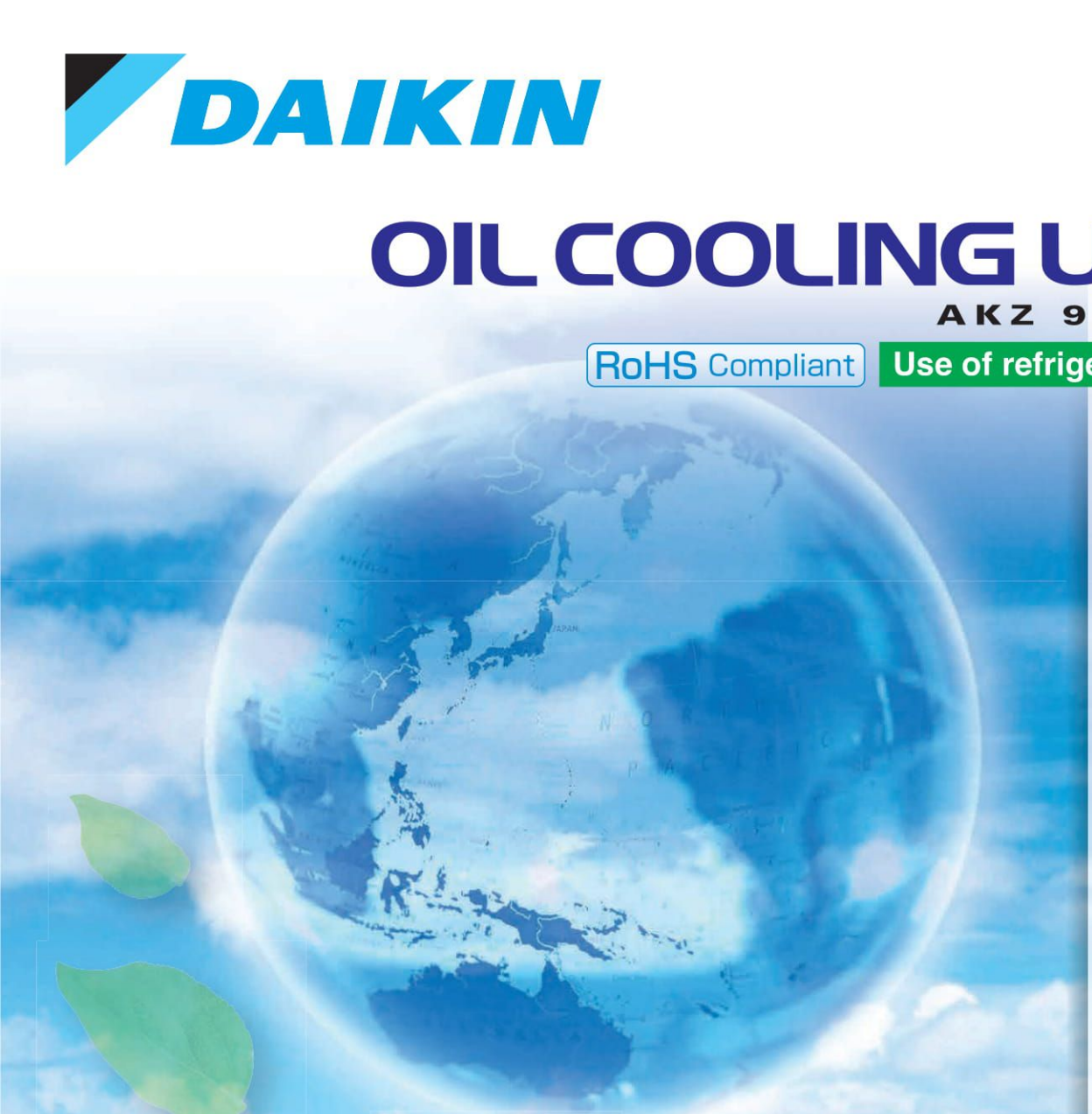
DAIKIN

OIL COOLING UNIT

AKZ 9 SERIES

RoHS Compliant | Use of refrigerant R410A



High-accuracy, Energy-saving, Compact

Environmentally Friendly Inverter Oil Cooling Unit

9 AKZ SERIES

INDEX

DAIKIN INDUSTRIES, LTD.
Oil Hydraulic Division
Oil Hydraulic Equipment

OIL COOLING UNIT

9 AKZ SERIES | Circulation type |

RoHS Compliant

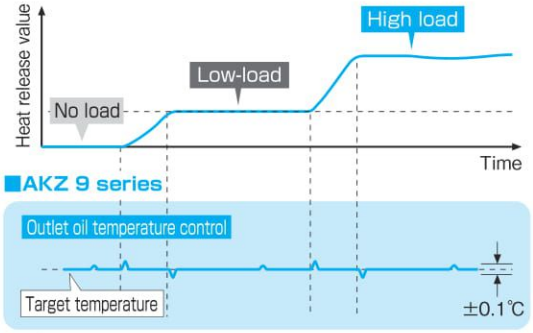
Features

Further Evolution of High-accuracy Temperature Control

- Our acclaimed ±0.1℃ oil temperature control has been extended to cover an even 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

- Control with loads from 0% (no load) to 100% achieved



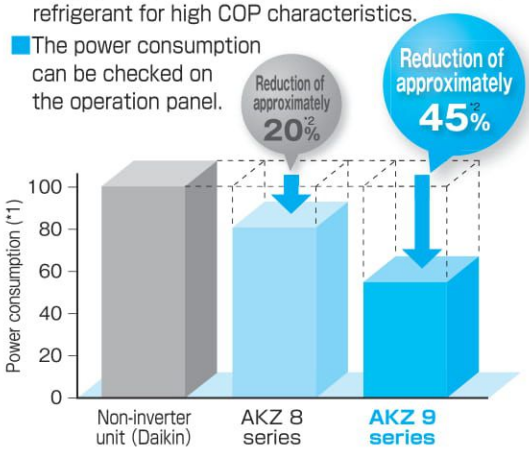
Note) Pattern diagram with the heating load stabilized at 0 - 100%

RoHS Compliant

- Complies with the RoHS Directive, 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.
- The power consumption can be checked on the operation panel.



*1. Comparison taking a non-inverter unit to have a power consumption of 100
*2. Measured during Daikin's model operation patterns

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

Compact design of top class in the industry

*Compared with AKZ 439 class (Unit: mm)

Features

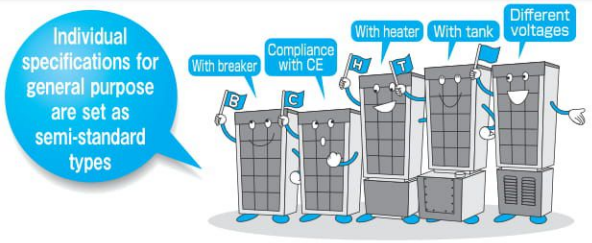
Reinforce durability for mist or dust in the severe condition of factory

- 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.

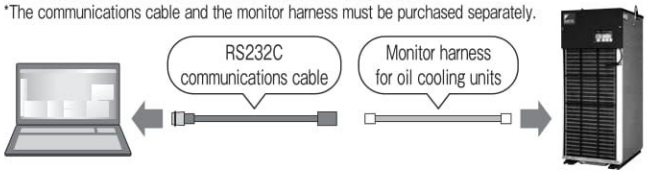
Five types of semi-standard specification units in addition to the standard type to achieve shorter product delivery terms



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.



Functions featured

- Refrigerant gas leakage detection alarm function
  An alarm signal is output when the refrigerant gas would be leaked (as cooling circuit failure).
- 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 ease of use

- 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.

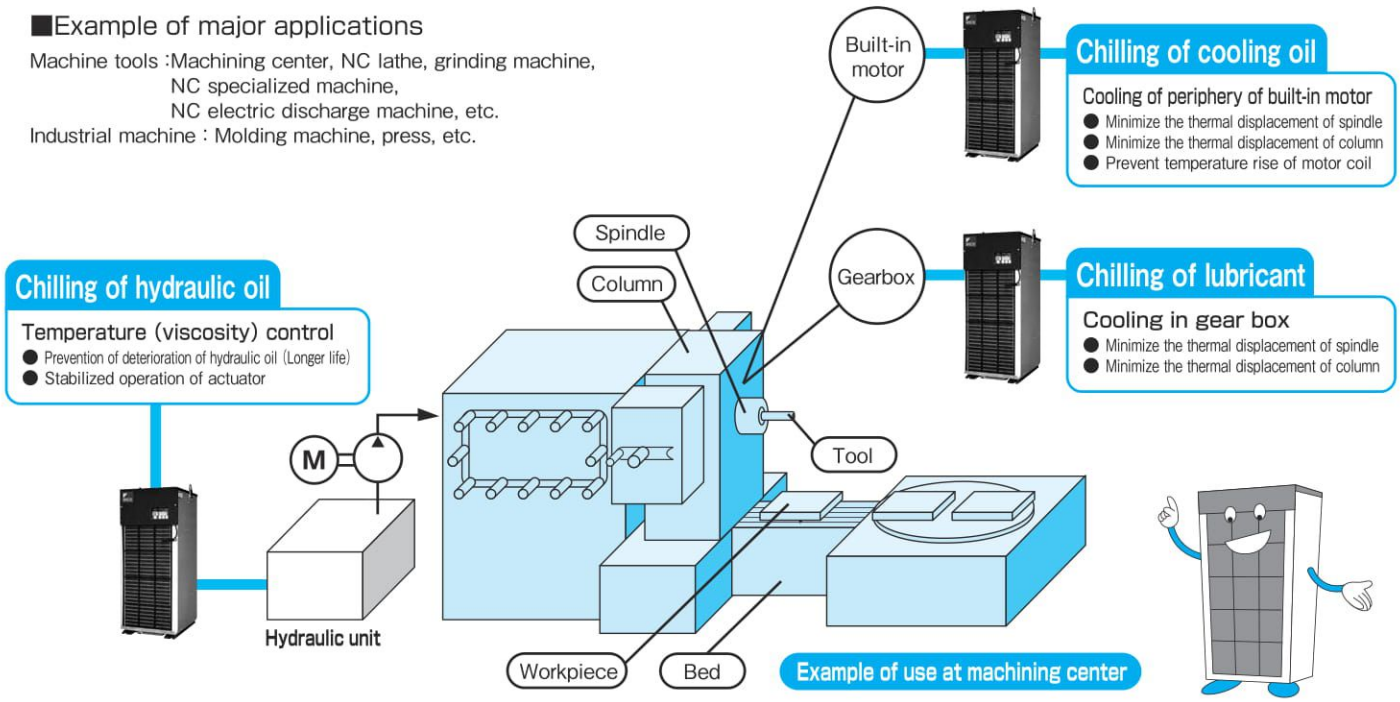
Improved operability/maintainability

- The control panel has been revamped. Data is now displayed in an easier-to-understand format with more digits space. The 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)

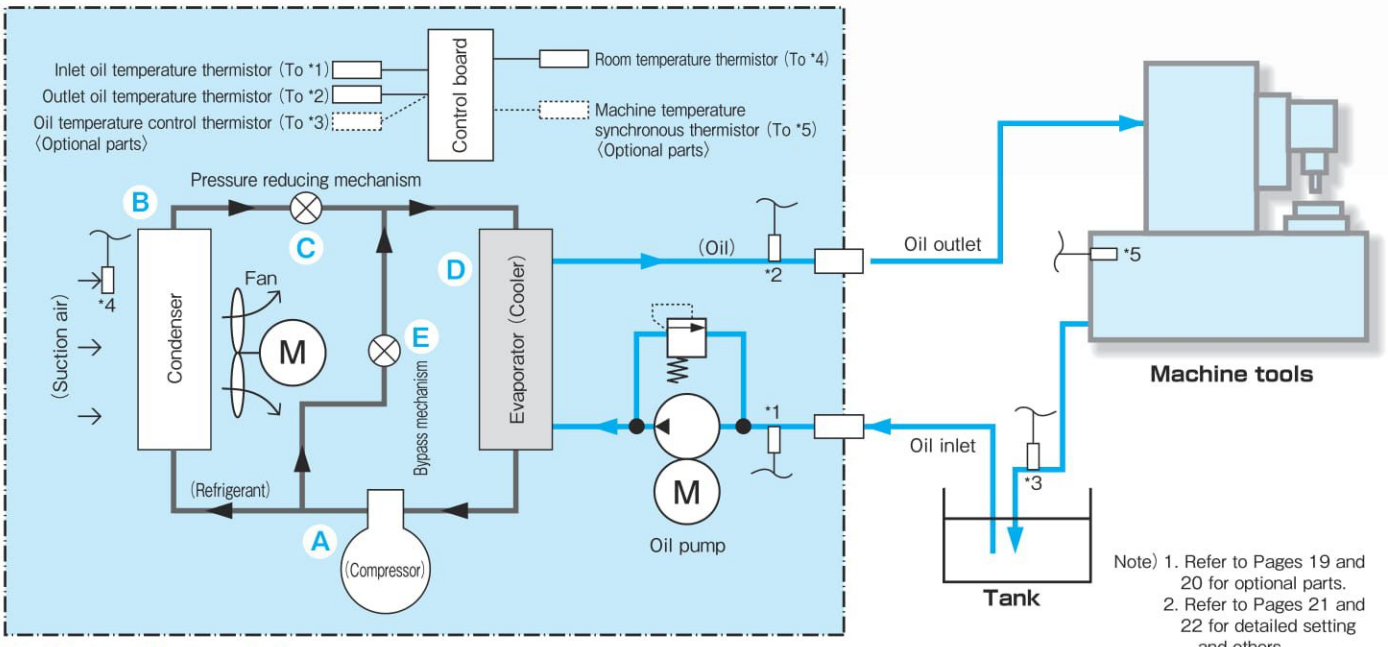
Applications

■Example of major applications

Machine tools :Machining center, NC lathe, grinding machine,
NC specialized machine,
NC electric discharge machine, etc.
Industrial machine : Molding machine, press, etc.



Principle and overall system diagram



Note) 1. Refer to Pages 19 and 20 for optional parts.
2. Refer to Pages 21 and 22 for detailed setting and others.

[Refrigerating cycle]

A:Refrigerant gas is converted into compressed gas at high temperature and high pressure by a compressor so that gas can be easily cooled and liquefied by a condenser.

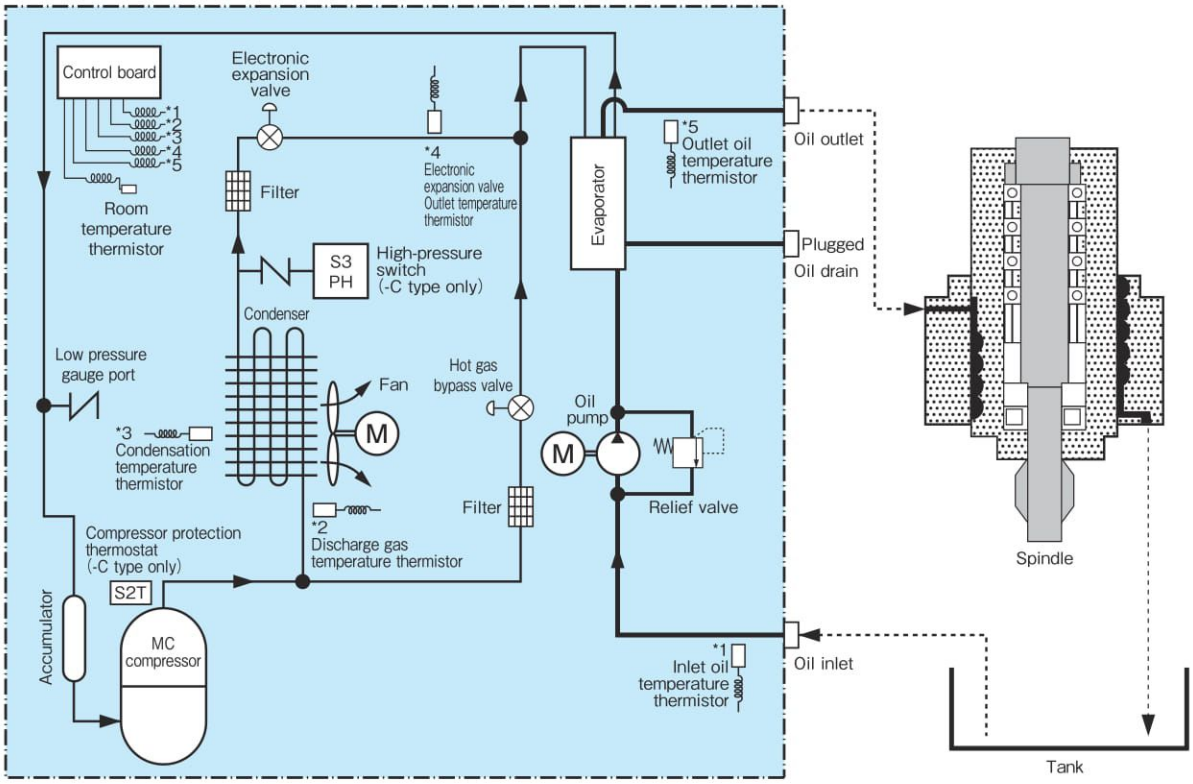
B:In the condenser, the gas at high temperature and high pressure made in the compressor is cooled with air and converted into liquid at high temperature and high pressure.

C:The pressure reduction mechanism reduces the pressure of the liquid at high temperature and high pressure and converts it into liquid at low temperature and low pressure by squeezing it so that it can be easily evaporated in a cooler.

D:In the cooler, liquid at low temperature and low pressure made in the pressure reduction mechanism removes heat from oil, evaporates (cools oil), and is converted into gas at low temperature and low pressure.

E:The bypass mechanism controls the cooling capacity at low loads by adjusting the volume of gas at high temperature and high pressure supplied to the cooler.

