	Equivalent 2.2kW
Refrigerant		R410A				
Water pump	Model	Immersion type multistage pump			cascade pump	
	Head (50/60Hz)	25/37m	24/36m		23/41m	30/55m
	Motor capacity (50/60Hz) (kW)	0.33/0.52			0.55/0.55	0.75/0.75
Power voltage*2	Main circuit	3-phase AC 200/200-220V 50/60Hz				
	Operation circuit	DC12/24V				
Max. power consumption Max. current consumption	200V 50Hz	1.20kW/4.5A	1.71kW/6.4A	1.97kW/7.4A	2.95kW/9.5A	4.60kW/14.3A
	200V 60Hz	1.36kW/4.8A	1.87kW/6.6A	2.20kW/7.8A	3.15kW/9.8A	4.91kW/15.0A
	220V 60Hz	1.36kW/4.8A	1.87kW/6.6A	2.20kW/7.8A	3.14kW/9.0A	4.96kW/13.7A
External dimensions (H×W×D) (mm)		630×360×700	815×360×700	915×360×700	1,197×470×500	1,309×560×620
Mass (kg)		61	65	68	92	115
Items prepared by the customer	Molded-case circuit breaker (Rated current) (A)	10			15	20

PC tool  
Hybrid-Win  
Supported

### Hybrid-Win

This PC utility reads data from Daikin hybrid systems (Super Unit, EcoRich, oil cooling unit, etc.) and manages it. Parameter setting and monitoring can be accomplished efficiently using the Windows application.

#### Equipment configuration



Main features

#### ● Displaying graphs

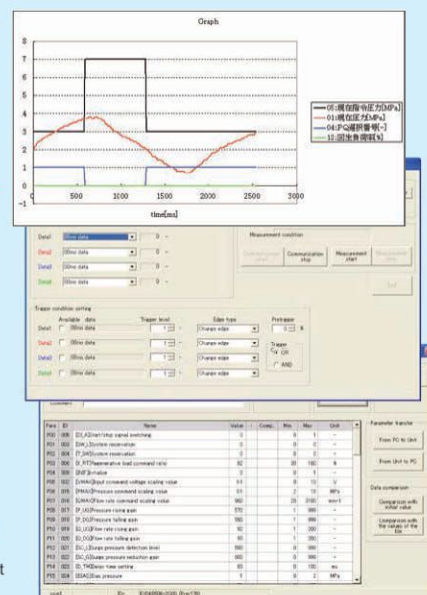
The pressure, flow rate, and other internal data of the inverter can be monitored and displayed in the form of graphs. This facilitates operation checks during test runs, adjustment of parameters such as time constants, and troubleshooting.

#### ● Reading, writing, editing, and saving parameters

The time required for setting can be slashed by editing the parameter settings on the PC and writing them to the unit in a batch. The ability to read and save settings facilitates management.

#### ● Reading and saving the alarm history

This function enables quick identification of the parts that require maintenance and reduction of the downtime. The operating time display can serve as the guide for the timing to replace consumable parts or to conduct maintenance. Troubleshooting information including the diagnosis results of the cause of an alarm and action to take can be displayed.



\*: Hybrid-Win is utility software to monitor the internal status of Daikin hybrid systems using a PC. Please contact your nearest Daikin distributor to get information of it in details. <http://daikinpmc.com/en/index.html>

\*: The communication cable is separately available. \*: Some models require a dedicated separate monitor harness.

\*: It is possible to connect to a smart phone or factory LAN by adding an optional WIFI module. This is useful to facilitate the user's daily inspection/maintenance work and for remote monitoring.