Piping system diagram



Description of model symbols

AKZ	※※	9	-	※※※
1	2	3	4	

1 Oil cooling unit identification code

AKZ : High-accuracy inverter oil cooling unit
[Circulation type, for spindle and lubricant]

2 Cooling capacity (kW)

14 : 1.4 kW　56 : 5.6 kW
32 : 3.2 kW　90 : 9.0 kW
43 : 4.3 kW

3 Symbol of series (Symbol to represent model change)

9 : "9" series

4 Symbol of option type/Non-standard number

Options and their combinations (Refer to the following table.)

Special specifications (dual pumps, specified paint colors, etc.)

-※※※ (3-digit number), C※※※ (3-digit number), etc.
Please consult us about detailed information.

Options and their combinations

Symbol of option type	With breaker	Compliance with CE	With heater	With tank	Different voltage type (1)	Different voltage type (2)	Different voltage type (3)
-B	✓	–	–	–	–	–	–
-C	–	✓	–	–	–	–	–
-H	–	–	✓	–	–	–	–
-T	–	–	–	✓	–	–	–
-046	–	–	–	–	✓	–	–
-047	✓	–	–	–	–	✓	–
-048	✓	–	–	–	–	–	✓
-BC	✓	✓	–	–	–	–	–
-BH	✓	–	✓	–	–	–	–
-BT	✓	–	–	✓	–	–	–
-CH	–	✓	✓	–	–	–	–
-CT	–	✓	–	✓	–	–	–
-HT	–	–	✓	✓	–	–	–
-BCH	✓	✓	✓	–	–	–	–
-BCT	✓	✓	–	✓	–	–	–
-BHT	✓	–	✓	✓	–	–	–
-CHT	–	✓	✓	✓	–	–	–
-BCHT	✓	✓	✓	✓	–	–	–
-001	✓	–	–	–	✓	–	–
-002	–	✓	–	–	✓	–	–
-003	–	–	✓	–	✓	–	–
-004	–	–	–	✓	✓	–	–
-005	✓	✓	–	–	✓	–	–
-006	✓	–	✓	–	✓	–	–
-007	✓	–	–	✓	✓	–	–
-008	–	✓	✓	–	✓	–	–
-009	–	✓	–	✓	✓	–	–
-010	–	–	✓	✓	✓	–	–
-011	✓	✓	✓	–	✓	–	–
-012	✓	✓	–	✓	✓	–	–
-013	✓	–	✓	✓	✓	–	–
-014	–	✓	✓	✓	✓	–	–
-015	✓	✓	✓	✓	✓	–	–
-017	✓	✓	–	–	–	✓	–
-018	✓	–	✓	–	–	✓	–
-019	✓	–	–	✓	–	✓	–
-023	✓	✓	✓	–	–	✓	–
-024	✓	✓	–	✓	–	✓	–
-025	✓	–	✓	✓	–	✓	–
-029	✓	✓	✓	✓	–	✓	–
-032	✓	✓	–	–	–	–	✓
-033	✓	–	✓	–	–	–	✓
-034	✓	–	–	✓	–	–	✓
-038	✓	✓	✓	–	–	–	✓
-039	✓	✓	–	✓	–	–	✓
-040	✓	–	✓	✓	–	–	✓
-044	✓	✓	✓	✓	–	–	✓

Different voltage type (1) Without transformer　AC 220, 230 V　(50/60 Hz)
Different voltage type (2) With transformer　AC 380, 400, 415 V　50/60 Hz, with breaker
Different voltage type (3) With transformer　AC 440, 460, 480 V　50/60 Hz, with breaker

AKZ149 AKZ329 AKZ439

Oil Cooling Unit horsepower (HP)		0.5						1.2						1.5					
Model name		AKZ149						AKZ329						AKZ439					
		Standard	−B	−C	−H	−T *8	Different voltage specifications *3	Standard	−B	−C	−H	−T *8	Different voltage specifications *3	Standard	−B	−C	−H	−T *8	Different voltage specifications *3
Cooling capacity (50/60Hz) *1	kW	1.3/1.4						2.8/3.2						3.8/4.3					
Heater	kW	−			1		−	−			1		−	−			1		−
Supply power *2		3-Phase AC 200/200･220V 50/60Hz					*3	3-Phase AC 200/200･220V 50/60Hz					*3	3-Phase AC 200/200･220V 50/60Hz					*3
Circuit voltage	Main circuit *3	3-Phase AC 200/200･220V 50/60Hz																	
	Operating circuit	DC12/24V																	
Max. power consumption Max. consumption current	200V 50Hz	0.90kW/3.9A			1.29kW/4.1A	0.90kW/3.9A	*9	1.36kW/4.9A			1.49kW/4.8A	1.36kW/4.9A	*9				1.80kW/6.6A		*9
	200V 60Hz	0.91kW/3.6A			1.32kW/4.2A	0.91kW/3.6A		1.43kW/4.8A			1.61kW/5.2A	1.43kW/4.8A					1.88kW/6.4A		
	220V 60Hz	0.91kW/3.5A			1.43kW/4.2A	0.91kW/3.5A		1.43kW/4.6A			1.72kW/5.0A	1.43kW/4.6A					1.88kW/6.1A		
Transformer capacity					−		2.6kVA				−		2.6kVA				−		2.6kVA
Exterior color		Ivory white																	
Outside dimensions (H×W×D)	mm	650×360×440			950×360×440	810×360×535	950×360×440	775×360×440			1075×360×440	965×360×535	1075×360×440	875×360×440			1175×360×440	1065×360×535	1175×360×440
Compressor (Totally enclosed DC swing type)		Equivalent to 0.4kW						Equivalent to 0.75kW						Equivalent to 1.1kW					
Evaporator		Shell-end coil type																	
Condenser		Cross-fin coil type																	
Propeller fan Motor					ϕ250、54W								ϕ300、54W						
Oil pump	Motor										0.4kW—4P								
	Theoretical discharge rate L/min				12/14.4								24/28.8						
	Open pressure MPa				0.5								0.6						
Temperature adjust (Selectable)	Synchronization type Standard	Room temperature or machine temperature *4 (Set to "Room temperature: Mode 3" by default)																	
	Synchronization type Object to be controlled	Inlet oil temperature or outlet oil temperature (Set to "Inlet oil temperature" by default)																	
	Synchronization type Synchronization range K	−9.9~+9.9 against the standard temperature (Set at 0.0 by default)																	
	Fixed type Object to be controlled	Inlet oil temperature or outlet oil temperature																	
	Fixed type Range ℃	5~50																	
Refrigerant control		Compressor revolutions by inverter + Opening of electric expansion valve																	
Refrigerant (New refrigerant: R410A) *5 Filling amount	kg	0.49						0.72						0.98					
Protection equipment		A set of overcurrent relay (motor for pump), reverse-phase protection equipment, restart prevention timer, low room-temperature protection thermostat, high room-temperature protection thermostat, low oil-temperature protection thermostat, relief valve for pump, discharge tube temperature thermostat, condenser temperature thermostat, refrigerant leak detector, and inverter protection equipment. High-pressure switch (−C type only), compressor protection thermostat (−C type only), overheat prevention temperature thermostat (−H type only), boil-dry protection switch (−H type only), no-fuse breaker (−B type only)																	
Operating range	Room temperature ℃	5~45																	
	Inlet oil temperature ℃	5~50																	
	Oil viscosity mm^2/s	1.4~200 (ISO VG2~32)																	
	Product external pressure loss Discharge side	0.5MPa or less																	
	Product external pressure loss Suction side	−30.7kPa or less																	
Usable oil		Lubricant, hydraulic oil of mineral oil (Not usable for hydraulic oil of ester phosphate, water, water-soluble liquid, drugs, food products, fuel, cutting liquid, grinding liquid, etc.)																	
Connecting tube	Oil inlet	Rc3/4																	
	Oil outlet	Rc3/4			Rc1 1/4		Rc3/4				Rc1 1/4		Rc3/4				Rc1 1/4		Rc3/4
	Oil drain	Rc1/4 (Plugged)																	
Noise value (Value measured at 1m high in front, value equivalent as measured in anechoic chamber)	dB(A)	62												65					
Transport vibration performance		Up down 14.7m/S^2 ×2.5 hr (7.5~100Hz sweep / 5 min.)																	
Ingress protection *6		IP2X																	
Mass	kg	51			78	68	87	56			83	73	92	64			91	81	100
Molded-case circuit breaker (Rated current)	A	−	10			−		−	10			−		−	10			−	
Oil tank (Capacity)	L			−		15	−			−		20	−			−		20	−
Items to be prepared by customer *7 Molded-case circuit breaker (Rated current)	A	10 (Required for types other than −B type)																	

Note) *1. The cooling capacity represents the value at the standard point (inlet oil temperature: 35℃, room temperature: 35℃, oil for use: ISO VG32). The tolerance of the product is approx.±5%.

*2. Be sure to use a commercial power supply for the power source. The use of an inverter power supply may cause burn damage to the unit. The voltage fluctuation range should be within ±10%. If the voltage fluctuation range is more than ±10%, please consult us.

*3. There are three types of different voltage specifications depending on the power source: −046, −047 and −048 units. −047 and −048 units deal with the different voltage by featuring a transformer.
The main circuit voltage is the transformer's secondary side voltage of 200 VAC, 50/60 Hz.
(−046 units have no transformer and therefore have the same external dimensions and mass as standard units. Their main circuit voltage is 220/230 VAC, 50/60 Hz.)

*4. The machine temperature synchronous thermistor optionally available is required for this function. (Refer to Page 19 for details.)

*5. The SDS (Safety Data Sheet) of refrigerant R410A is attached to −C type.

*6. Electric component box ingress protection: IP54 or equivalent (However, use piping conduits etc. rated at least IP54 at wiring ports.)

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

*8. The yellow line on the tank oil level gauge shows the highest oil level and the red line the lowest oil level.

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

■AKZ149

Supply power		Power/current	
220V	50/60Hz	0.91kW	3.6A
230V			3.4A
380V		0.92kW	2.1A
400V			1.9A
415V		0.93kW	1.8A
440V		0.92kW	
460V			
480V		0.93kW	1.7A

■AKZ329

Supply power		Power/current	
220V	50/60Hz	1.43kW	4.5A
230V			4.3A
380V		1.38kW	2.6A
400V		1.44kW	2.5A
415V		1.46kW	2.4A
440V		1.38kW	2.3A
460V		1.44kW	2.2A
480V		1.46kW	2.1A

■AKZ439

Supply power		Power/current	
220V	50/60Hz	1.88kW	6.0A
230V			5.8A
380V		1.82kW	3.4A
400V		1.89kW	3.3A
415V		1.90kW	3.1A
440V		1.82kW	3.0A
460V		1.89kW	2.9A
480V		1.90kW	2.7A

■AKZ569

Supply power		Power/current	
220V	50/60Hz	2.30kW	7.2A
230V			6.9A
380V		2.22kW	3.9A
400V			3.7A
415V			3.5A
440V			3.3A
460V			3.2A
480V			3.0A

■AKZ909

Supply power		Power/current	
220V	50/60Hz	4.30kW	12.9A
230V			12.3A
380V		4.28kW	7.0A
400V			6.7A
415V			6.4A
440V			6.1A
460V			5.8A
480V			5.6A

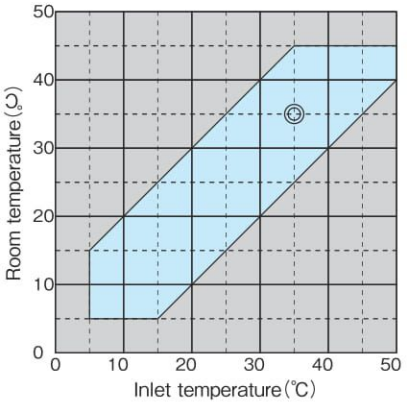
AKZ569
AKZ909

Oil Cooling Unit horsepower (HP)		2.0						3.0					
Model name		AKZ569						AKZ909					
		Standard	−B	−C	−T *8	−H	Different voltage specifications *3	Standard	−B	−C	−T *8	−H	Different voltage specifications *3
Cooling capacity (50/60Hz) *1	kW	5.0/5.6						8.0/9.0					
Heater	kW			−		2	−			−		3	−
Supply power *2		3-Phase AC 200/200·220V 50/60Hz					*3	3-Phase AC 200/200·220V 50/60Hz					*3
Circuit voltage	Main circuit *3	3-Phase AC 200/200·220V 50/60Hz											
	Operating circuit	DC12/24V											
Max. power consumption Max. consumption current	200V 50Hz	2.22kW/7.6A				2.50kW/8.3A	*9	4.25kW/13.5A					*9
	200V 60Hz	2.30kW/7.5A				2.57kW/8.0A		4.30kW/13.4A					
	220V 60Hz	2.30kW/7.2A				3.00kW/8.8A		4.30kW/12.9A					
Transformer capacity		−					4.0kVA	−					6.0kVA
Exterior color		Ivory white											
Outside dimensions (H×W×D)	mm	1110×470×560			1375×470×580	1410×470×560	1360×470×590	1220×560×680			1485×560×700	1520×560×680	1470×560×659
Compressor (Totally enclosed DC swing type)		Equivalent to 1.5kW						Equivalent to 2.2kW					
Evaporator		Brazed plate type											
Condenser		Cross-fin coil type											
Propeller fan Motor		φ400、100W						φ455、100W					
Oil pump	Motor	0.7kW−4P											
	Theoretical discharge rate L/min	30/36											
	Open pressure MPa	0.6											
Temperature adjust (Selectable)	Synchronization type: Standard	Room temperature or machine temperature *4 (Set to "Room temperature: Mode 3" by default)											
	Synchronization type: Object to be controlled	Inlet oil temperature or outlet oil temperature (Set to "Inlet oil temperature" by default)											
	Synchronization type: Synchronization range K	−9.9~+9.9 against the standard temperature (Set at 0.0 by default)											
	Fixed type: Object to be controlled	Inlet oil temperature or outlet oil temperature											
	Fixed type: Range ℃	5~50											
Refrigerant control		Compressor revolutions by inverter + Opening of electric expansion valve											
Refrigerant (New refrigerant: R410A) *5 Filling amount	kg	1.02						1.48					
Protection equipment		A set of overcurrent relay (motor for pump), reverse-phase protection equipment, restart prevention timer, low room-temperature protection thermostat, high room-temperature protection thermostat, low oil-temperature protection thermostat, relief valve for pump, discharge tube temperature thermostat, condenser temperature thermostat, refrigerant leak detector, and inverter protection equipment. High-pressure switch (−C type only), compressor protection thermostat (−C type only), overheat prevention temperature thermostat (−H type only), boil-dry protection switch (−H type only), no-fuse breaker (−B type only)											
Operating range	Room temperature ℃	5~45											
	Inlet oil temperature ℃	5~50											
	Oil viscosity mm^2/s	1.4~200 (ISO VG2~32)											
	Product external pressure loss: Discharge side	0.5MPa or less											
	Product external pressure loss: Suction side	−30.7kPa or less											
Usable oil		Lubricant, hydraulic oil of mineral oil (Not usable for hydraulic oil of ester phosphate, water, water-soluble liquid, drugs, food products, fuel, cutting liquid, grinding liquid, etc.)											
Connecting tube	Oil inlet	Rc1 1/4			Rc1	Rc1 1/4		Rc1 1/4			Rc1	Rc1 1/4	
	Oil outlet	Rc1 1/4											
	Oil drain	Rc1/4 (Plugged)											
Noise value (Value measured at 1m high in front, value equivalent as measured in anechoic chamber)	dB(A)	65						67					
Transport vibration performance		Up down 14.7m/S^2 ×2.5 hr (7.5~100Hz sweep / 5 min.)											
Ingress protection *6		IP2X											
Mass	kg		82		115	100	145		97		132	122	175
Molded-case circuit breaker (Rated current)	A	−	15			−		−	20			−	
Oil tank (Capacity)	L		−		50	−			−		70	−	
Items to be prepared by customer *7: Molded-case circuit breaker (Rated current)	A	15 (Required for types other than −B type)						20 (Required for types other than −B type)					

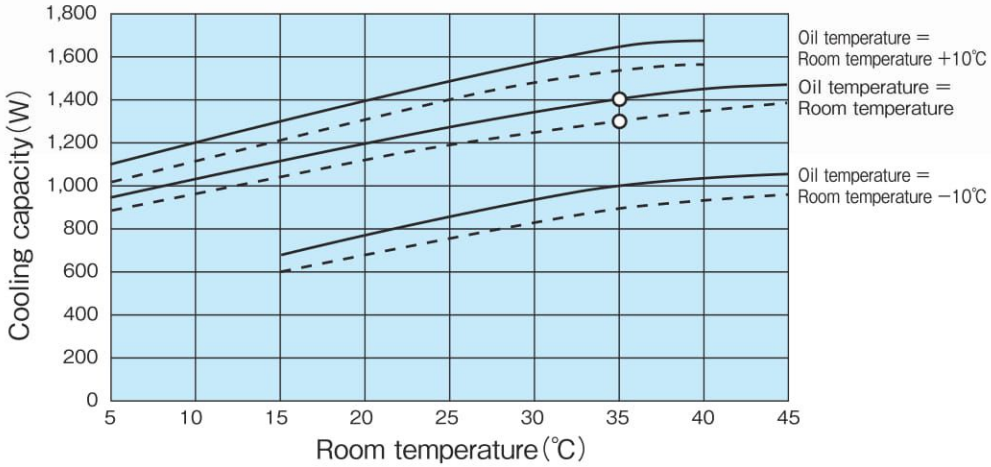
Refer to Page 5 for explanatory notes.

Range of use

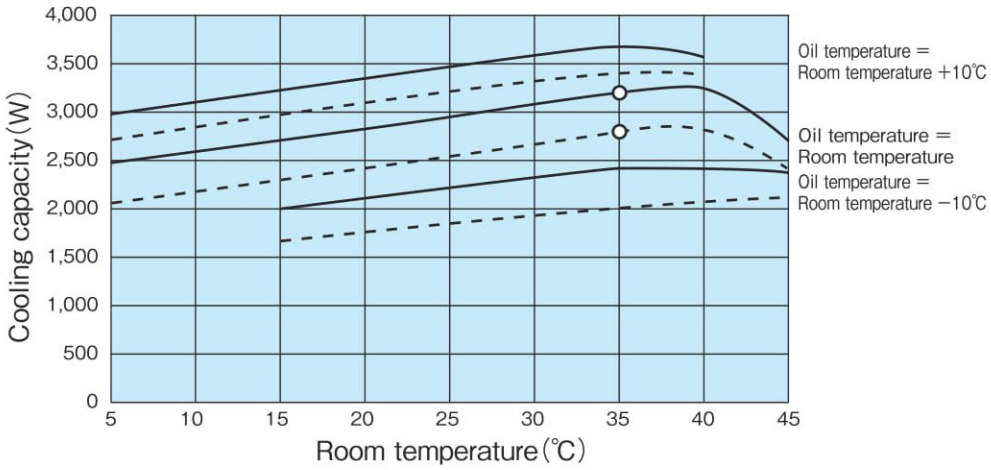
Note) 1. The mark ◎ shows the standard point.
2. Be sure to use the unit at the range of use specified in ▭.
(The use outside the use range may cause unit failure.)



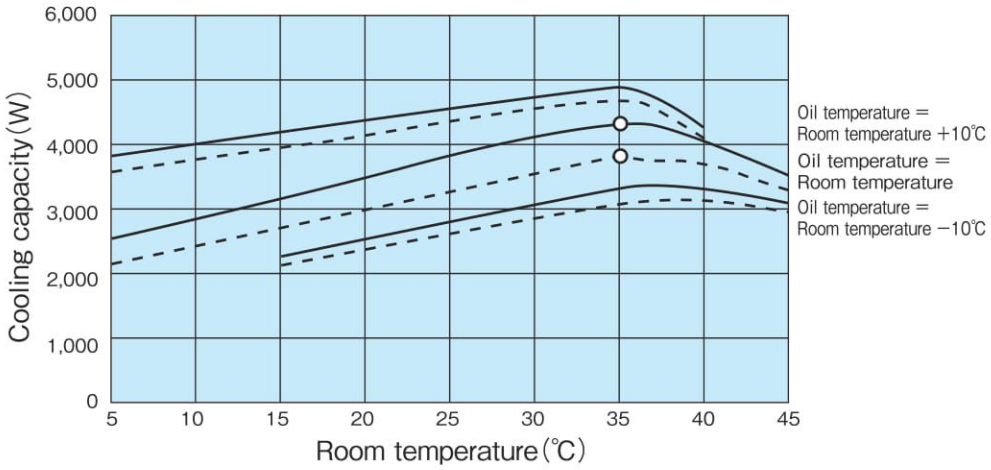
AKZ149



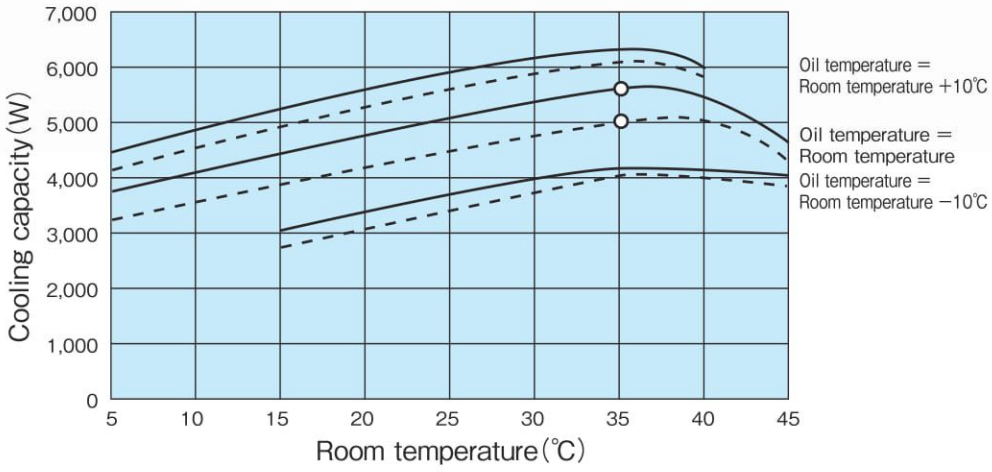
AKZ329



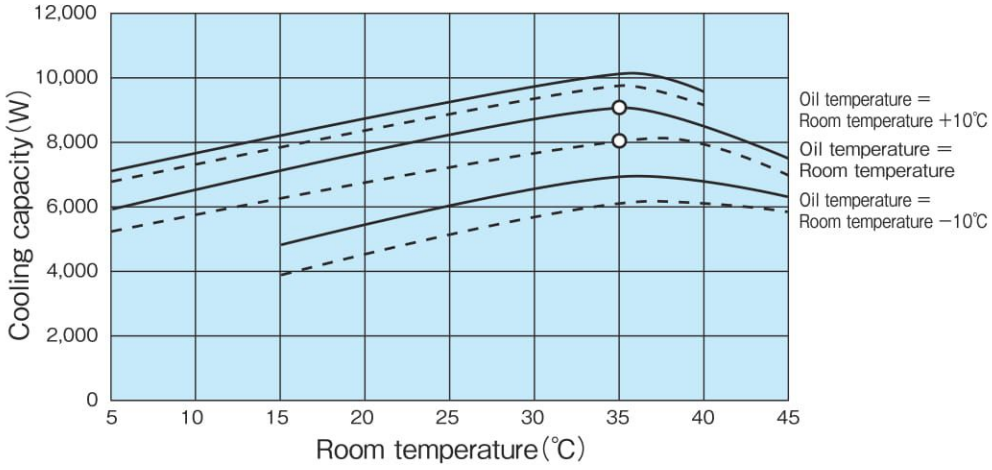
AKZ439



AKZ569



AKZ909



■Solid line ——: When operated at 60Hz ■Broken line - - -: When operated at 50Hz

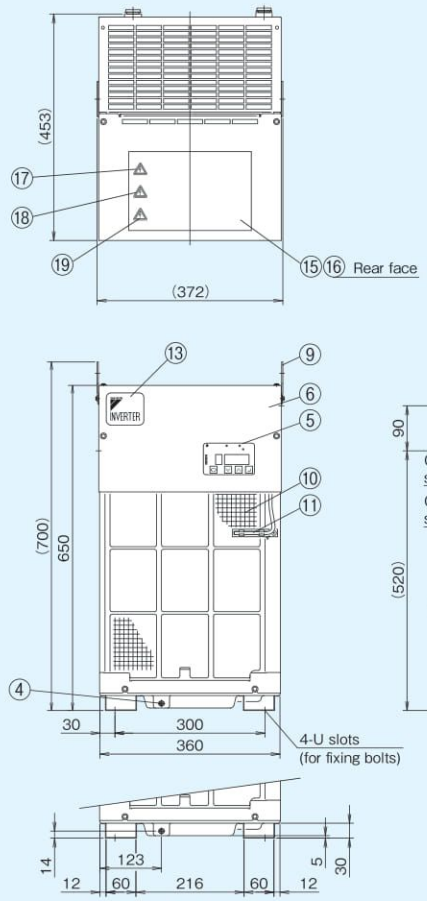
1. The mark "○" shows the standard point.
   (Room temperature: 35℃ Inlet oil temperature : 35℃ Oil for use: ISO VG32)
2. The cooling capacity differs depending on conditions such as room temperature, inlet oil temperature, oil dynamic viscosity and other factors.

Note) Refer to Page 5 for more details.

The positions of the fixing bolt holes are compatible with the AKZ 8 series, but the positions of the oil outlet/inlet and the power supply/signal cable inlet ports are not.

AKZ149(-B,-C,-046)

Standard specifications | With breaker | Compliance with CE | Different voltages (without transformer)

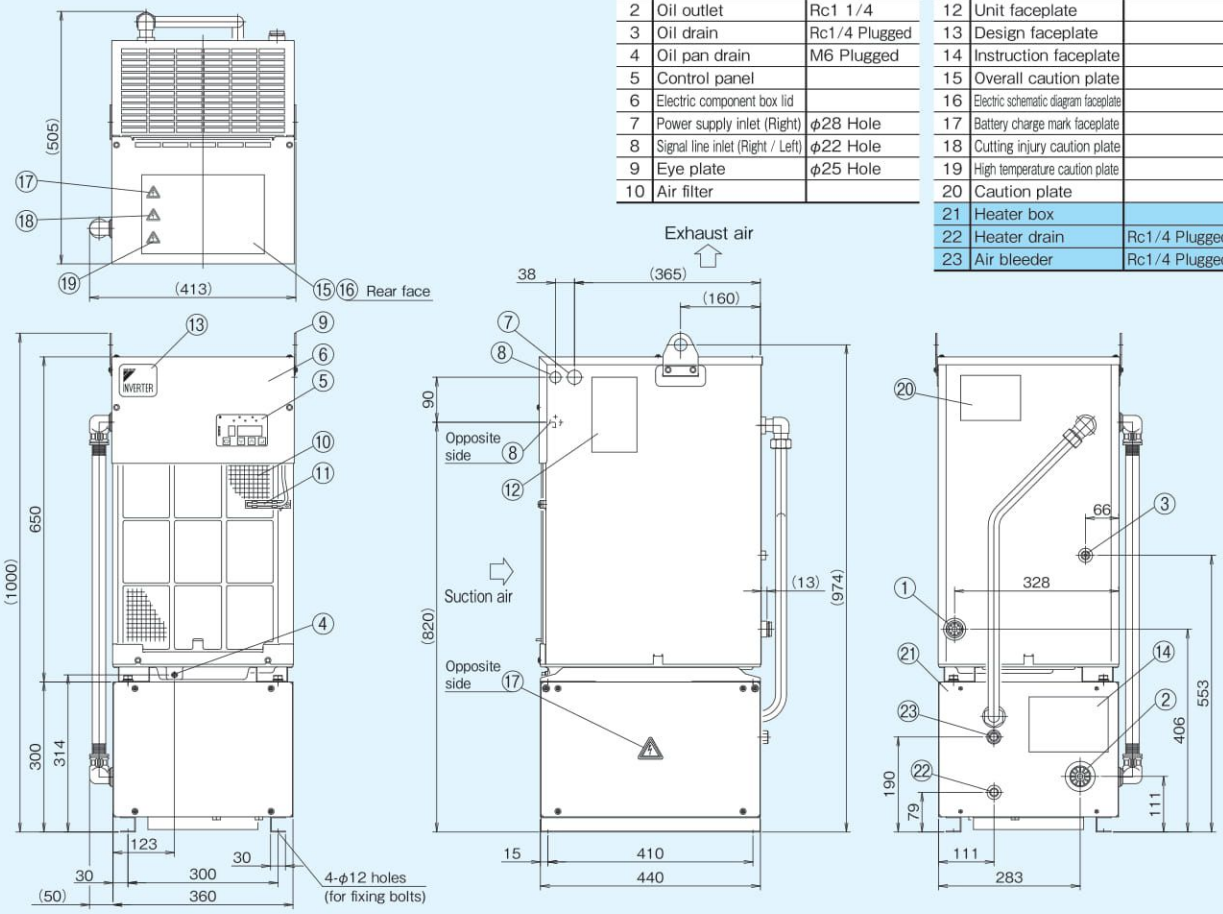


Part No.	Name	Description
1	Oil inlet	Rc3/4
2	Oil outlet	Rc3/4
3	Oil drain	Rc1/4 Plugged
4	Oil pan drain	M6 Plugged
5	Control panel	
6	Electric component box lid	
7	Power supply inlet (Right / Left)	ϕ28 Hole
8	Signal line inlet (Right / Left)	ϕ22 Hole
9	Eye plate	ϕ25 Hole
10	Air filter	

Part No.	Name	Description
11	Room temperature thermistor	
12	Unit faceplate	
13	Design faceplate	
14	Instruction faceplate	
15	Overall caution plate	
16	Electric schematic diagram faceplate	
17	Battery charge mark faceplate	
18	Cutting injury caution plate	
19	High temperature caution plate	
20	Caution plate	

AKZ149-H

With heater



Part No.	Name	Description
1	Oil inlet	Rc3/4
2	Oil outlet	Rc1 1/4
3	Oil drain	Rc1/4 Plugged
4	Oil pan drain	M6 Plugged
5	Control panel	
6	Electric component box lid	
7	Power supply inlet (Right)	ϕ28 Hole
8	Signal line inlet (Right / Left)	ϕ22 Hole
9	Eye plate	ϕ25 Hole
10	Air filter	

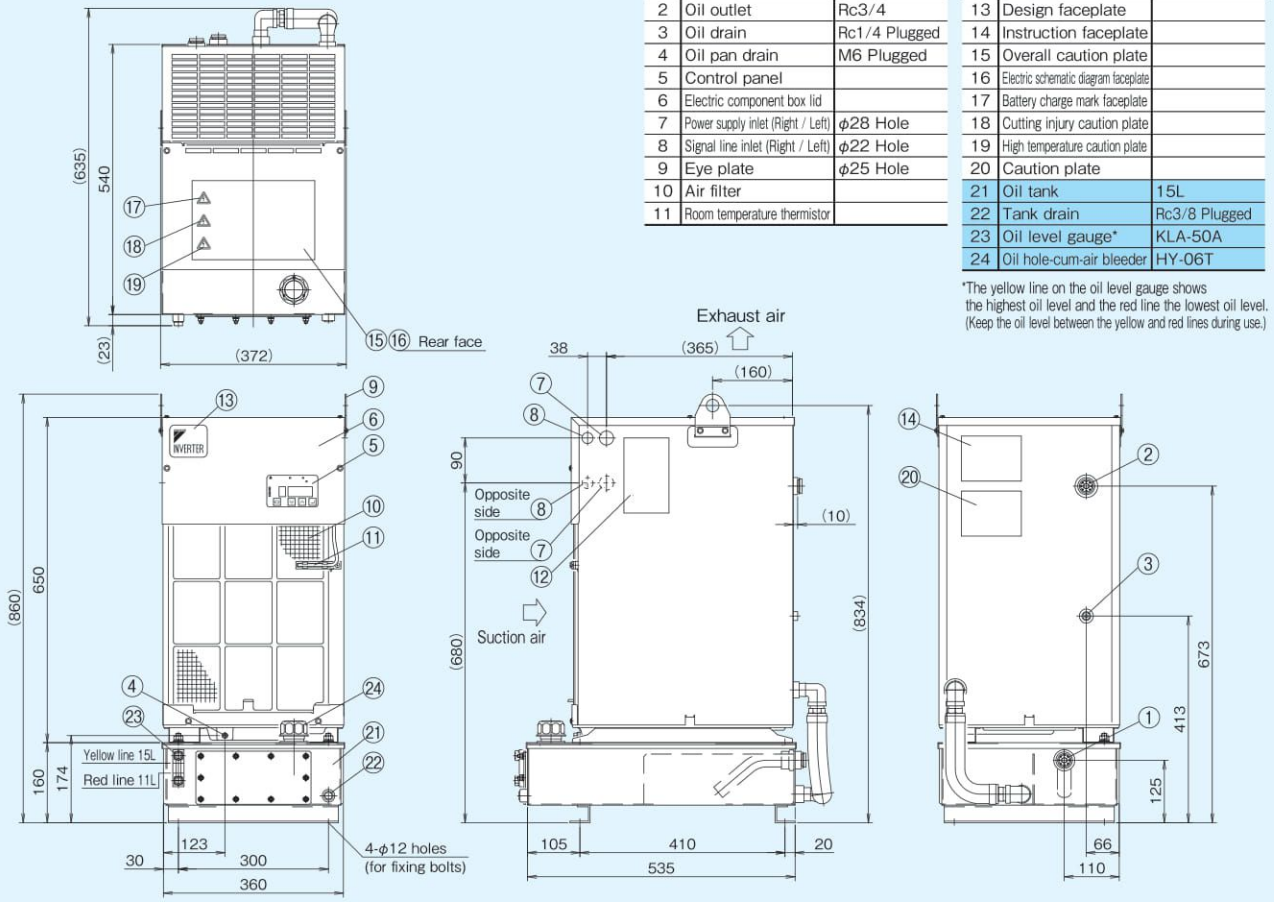
Part No.	Name	Description
11	Room temperature thermistor	
12	Unit faceplate	
13	Design faceplate	
14	Instruction faceplate	
15	Overall caution plate	
16	Electric schematic diagram faceplate	
17	Battery charge mark faceplate	
18	Cutting injury caution plate	
19	High temperature caution plate	
20	Caution plate	
21	Heater box	
22	Heater drain	Rc1/4 Plugged
23	Air bleeder	Rc1/4 Plugged

AKZ149-T With tank

Part No.	Name	Description
1	Oil inlet	Rc3/4
2	Oil outlet	Rc3/4
3	Oil drain	Rc1/4 Plugged
4	Oil pan drain	M6 Plugged
5	Control panel	
6	Electric component box lid	
7	Power supply inlet (Right / Left)	ϕ28 Hole
8	Signal line inlet (Right / Left)	ϕ22 Hole
9	Eye plate	ϕ25 Hole
10	Air filter	
11	Room temperature thermistor	

Part No.	Name	Description
12	Unit faceplate	
13	Design faceplate	
14	Instruction faceplate	
15	Overall caution plate	
16	Electric schematic diagram faceplate	
17	Battery charge mark faceplate	
18	Cutting injury caution plate	
19	High temperature caution plate	
20	Caution plate	
21	Oil tank	15L
22	Tank drain	Rc3/8 Plugged
23	Oil level gauge*	KLA-50A
24	Oil hole-cum-air bleeder	HY-06T