# Optional parts

## Optional parts for ECORICH / ECORICH-R / SUPER UNIT

### Level switch

Model	Operating voltage	Maximum operation current	Contact resistance	Protection class	Alarm for oil temperature and action		CE standard	Remark
E-DLSN-130L-A-10	24V DC	0.05A	1Ω maximum	IP65	EHU14/25/30 (with 18 L tank)	11 L maximum	N/A	•Directly mountable on EHU1404 (0.75 kW) to EHU3007 (2.8 kW) at drain port DR2 (Rc1/2) •Mountable on EHU15R/30R (with 20 L tank) at drain port DR2 (Rc3/4) with a bushing (3/4 × 1/2)
E-DLSN-130L-B-10					EHU15R/30R (with 20 L tank)	13 L maximum		
	SUT03 (with 30 L tank)	21 L maximum	Open					
	SUT06 (with 60 L tank)	50 L maximum						
E-DLSN-90L-A-10	24V DC	0.05A	1Ω maximum	IP65	EHU15R/30R (with 10 L tank)	7.2 L maximum	N/A	•Mountable on EHU15R/30R (with 10 L tank) at drain port DR2 (Rc3/4) with a bushing (3/4 × 1/2)
E-DLSN-90L-B-10								
			Open					

### Temperature switch

Model	Operating voltage	Maximum operation current	Contact resistance	Protection class	Alarm for oil temperature and action		CE standard	Remark
E-MQT83PD-L60X1-10	AC100V DC24V	AC 2A DC 50mA	30mΩ maximum	IP65	Temperature rise over 60°C Temperature differential from 7 to 13°C	Open	N/A	•Mountable on EHU1404 (0.75 kW) to EHU3007 (2.8 kW) at drain port DR1 (Rc1) with a bushing (1 × 3/8) or DR2 (Rc1/2) with a bushing (1/2 × 3/8) •Mountable on EHU15R/30R at drain port DR2 (Rc3/4) with a bushing (3/4 × 3/8)
E-MQT83PD-L60X1-1-10								

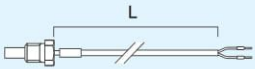
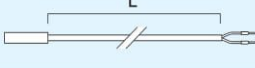
### Base plate set

Model	Applicable model				Color	Accessories
E-SUTPLATE-2	Unit type: Single pump type	SUT03S1507-30 SUT03S3007-30 SUT03S4007-30	SUT06S6007-30 SUT10S8007-30 SUT03S1510-30	SUT03S3010-30 SUT03S1516-30 SUT06S3016-30	Ivory white (Munsell code 5Y7.5/1)	① Base plate (4 pcs) ② Tank fastening bolt (8 pcs) ③ Plain and spring washers for the above parts (8 pcs each)
	Unit type: Double pump type	SUT06D4016-30 SUT06D6021-30 SUT10D6021-30	SUT10D8021-30 SUT16D8021-30			


## Optional parts for Oil Cooling Unit / Inverter Controlled Chiller

### Thermistor (for AKZ9/AKC9/AKW9 series)

#### ● Machine temperature synchronization thermistor

Model	Length of lead wire L (m)	Figure	Application
AKZ9-OP-K5	5m		For machine temperature synchronization control (implanted in the main machine)
AKZ9-OP-K10	10m		
AKZ9-OP-K15	15m		
AKZ9-OP-A5	5m		For machine temperature synchronization control (Attached to the surface of main machine body)
AKZ9-OP-A10	10m		

#### ● Oil or water temperature control thermistor

Model	Length of lead wire L (m)	Figure	Application
AKZ9-OP-Y5	5m		For return oil or water temperature control (installed in the oil pipe or water pipe of the main machine)
AKZ9-OP-Y10	10m		

### Communication board with a machine (for AKZ9/AKC9/AKW9 series)

Model	AKZ9-OP-CS
Use	For serial communication

# **DAIKIN INDUSTRIES, LTD.**

**Oil Hydraulic Equipment**

## **Osaka Office**

YODOGAWA PLANT

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

Phone: 81-6-6349-4475

Fax.: 81-6-6349-7862

Home Page: <http://www.daikinpmc.com/en/>

## **All World Machinery Supply, Inc.**

**A member of Daikin group**

6164 All World Way, Roscoe, IL 61073, U. S. A.

Phone: +1-815-943-9111

Fax.: +1-815-943-5370

Home Page: <http://www.allworldmachinery.com/>