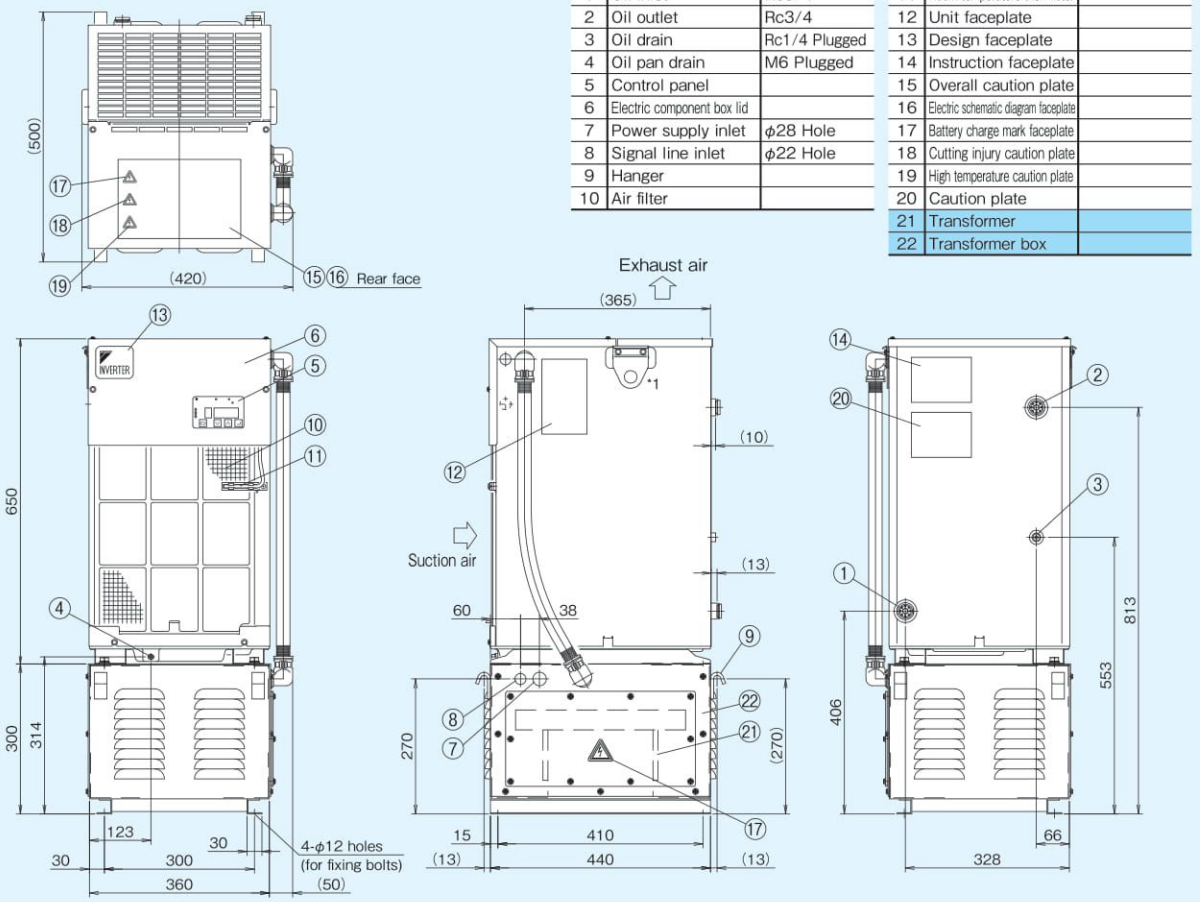
*The yellow line on the oil level gauge shows the highest oil level and the red line the lowest oil level. (Keep the oil level between the yellow and red lines during use.)



AKZ149-047,-048 Different voltages (With transformer)

Part No.	Name	Description
1	Oil inlet	Rc3/4
2	Oil outlet	Rc3/4
3	Oil drain	Rc1/4 Plugged
4	Oil pan drain	M6 Plugged
5	Control panel	
6	Electric component box lid	
7	Power supply inlet	ϕ28 Hole
8	Signal line inlet	ϕ22 Hole
9	Hanger	
10	Air filter	

Part No.	Name	Description
11	Room temperature thermistor	
12	Unit faceplate	
13	Design faceplate	
14	Instruction faceplate	
15	Overall caution plate	
16	Electric schematic diagram faceplate	
17	Battery charge mark faceplate	
18	Cutting injury caution plate	
19	High temperature caution plate	
20	Caution plate	
21	Transformer	
22	Transformer box	



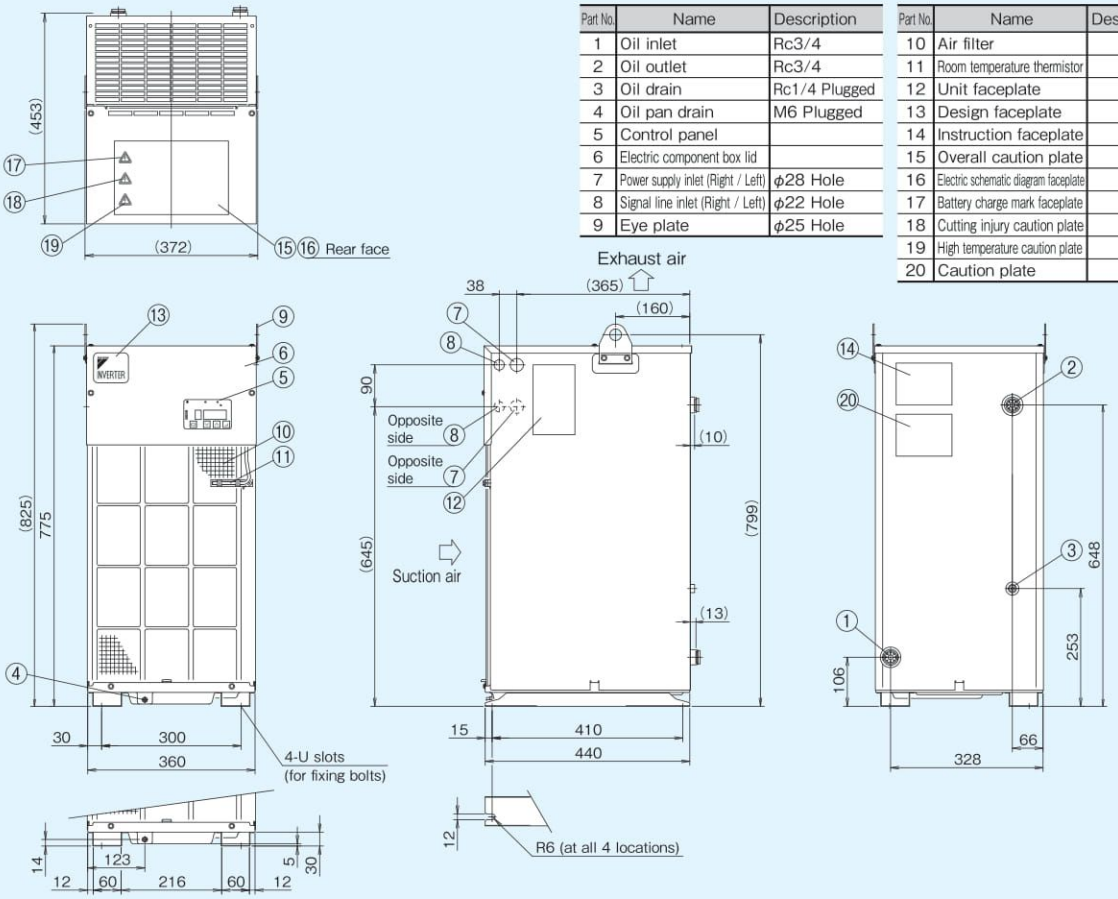
Note) *1. The hanging fitting is located below. Do not use this fitting for hanging.

Note) Refer to Page 5 for more details.

The positions of the fixing bolt holes are compatible with the AKZ 8 series, but the positions of the oil outlet/inlet and the power supply/signal cable inlet ports are not.

AKZ329(-B,-C,-046)

Standard specifications | With breaker | Compliance with CE | Different voltages (without transformer)

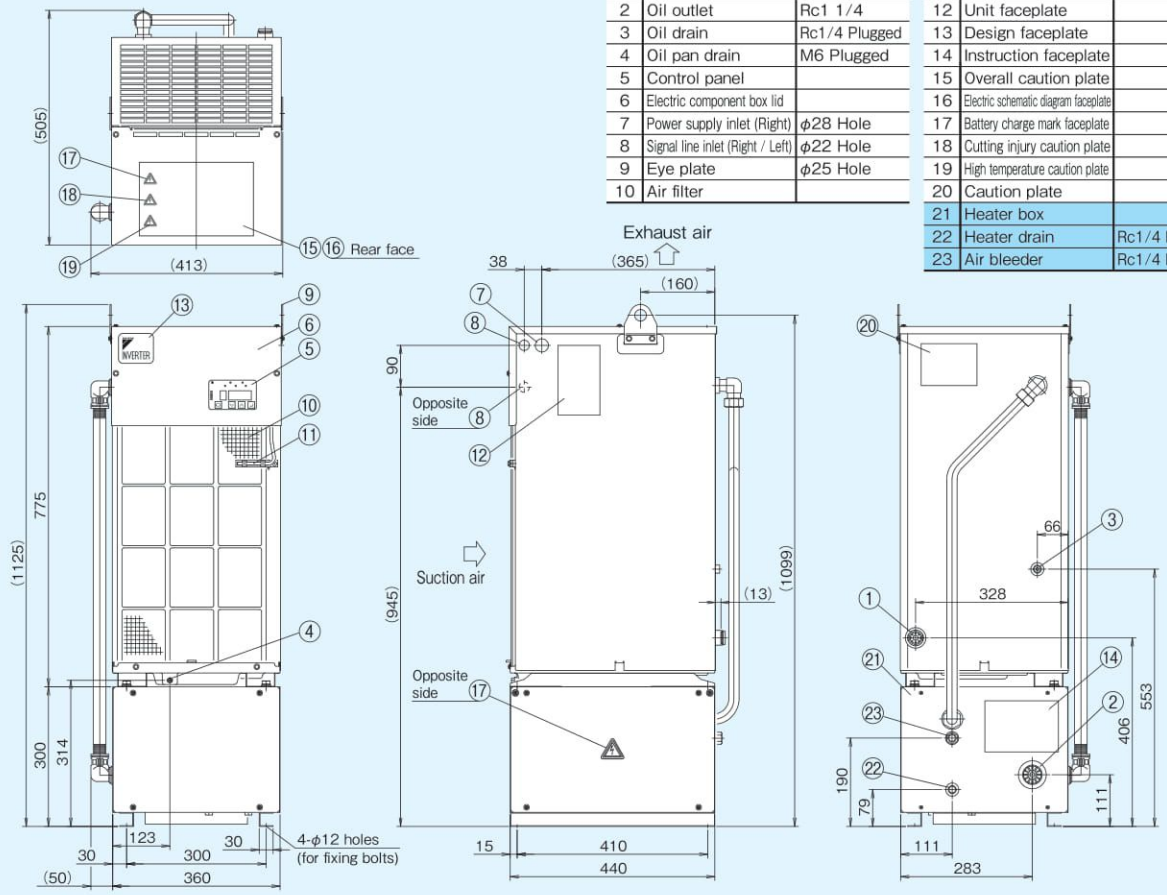


Part No.	Name	Description
1	Oil inlet	Rc3/4
2	Oil outlet	Rc3/4
3	Oil drain	Rc1/4 Plugged
4	Oil pan drain	M6 Plugged
5	Control panel	
6	Electric component box lid	
7	Power supply inlet (Right / Left)	ϕ28 Hole
8	Signal line inlet (Right / Left)	ϕ22 Hole
9	Eye plate	ϕ25 Hole

Part No.	Name	Description
10	Air filter	
11	Room temperature thermistor	
12	Unit faceplate	
13	Design faceplate	
14	Instruction faceplate	
15	Overall caution plate	
16	Electric schematic diagram faceplate	
17	Battery charge mark faceplate	
18	Cutting injury caution plate	
19	High temperature caution plate	
20	Caution plate	

AKZ329-H

With heater



Part No.	Name	Description
1	Oil inlet	Rc3/4
2	Oil outlet	Rc1 1/4
3	Oil drain	Rc1/4 Plugged
4	Oil pan drain	M6 Plugged
5	Control panel	
6	Electric component box lid	
7	Power supply inlet (Right)	ϕ28 Hole
8	Signal line inlet (Right / Left)	ϕ22 Hole
9	Eye plate	ϕ25 Hole
10	Air filter	

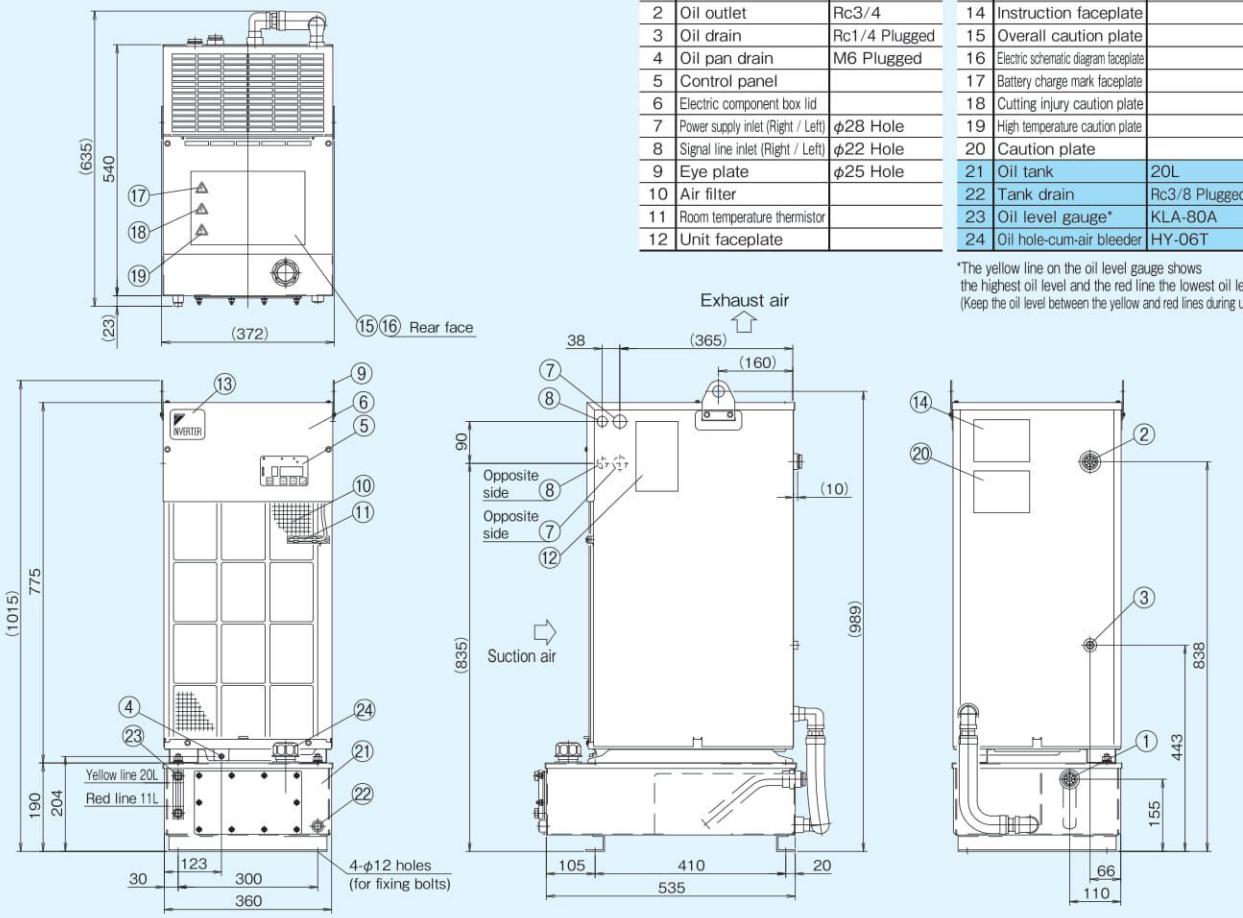
Part No.	Name	Description
11	Room temperature thermistor	
12	Unit faceplate	
13	Design faceplate	
14	Instruction faceplate	
15	Overall caution plate	
16	Electric schematic diagram faceplate	
17	Battery charge mark faceplate	
18	Cutting injury caution plate	
19	High temperature caution plate	
20	Caution plate	
21	Heater box	
22	Heater drain	Rc1/4 Plugged
23	Air bleeder	Rc1/4 Plugged

AKZ329-T With tank

Part No.	Name	Description
1	Oil inlet	Rc3/4
2	Oil outlet	Rc3/4
3	Oil drain	Rc1/4 Plugged
4	Oil pan drain	M6 Plugged
5	Control panel	
6	Electric component box lid	
7	Power supply inlet (Right / Left)	ϕ28 Hole
8	Signal line inlet (Right / Left)	ϕ22 Hole
9	Eye plate	ϕ25 Hole
10	Air filter	
11	Room temperature thermistor	
12	Unit faceplate	

Part No.	Name	Description
13	Design faceplate	
14	Instruction faceplate	
15	Overall caution plate	
16	Electric schematic diagram faceplate	
17	Battery charge mark faceplate	
18	Cutting injury caution plate	
19	High temperature caution plate	
20	Caution plate	
21	Oil tank	20L
22	Tank drain	Rc3/8 Plugged
23	Oil level gauge*	KLA-80A
24	Oil hole-cum-air bleeder	HY-06T

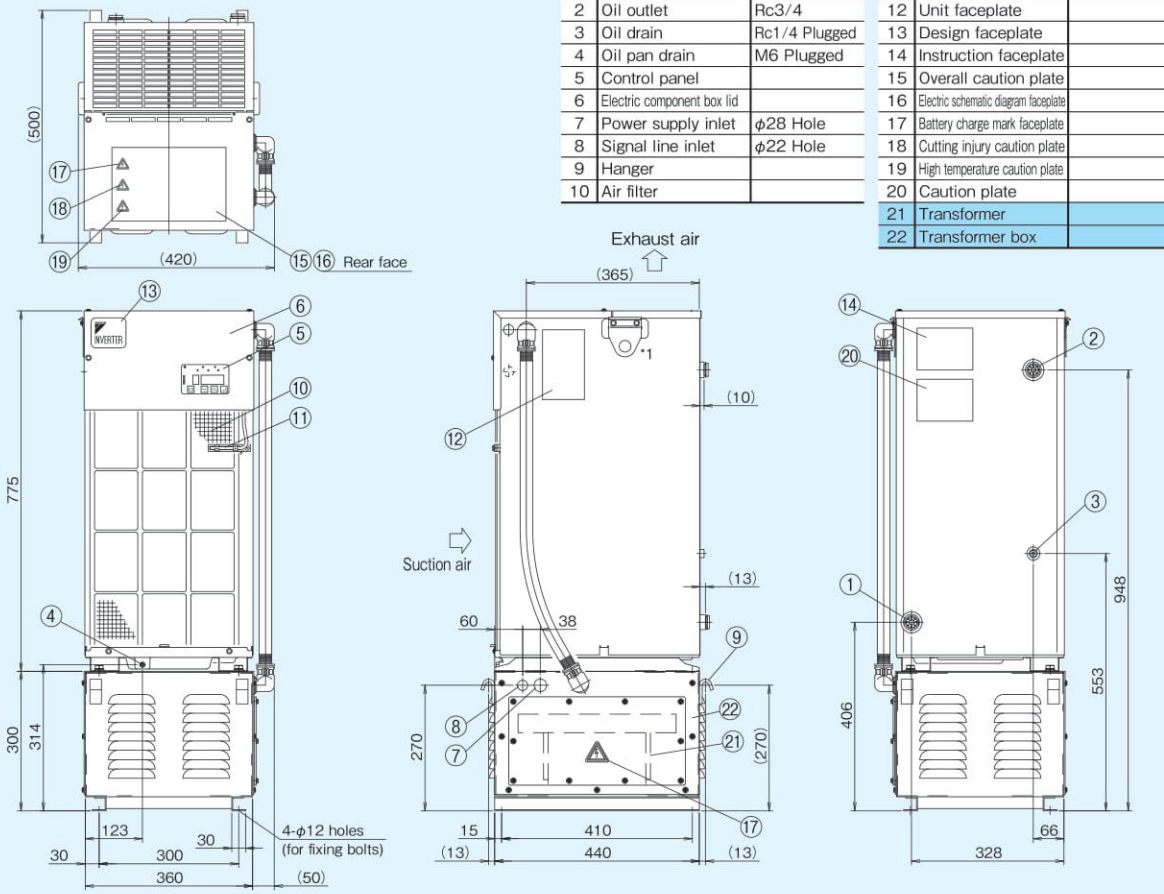
*The yellow line on the oil level gauge shows the highest oil level and the red line the lowest oil level. (Keep the oil level between the yellow and red lines during use.)



AKZ329-047,-048 Different voltages (With transformer)

Part No.	Name	Description
1	Oil inlet	Rc3/4
2	Oil outlet	Rc3/4
3	Oil drain	Rc1/4 Plugged
4	Oil pan drain	M6 Plugged
5	Control panel	
6	Electric component box lid	
7	Power supply inlet	ϕ28 Hole
8	Signal line inlet	ϕ22 Hole
9	Hanger	
10	Air filter	

Part No.	Name	Description
11	Room temperature thermistor	
12	Unit faceplate	
13	Design faceplate	
14	Instruction faceplate	
15	Overall caution plate	
16	Electric schematic diagram faceplate	
17	Battery charge mark faceplate	
18	Cutting injury caution plate	
19	High temperature caution plate	
20	Caution plate	
21	Transformer	
22	Transformer box	



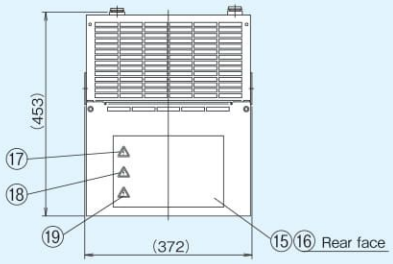
Note) *1. The hanging fitting is located below. Do not use this fitting for hanging.

Note) Refer to Page 5 for more details.

The positions of the fixing bolt holes are compatible with the AKZ 8 series, but the positions of the oil outlet/inlet and the power supply/signal cable inlet ports are not.

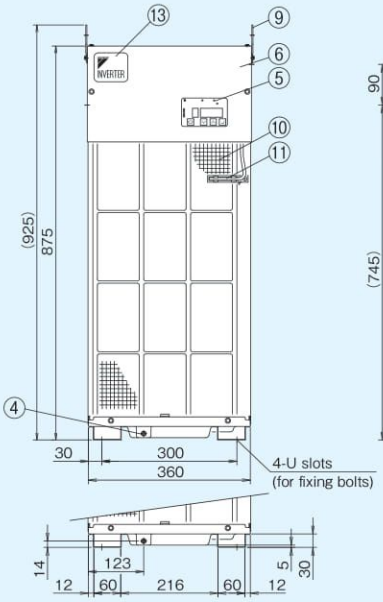
AKZ439(-B,-C,-046)

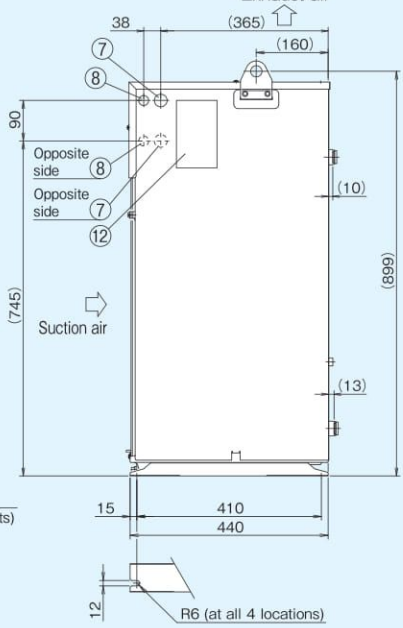
Standard specifications | With breaker | Compliance with CE | Different voltages (without transformer)

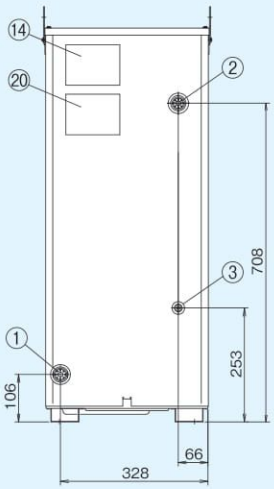


Part No.	Name	Description
1	Oil inlet	Rc3/4
2	Oil outlet	Rc3/4
3	Oil drain	Rc1/4 Plugged
4	Oil pan drain	M6 Plugged
5	Control panel	
6	Electric component box lid	
7	Power supply inlet (Right / Left)	ϕ28 Hole
8	Signal line inlet (Right / Left)	ϕ22 Hole
9	Eye plate	ϕ25 Hole

Part No.	Name	Description
10	Air filter	
11	Room temperature thermistor	
12	Unit faceplate	
13	Design faceplate	
14	Instruction faceplate	
15	Overall caution plate	
16	Electric schematic diagram faceplate	
17	Battery charge mark faceplate	
18	Cutting injury caution plate	
19	High temperature caution plate	
20	Caution plate	





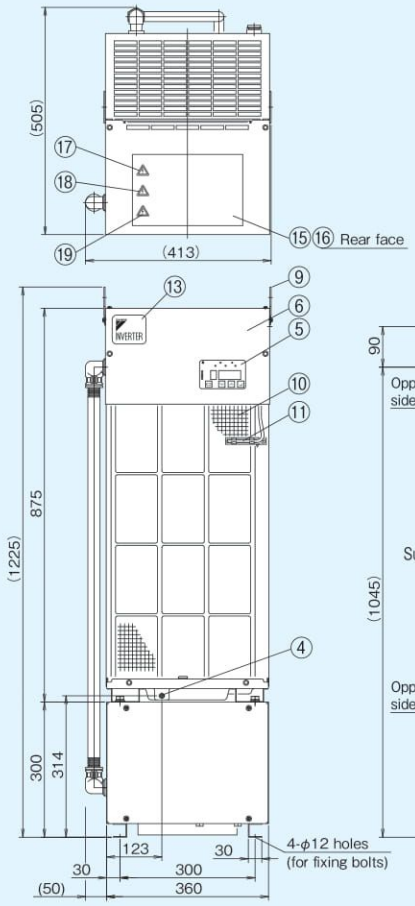


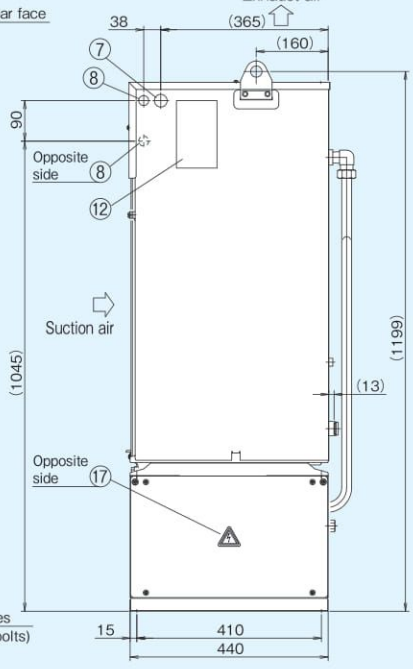
AKZ439-H

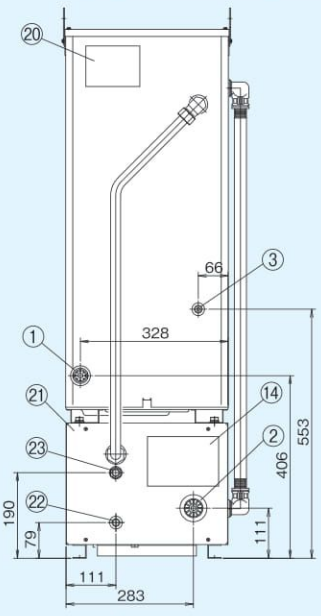
With heater

Part No.	Name	Description
1	Oil inlet	Rc3/4
2	Oil outlet	Rc1 1/4
3	Oil drain	Rc1/4 Plugged
4	Oil pan drain	M6 Plugged
5	Control panel	
6	Electric component box lid	
7	Power supply inlet (Right)	ϕ28 Hole
8	Signal line inlet (Right / Left)	ϕ22 Hole
9	Eye plate	ϕ25 Hole
10	Air filter	

Part No.	Name	Description
11	Room temperature thermistor	
12	Unit faceplate	
13	Design faceplate	
14	Instruction faceplate	
15	Overall caution plate	
16	Electric schematic diagram faceplate	
17	Battery charge mark faceplate	
18	Cutting injury caution plate	
19	High temperature caution plate	
20	Caution plate	
21	Heater box	
22	Heater drain	Rc1/4 Plugged
23	Air bleeder	Rc1/4 Plugged





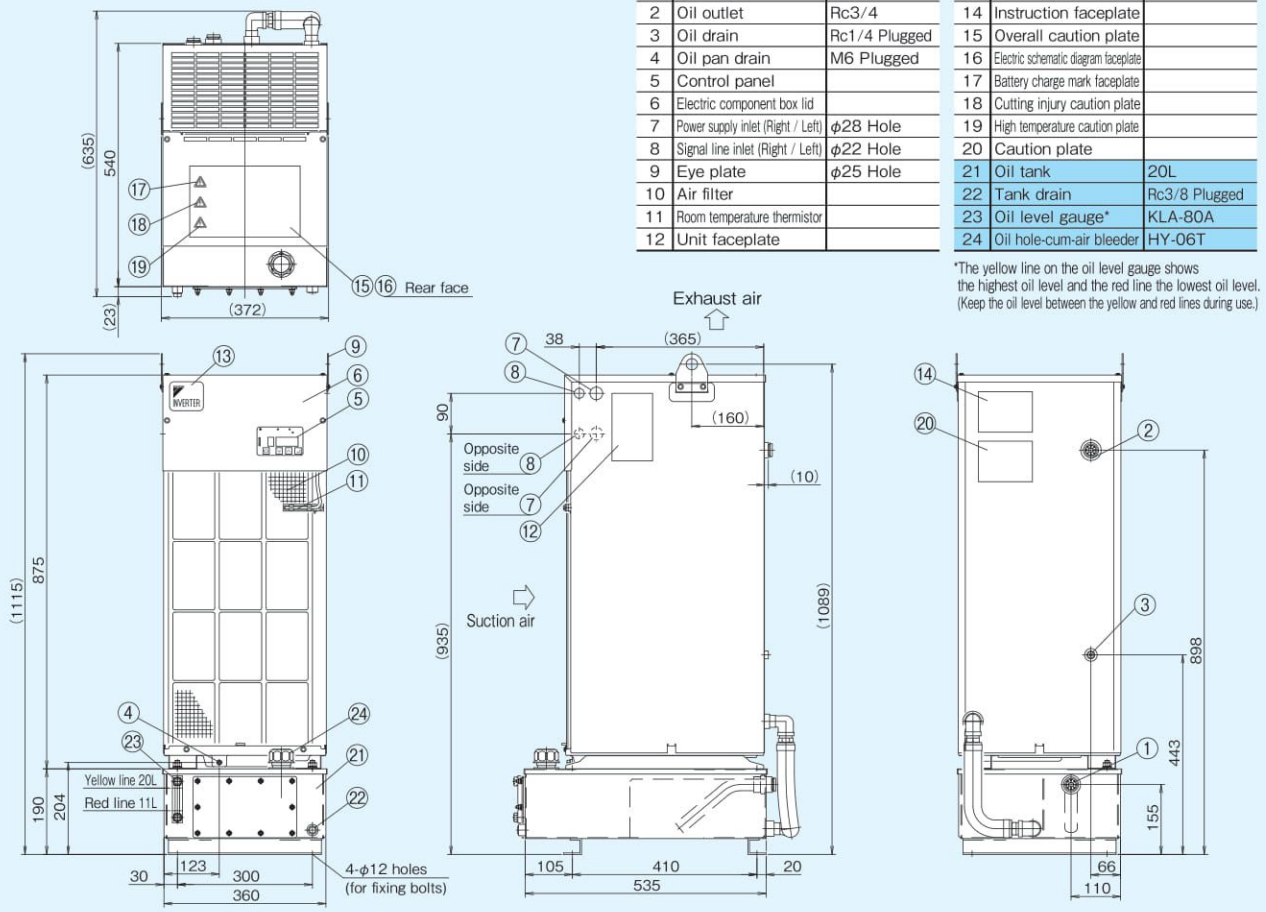


AKZ439-T With tank

Part No.	Name	Description
1	Oil inlet	Rc3/4
2	Oil outlet	Rc3/4
3	Oil drain	Rc1/4 Plugged
4	Oil pan drain	M6 Plugged
5	Control panel	
6	Electric component box lid	
7	Power supply inlet (Right / Left)	ϕ28 Hole
8	Signal line inlet (Right / Left)	ϕ22 Hole
9	Eye plate	ϕ25 Hole
10	Air filter	
11	Room temperature thermistor	
12	Unit faceplate	

Part No.	Name	Description
13	Design faceplate	
14	Instruction faceplate	
15	Overall caution plate	
16	Electric schematic diagram faceplate	
17	Battery charge mark faceplate	
18	Cutting injury caution plate	
19	High temperature caution plate	
20	Caution plate	
21	Oil tank	20L
22	Tank drain	Rc3/8 Plugged
23	Oil level gauge*	KLA-80A
24	Oil hole-cum-air bleeder	HY-06T

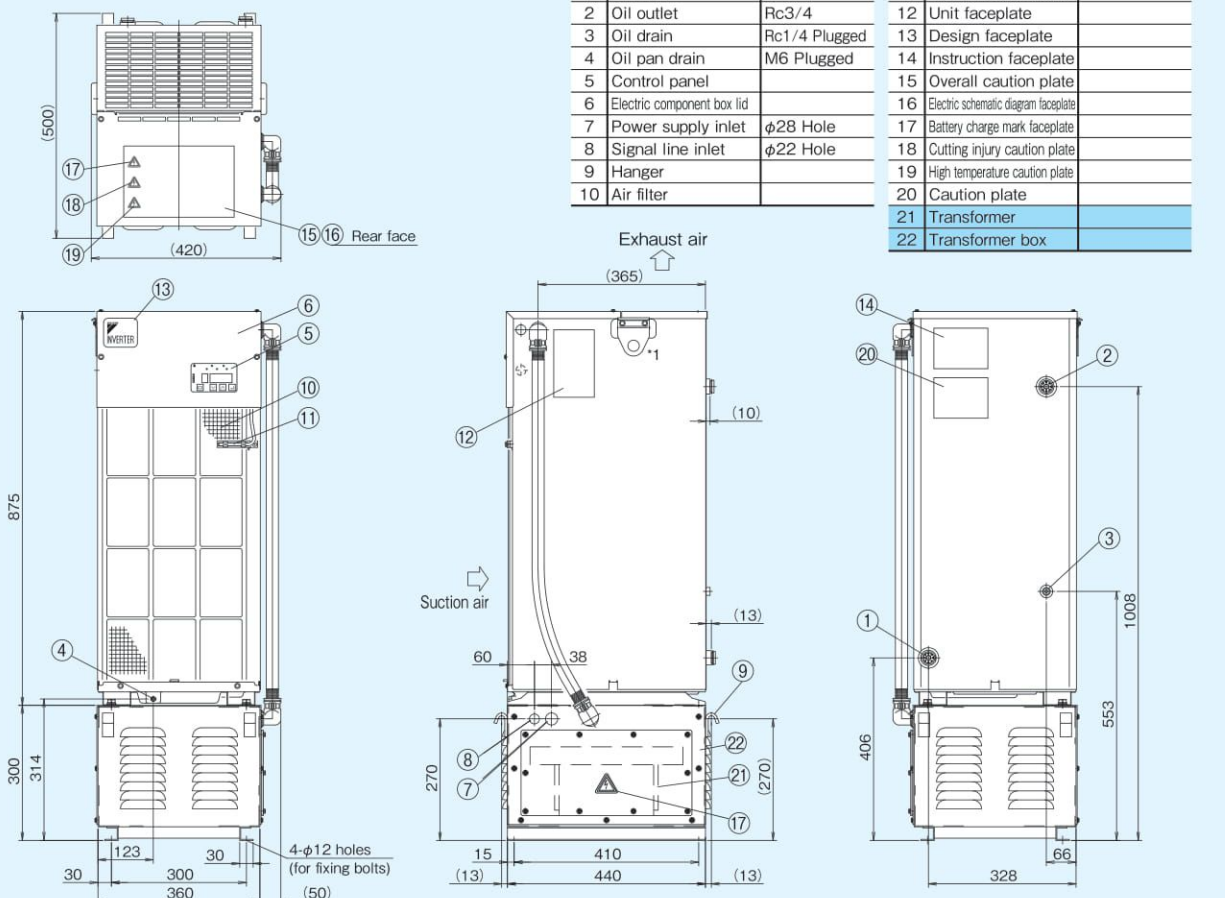
*The yellow line on the oil level gauge shows the highest oil level and the red line the lowest oil level. (Keep the oil level between the yellow and red lines during use.)



AKZ439-047,-048 Different voltages (With transformer)

Part No.	Name	Description
1	Oil inlet	Rc3/4
2	Oil outlet	Rc3/4
3	Oil drain	Rc1/4 Plugged
4	Oil pan drain	M6 Plugged
5	Control panel	
6	Electric component box lid	
7	Power supply inlet	ϕ28 Hole
8	Signal line inlet	ϕ22 Hole
9	Hanger	
10	Air filter	

Part No.	Name	Description
11	Room temperature thermistor	
12	Unit faceplate	
13	Design faceplate	
14	Instruction faceplate	
15	Overall caution plate	
16	Electric schematic diagram faceplate	
17	Battery charge mark faceplate	
18	Cutting injury caution plate	
19	High temperature caution plate	
20	Caution plate	
21	Transformer	
22	Transformer box	



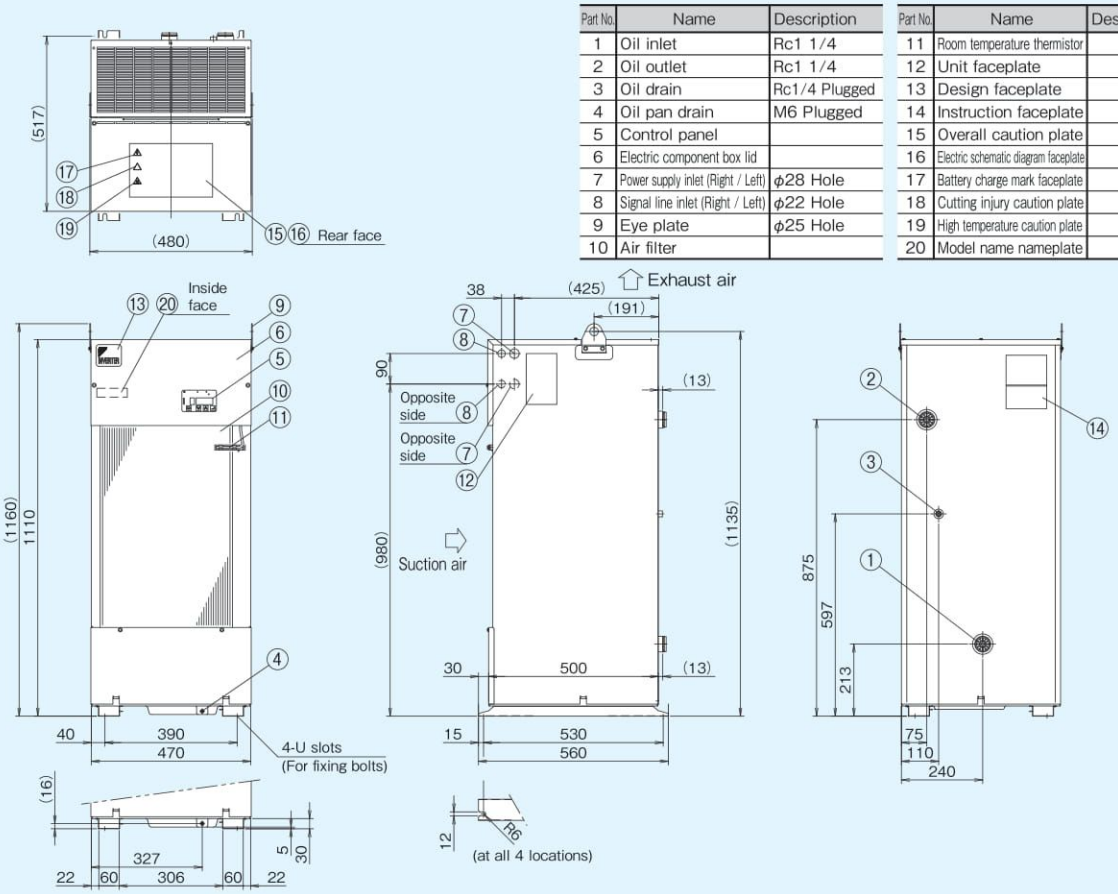
Note) *1. The hanging fitting is located below. Do not use this fitting for hanging.

Note) Refer to Page 6 for more details.

The positions of the fixing bolt holes and the oil outlet/inlet ports are compatible with the AKZ 8 series, but the positions of the power supply/signal cable inlet ports are not.

AKZ569 (-B,-C,-046)

Standard specifications | With breaker | Compliance with CE | Different voltages (without transformer)

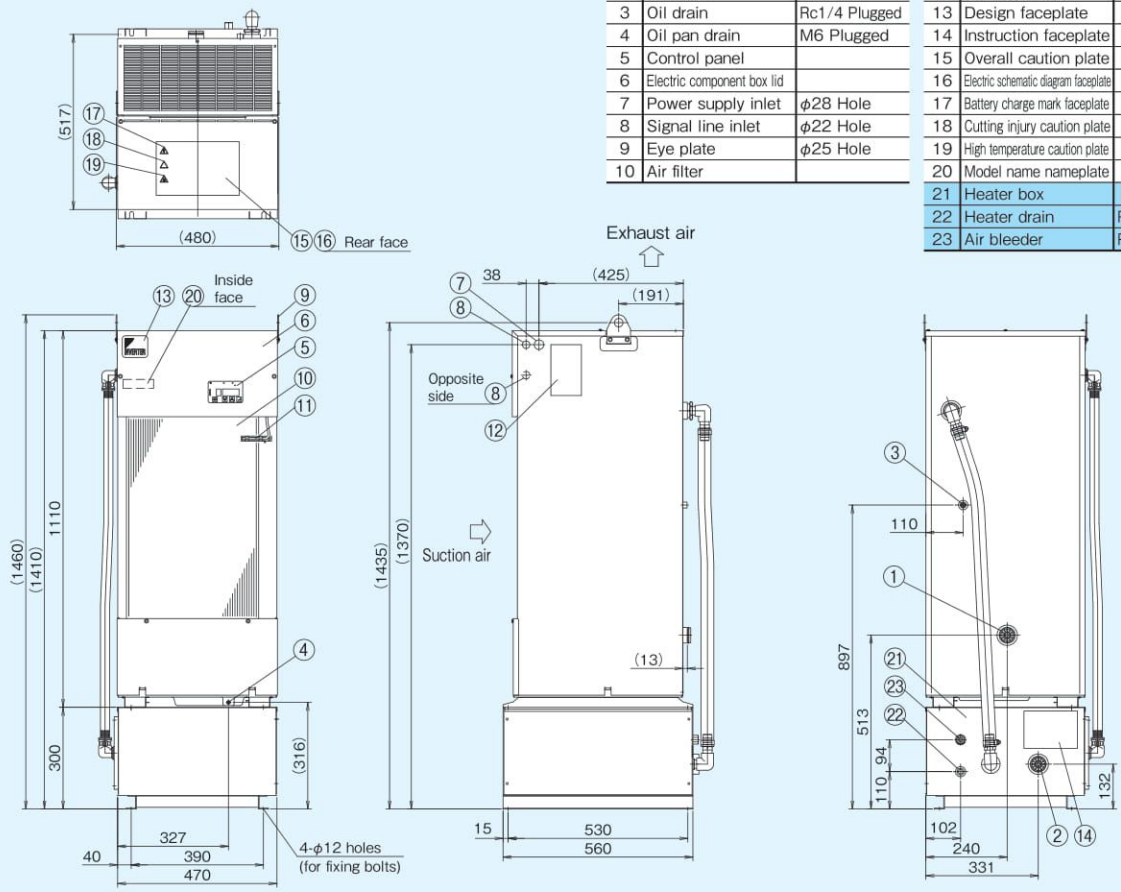


Part No.	Name	Description
1	Oil inlet	Rc1 1/4
2	Oil outlet	Rc1 1/4
3	Oil drain	Rc1/4 Plugged
4	Oil pan drain	M6 Plugged
5	Control panel	
6	Electric component box lid	
7	Power supply inlet (Right / Left)	ϕ28 Hole
8	Signal line inlet (Right / Left)	ϕ22 Hole
9	Eye plate	ϕ25 Hole
10	Air filter	

Part No.	Name	Description
11	Room temperature thermistor	
12	Unit faceplate	
13	Design faceplate	
14	Instruction faceplate	
15	Overall caution plate	
16	Electric schematic diagram faceplate	
17	Battery charge mark faceplate	
18	Cutting injury caution plate	
19	High temperature caution plate	
20	Model name nameplate	

AKZ569-H

With heater



Part No.	Name	Description
1	Oil inlet	Rc1 1/4
2	Oil outlet	Rc1 1/4
3	Oil drain	Rc1/4 Plugged
4	Oil pan drain	M6 Plugged
5	Control panel	
6	Electric component box lid	
7	Power supply inlet	ϕ28 Hole
8	Signal line inlet	ϕ22 Hole
9	Eye plate	ϕ25 Hole
10	Air filter	

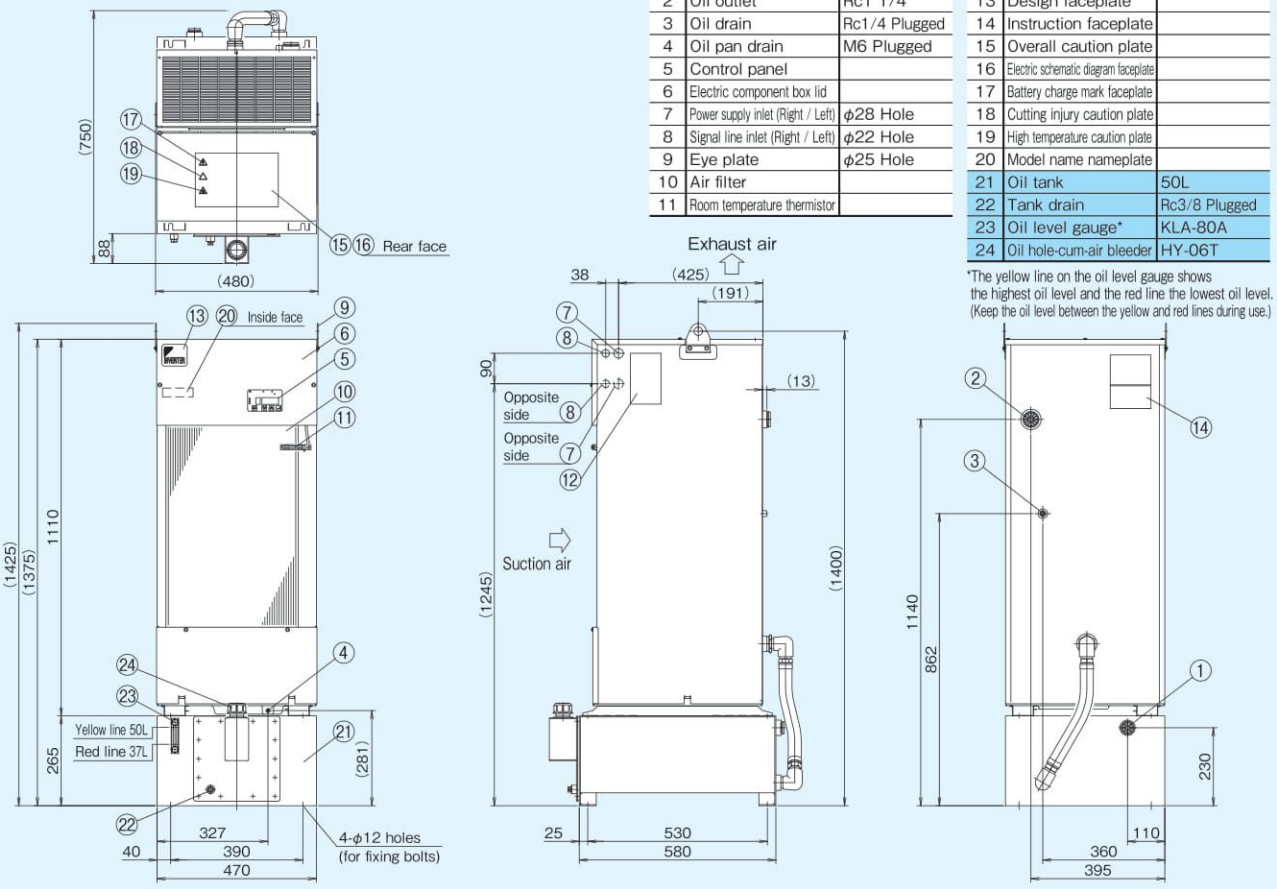
Part No.	Name	Description
11	Room temperature thermistor	
12	Unit faceplate	
13	Design faceplate	
14	Instruction faceplate	
15	Overall caution plate	
16	Electric schematic diagram faceplate	
17	Battery charge mark faceplate	
18	Cutting injury caution plate	
19	High temperature caution plate	
20	Model name nameplate	
21	Heater box	
22	Heater drain	Rc1/4 Plugged
23	Air bleeder	Rc1/4 Plugged

AKZ569-T With tank

Part No.	Name	Description
1	Oil inlet	Rc1
2	Oil outlet	Rc1 1/4
3	Oil drain	Rc1/4 Plugged
4	Oil pan drain	M6 Plugged
5	Control panel	
6	Electric component box lid	
7	Power supply inlet (Right / Left)	ϕ28 Hole
8	Signal line inlet (Right / Left)	ϕ22 Hole
9	Eye plate	ϕ25 Hole
10	Air filter	
11	Room temperature thermistor	

Part No.	Name	Description
12	Unit faceplate	
13	Design faceplate	
14	Instruction faceplate	
15	Overall caution plate	
16	Electric schematic diagram faceplate	
17	Battery charge mark faceplate	
18	Cutting injury caution plate	
19	High temperature caution plate	
20	Model name nameplate	
21	Oil tank	50L
22	Tank drain	Rc3/8 Plugged
23	Oil level gauge*	KLA-80A
24	Oil hole-cum-air bleeder	HY-06T

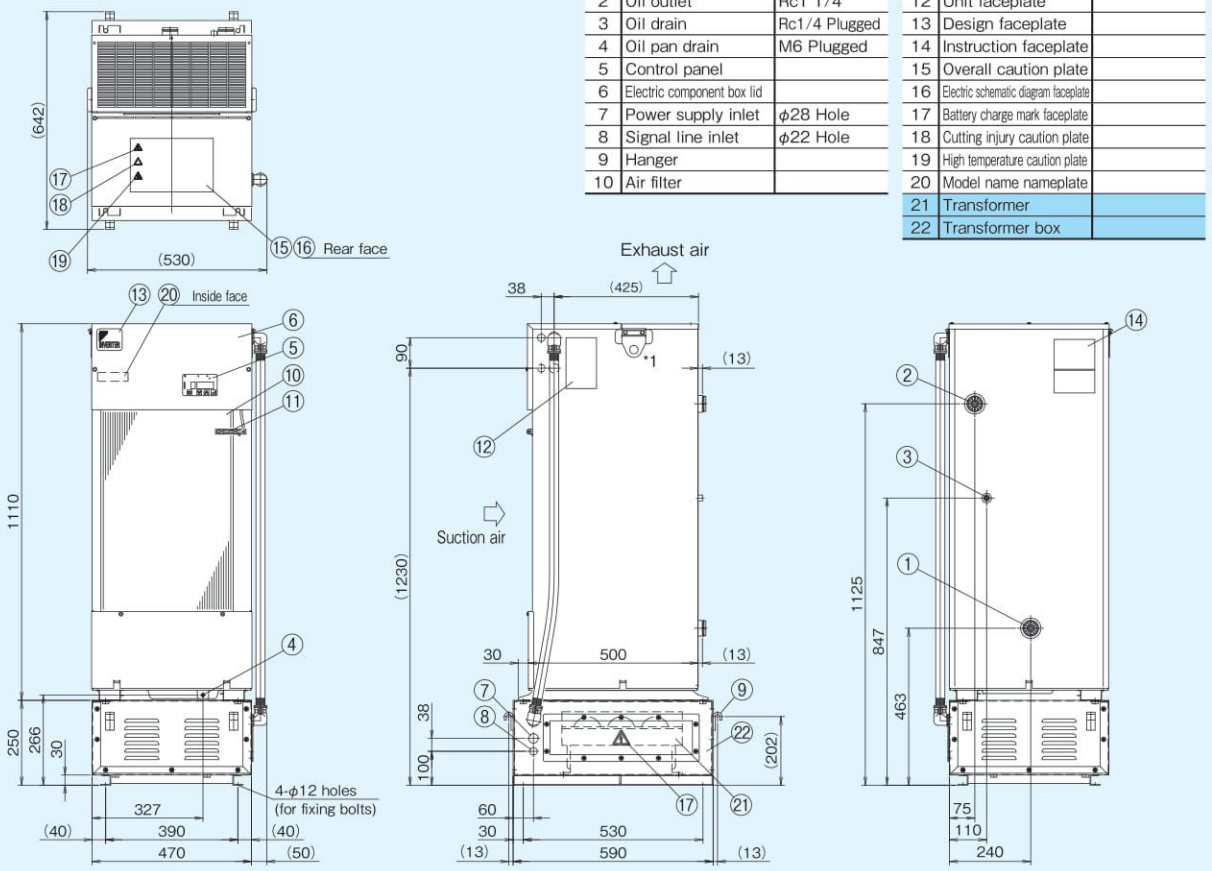
*The yellow line on the oil level gauge shows the highest oil level and the red line the lowest oil level. (Keep the oil level between the yellow and red lines during use.)



AKZ569-047,-048 Different voltages (With transformer)

Part No.	Name	Description
1	Oil inlet	Rc1 1/4
2	Oil outlet	Rc1 1/4
3	Oil drain	Rc1/4 Plugged
4	Oil pan drain	M6 Plugged
5	Control panel	
6	Electric component box lid	
7	Power supply inlet	ϕ28 Hole
8	Signal line inlet	ϕ22 Hole
9	Hanger	
10	Air filter	

Part No.	Name	Description
11	Room temperature thermistor	
12	Unit faceplate	
13	Design faceplate	
14	Instruction faceplate	
15	Overall caution plate	
16	Electric schematic diagram faceplate	
17	Battery charge mark faceplate	
18	Cutting injury caution plate	
19	High temperature caution plate	
20	Model name nameplate	
21	Transformer	
22	Transformer box	



Note) *1. The hanging fitting is located below. Do not use this fitting for hanging.

Note) Refer to Page 6 for more details.

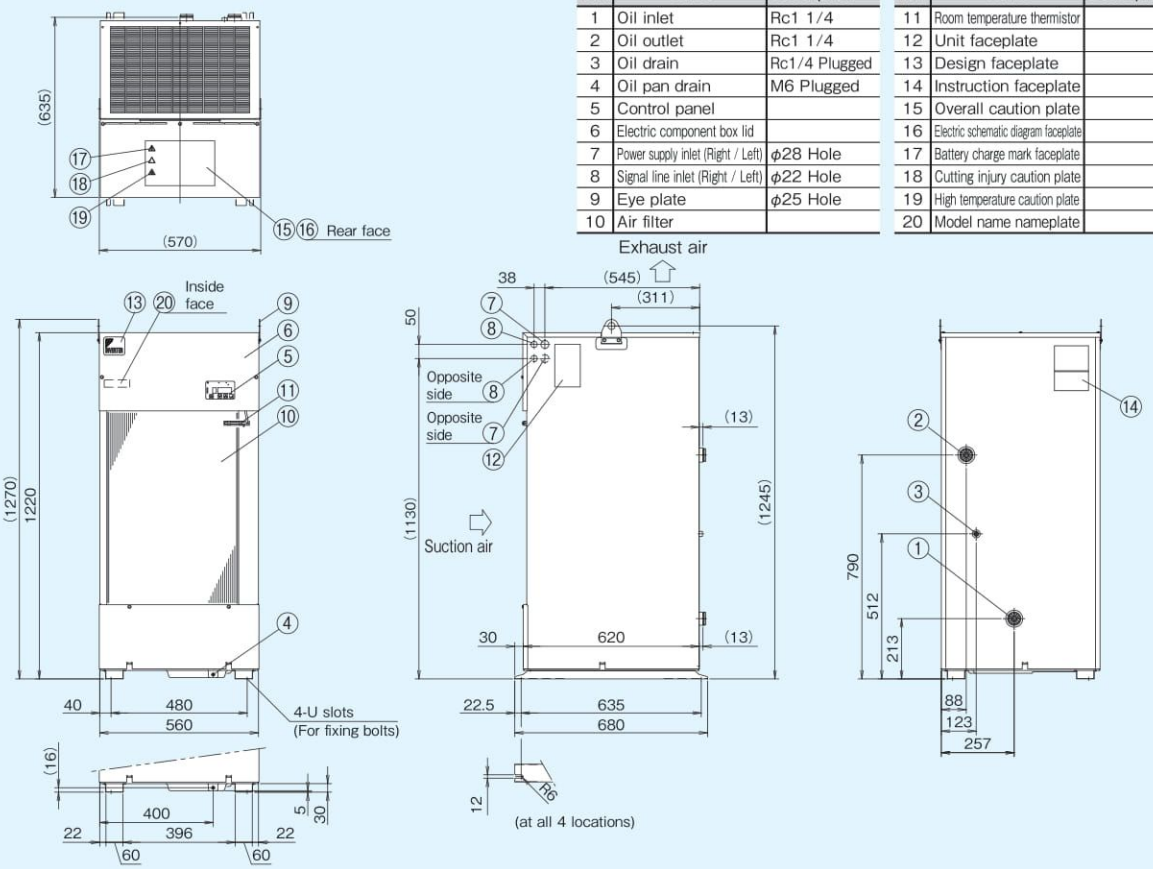
The positions of the fixing bolt holes and the oil outlet/inlet ports are compatible with the AKZ 8 series, but the positions of the power supply/signal cable inlet ports are not.

AKZ909(-B,-C,-046)

Standard specifications | With breaker | Compliance with CE | Different voltages (without transformer)

Part No.	Name	Description
1	Oil inlet	Rc1 1/4
2	Oil outlet	Rc1 1/4
3	Oil drain	Rc1/4 Plugged
4	Oil pan drain	M6 Plugged
5	Control panel	
6	Electric component box lid	
7	Power supply inlet (Right / Left)	ϕ28 Hole
8	Signal line inlet (Right / Left)	ϕ22 Hole
9	Eye plate	ϕ25 Hole
10	Air filter	

Part No.	Name	Description
11	Room temperature thermistor	
12	Unit faceplate	
13	Design faceplate	
14	Instruction faceplate	
15	Overall caution plate	
16	Electric schematic diagram faceplate	
17	Battery charge mark faceplate	
18	Cutting injury caution plate	
19	High temperature caution plate	
20	Model name nameplate	

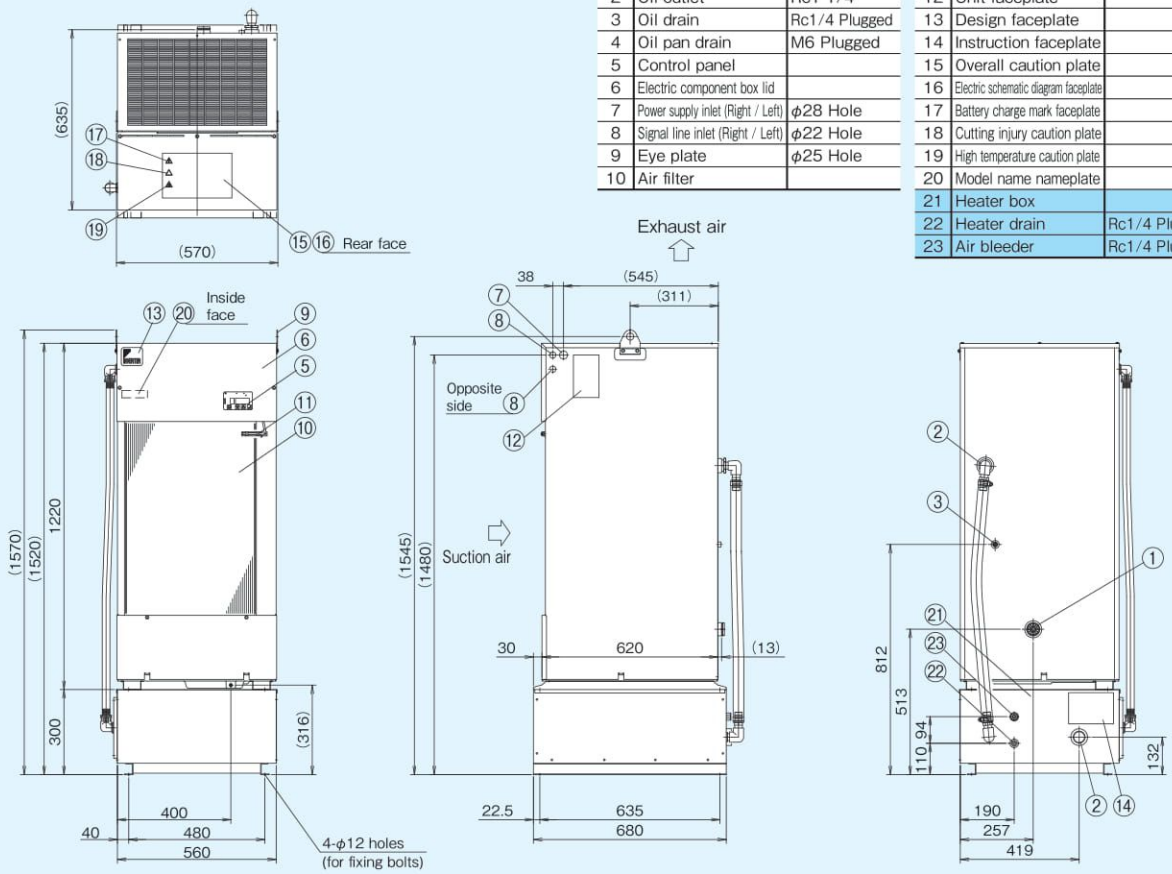


AKZ909-H

With heater

Part No.	Name	Description
1	Oil inlet	Rc1 1/4
2	Oil outlet	Rc1 1/4
3	Oil drain	Rc1/4 Plugged
4	Oil pan drain	M6 Plugged
5	Control panel	
6	Electric component box lid	
7	Power supply inlet (Right / Left)	ϕ28 Hole
8	Signal line inlet (Right / Left)	ϕ22 Hole
9	Eye plate	ϕ25 Hole
10	Air filter	

Part No.	Name	Description
11	Room temperature thermistor	
12	Unit faceplate	
13	Design faceplate	
14	Instruction faceplate	
15	Overall caution plate	
16	Electric schematic diagram faceplate	
17	Battery charge mark faceplate	
18	Cutting injury caution plate	
19	High temperature caution plate	
20	Model name nameplate	
21	Heater box	
22	Heater drain	Rc1/4 Plugged
23	Air bleeder	Rc1/4 Plugged

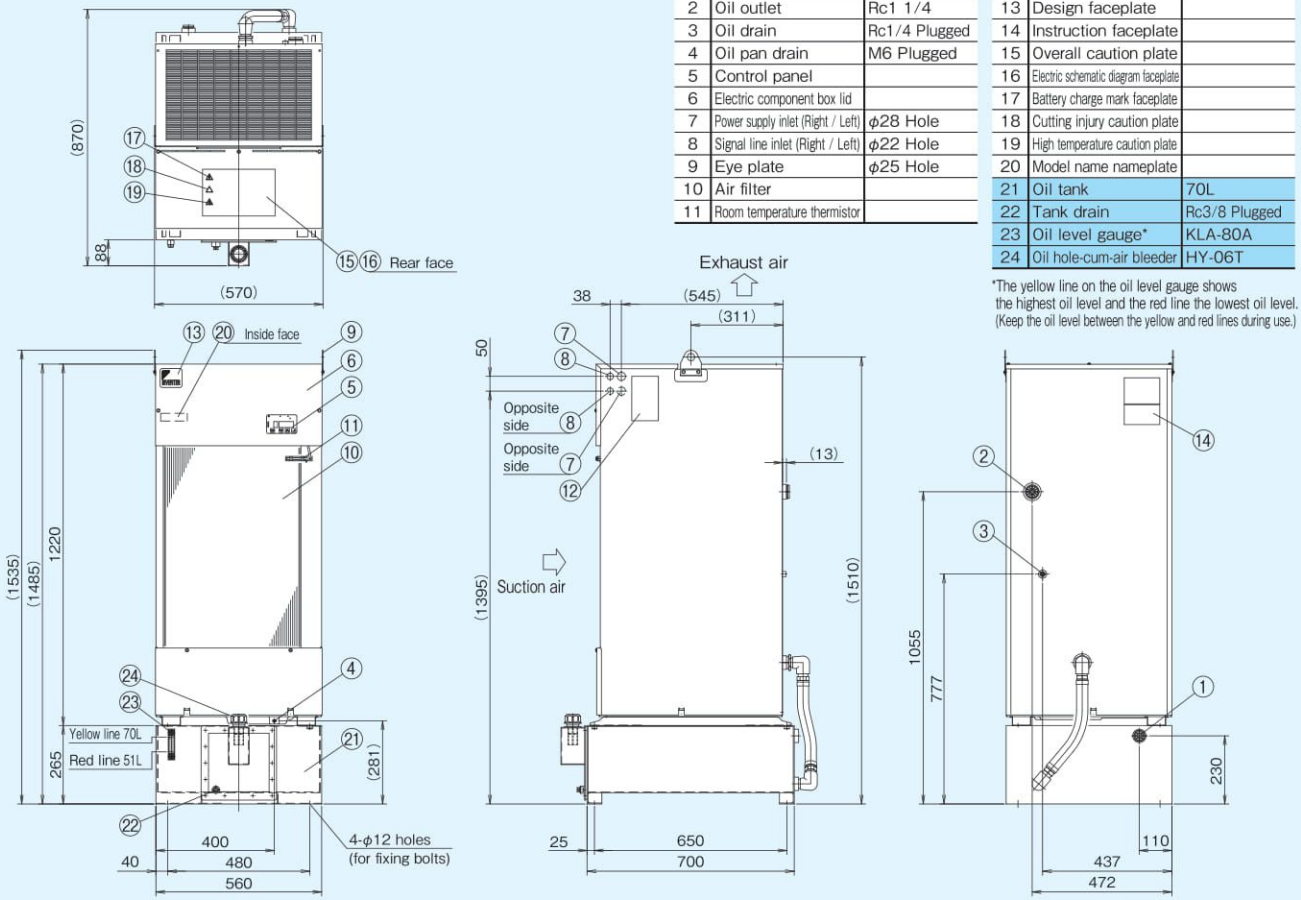


AKZ909-T With tank

Part No.	Name	Description
1	Oil inlet	Rc1
2	Oil outlet	Rc1 1/4
3	Oil drain	Rc1/4 Plugged
4	Oil pan drain	M6 Plugged
5	Control panel	
6	Electric component box lid	
7	Power supply inlet (Right / Left)	ϕ28 Hole
8	Signal line inlet (Right / Left)	ϕ22 Hole
9	Eye plate	ϕ25 Hole
10	Air filter	
11	Room temperature thermistor	

Part No.	Name	Description
12	Unit faceplate	
13	Design faceplate	
14	Instruction faceplate	
15	Overall caution plate	
16	Electric schematic diagram faceplate	
17	Battery charge mark faceplate	
18	Cutting injury caution plate	
19	High temperature caution plate	
20	Model name nameplate	
21	Oil tank	70L
22	Tank drain	Rc3/8 Plugged
23	Oil level gauge*	KLA-80A
24	Oil hole-cum-air bleeder	HY-06T

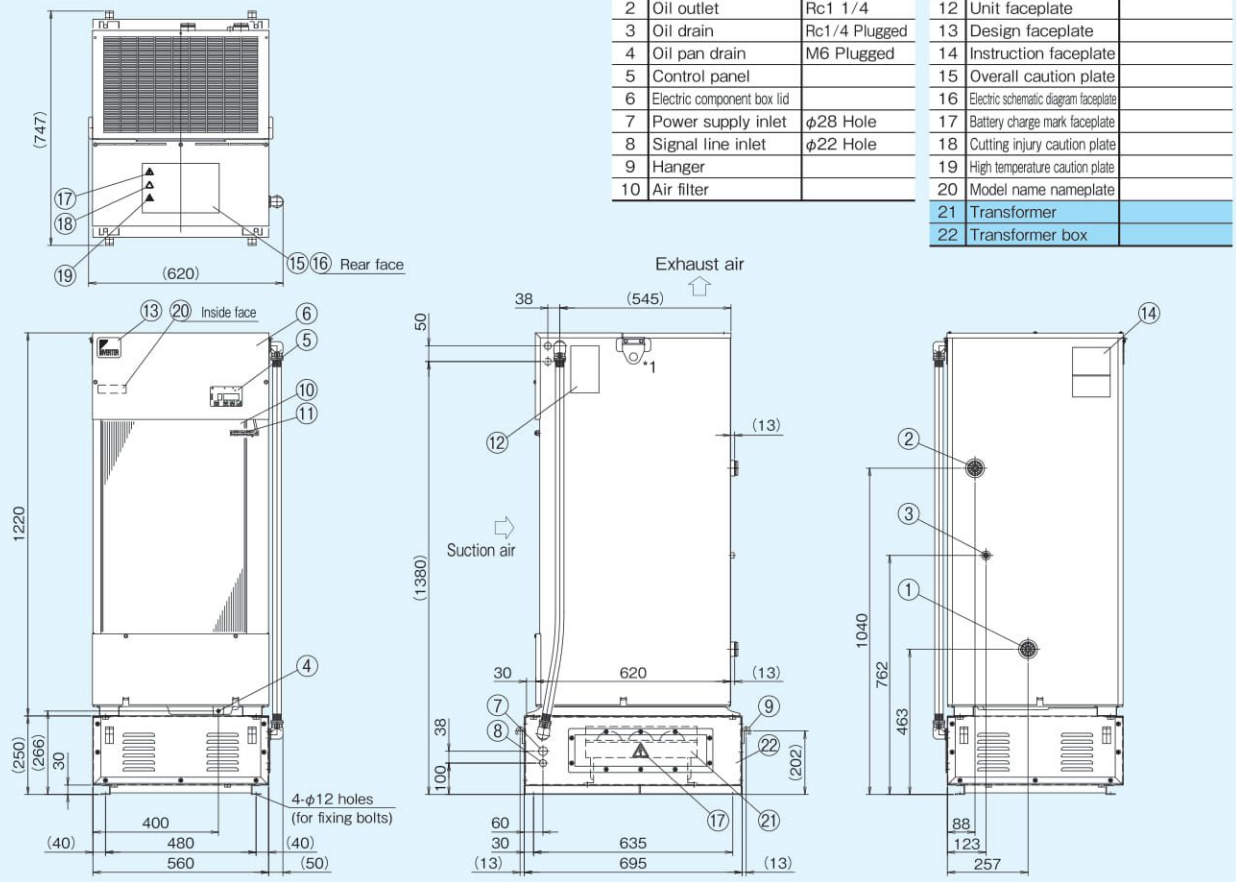
*The yellow line on the oil level gauge shows the highest oil level and the red line the lowest oil level. (Keep the oil level between the yellow and red lines during use.)



AKZ909-047,-048 Different voltages (With transformer)

Part No.	Name	Description
1	Oil inlet	Rc1 1/4
2	Oil outlet	Rc1 1/4
3	Oil drain	Rc1/4 Plugged
4	Oil pan drain	M6 Plugged
5	Control panel	
6	Electric component box lid	
7	Power supply inlet	ϕ28 Hole
8	Signal line inlet	ϕ22 Hole
9	Hanger	
10	Air filter	

Part No.	Name	Description
11	Room temperature thermistor	
12	Unit faceplate	
13	Design faceplate	
14	Instruction faceplate	
15	Overall caution plate	
16	Electric schematic diagram faceplate	
17	Battery charge mark faceplate	
18	Cutting injury caution plate	
19	High temperature caution plate	
20	Model name nameplate	
21	Transformer	
22	Transformer box	

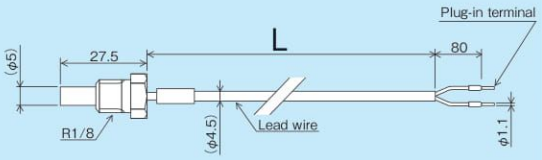
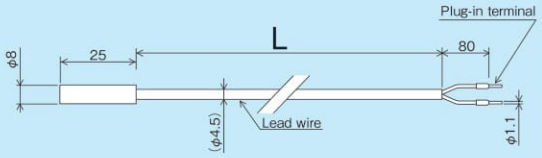
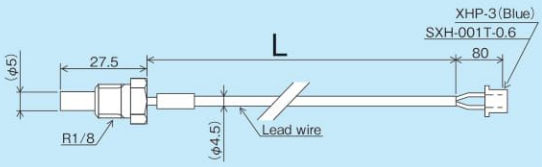


Note) *1. The hanging fitting is located below. Do not use this fitting for hanging.

Thermistor (Compatible with all types of Oil Cooling Unit 9 series)

■Thermistor models and applications

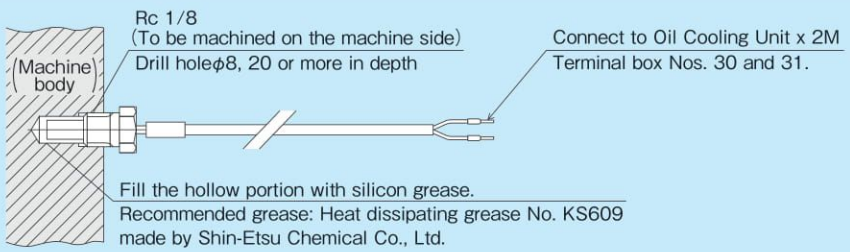
When this optional part is installed in the oil piping of the machine,
the thermistor detects the temperature to allow the control of oil temperature.

Name	Model	Length of lead wire L(m)	Shape	Application (To be installed) by you	Applicable model
Machine temperature synchronous thermistor	AKZ9-OP-K5	5m		For machine temperature synchronous control (Implanted in the machine body)	AKZ 9 Series
	AKZ9-OP-K10	10m			
	AKZ9-OP-K15	15m			
	AKZ9-OP-A5	5m		For machine temperature synchronous control (Attached to the surface of machine body)	
	AKZ9-OP-A10	10m			
Thermistor for oil temperature control	AKZ9-OP-Y5	5m		For return oil temperature control (Installed in oil tube of the machine)	
	AKZ9-OP-Y10	10m			

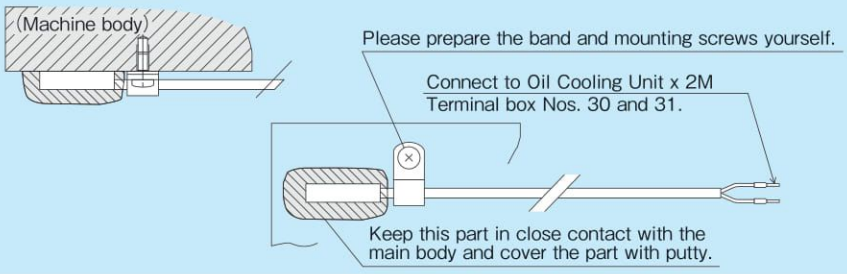
Thermistor characteristics: Resistance value ··· R25 (Resistance value at 25℃) = 20kΩ, Tolerance: ±3%

■Instruction for installation and connection

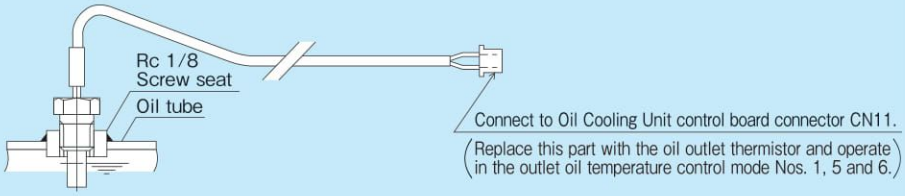
AKZ9-OP-K



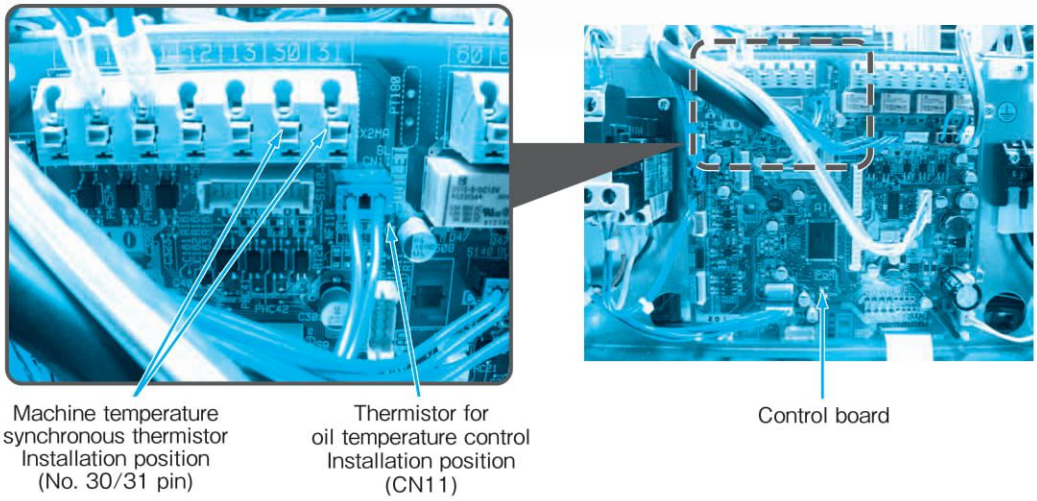
AKZ9-OP-A



AKZ9-OP-Y



■Installation positions of additional oil temperature control thermistor (machine body or others)



Optional communication board (serial communication board)

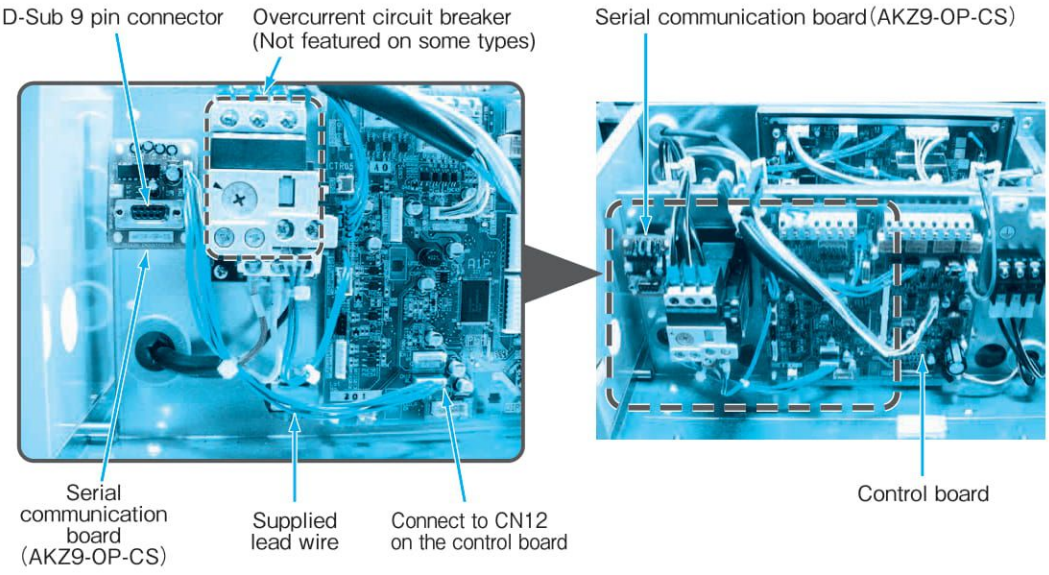
The following functions are enabled by mounting this option board on the Oil Cooling Unit and connecting it to the machine:

1. The operation mode and the operation setting can be changed from the machine side.
2. The alarm code and temperature data (machine temperature, room temperature, inlet oil temperature, outlet oil temperature, inlet and outlet differential temperature, inverter frequency) of Oil Cooling Unit can be read from the machine side.

Model	Communication method	Installation position	Applicable model	Specification sheet No.
AKZ9-OP-CS	Serial communication only (RS-232C)	Installation plate inside electric component box	AKZ149、AKZ329、AKZ439、AKZ569、AKZ909	PSP04664

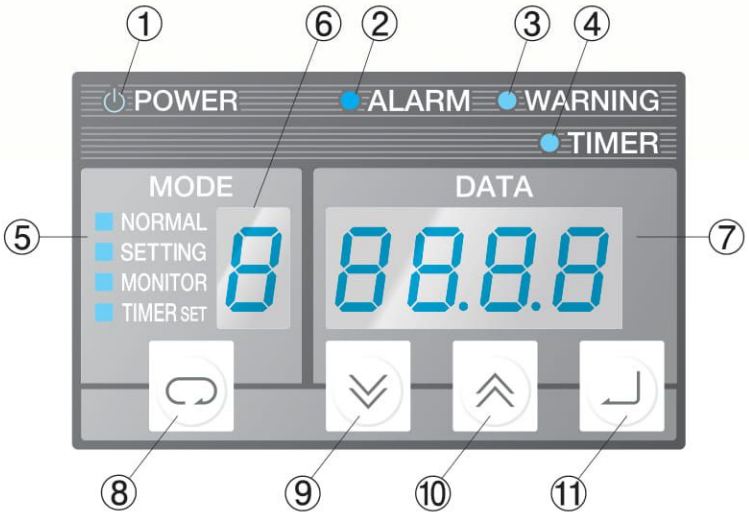
Note) 1. Refer to the specifications sheet for the communication procedure and specifications.
2. Modbus communication system would be possible as well soon.

■Installation position of the serial communication board



・Dimensions of communication board (W×H): 40×50
・The communication board is secured at four positions by locking support.

Parts names, functions and operation of control panel

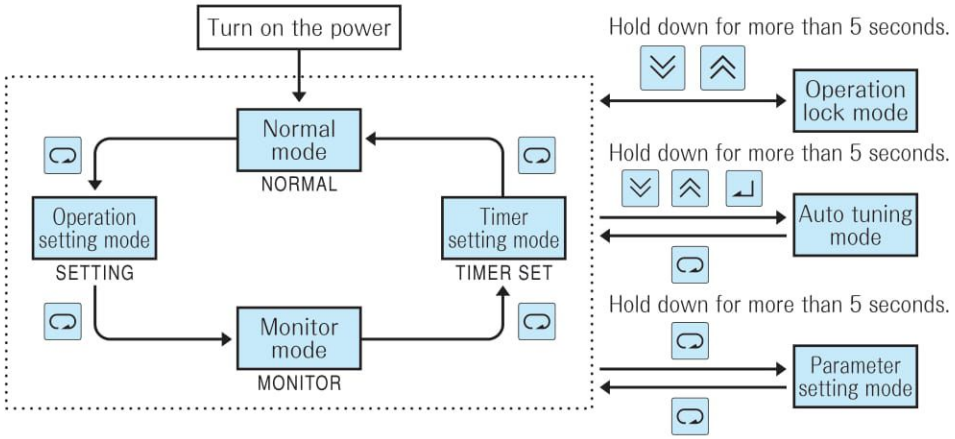


NO.	Item	Description
①	Power lamp (Green)	The lamp is turned on while power is supplied.
②	Error warning lamp (Red)	When an error occurs — Level 1 alarm: The lamp keeps blinking Level 2 alarm: The lamp is turned on
③	Warning lamp (Green)	When a warning occurs — Level 1 warning: The lamp keeps blinking. Level 2 warning: The lamp is turned on.
④	Timer mode lamp (Green)	The lamp keeps blinking while the unit is at a stop in the timer mode.
⑤	Operation mode display	Displays the mode of the control panel — NORMAL: Normal mode; MONITOR: Monitor mode; SETTING: Operation setting mode; TIMER SET: Timer setting mode
⑥	Operation mode / Data No. display	Displays the current operation mode (Normal mode, Operation setting mode) or data number of the data currently displayed on the data display.
⑦	Data display	Displays various data. The data displayed differs depending on the operation mode and data number.
⑧	[SELECT] key	Selects the operation mode.
⑨	[DOWN] key	Decrements the value of the operation mode, data number and data by 1. When held for two seconds or longer, decrements the values by 10.
⑩	[UP] key	Increments the value of the operation mode, data number and data by 1. When held for two seconds or longer, increments the values by 10.
⑪	[ENT] (Determine) key	Determines the operation mode, data number, and data to be changed.

■Operation for change to each mode

A mode can be changed by operating the ↻ key in general.

To enter a special mode, hold down a number of keys in combination for more than 5 seconds.



⚠ CAUTION

- The default setting is "Operation lock mode".
  To start operation, perform the unlocking operation as shown above.
- The default setting for operation on the standard unit is:
  Operation mode: 3 (Inlet oil temperature control, room temperature synchronization control)
  Differential temperature: 0.0 (K)

Supplement information

Operation mode and setting method

AKZ 9 Series

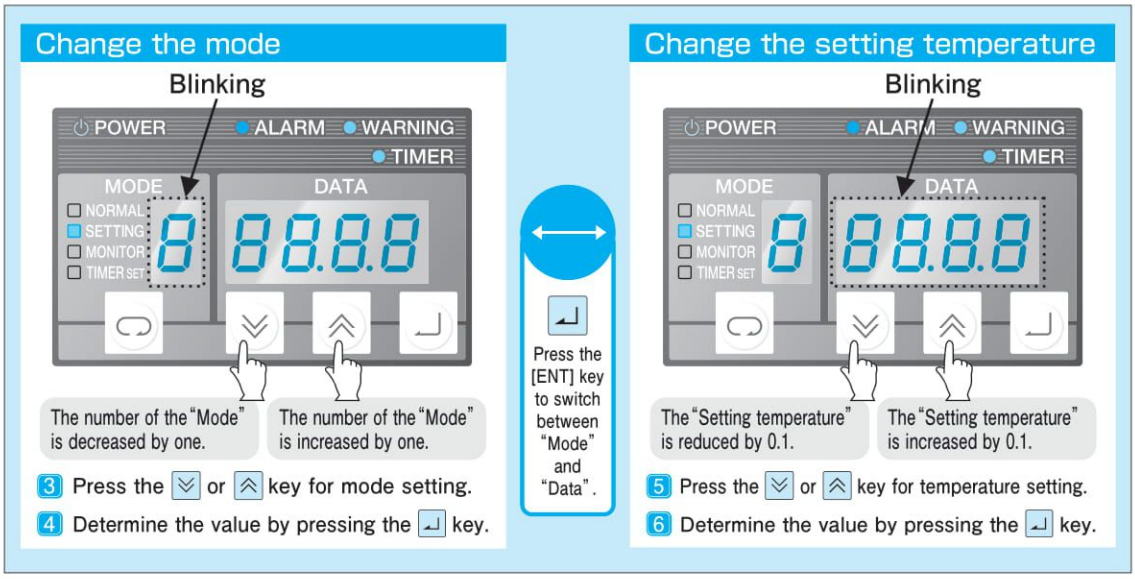
Mode No.	Mode name	Description	Setting temperature range	Necessary optional part
Mode 0	Inlet oil temperature, fixed temperature control	Keep the inlet oil temperature at the setting temperature within the range specified in the right column.	5~50℃	
Mode 1	Outlet oil temperature or return oil temperature control Fixed temperature control	Keep the outlet oil temperature or return oil temperature at the setting temperature within the range specified in the right column.	5~50℃	Oil temperature control thermistor (When return oil temperature is controlled)
Mode 3	Inlet oil temperature, room temperature synchronous control	Keep the inlet oil temperature at the setting temperature within the range specified in the right column.	Between Room temperature -9.9℃ and Room temperature + 9.9℃	
Mode 4	Inlet oil temperature, machine temperature synchronous control	Keep the inlet oil temperature at the setting temperature within the range specified in the right column.	Between Machine temperature -9.9℃ and Machine temperature+ 9.9℃	Machine temperature synchronous thermistor
Mode 5	Outlet oil temperature or return oil temperature control, room temperature synchronous control	Keep the outlet oil temperature or return oil temperature at the setting temperature within the range specified in the right column.	Between Room temperature -9.9℃ and Room temperature + 9.9℃	Oil temperature control thermistor (When return oil temperature is controlled)
Mode 6	Outlet oil temperature or return oil temperature control Machine temperature synchronous control	Keep the outlet oil temperature or return oil temperature at the setting temperature within the range specified in the right column.	Between Machine temperature -9.9℃ and Machine temperature + 9.9℃	Oil temperature control thermistor (When return oil temperature is controlled) Machine temperature synchronous thermistor

Note) 1. Modes 2, 7, and 8 cannot be used on this series. Note) 2. Refer to Page 19 for details of necessary optional parts.

■Setting procedure

Default setting: Set to "Mode: 3" and temperature to "0.0". When you use your unit at a setting other than the default setting, change the setting following the procedure shown below.

1. Power ON --- Release the operation lock mode before starting operation for the first time.
   Hold down the ⩛ key and ⩝ key simultaneously for more than 5 seconds.
2. Select the "Setting" mode and press the ↺ key once.



3. Press the ⩛ or ⩝ key for mode setting.
4. Determine the value by pressing the ↵ key.
5. Press the ⩛ or ⩝ key for temperature setting.
6. Determine the value by pressing the ↵ key.
7. To return to the "Normal" mode, press the ↺ key three times.

Points checked in the monitor mode

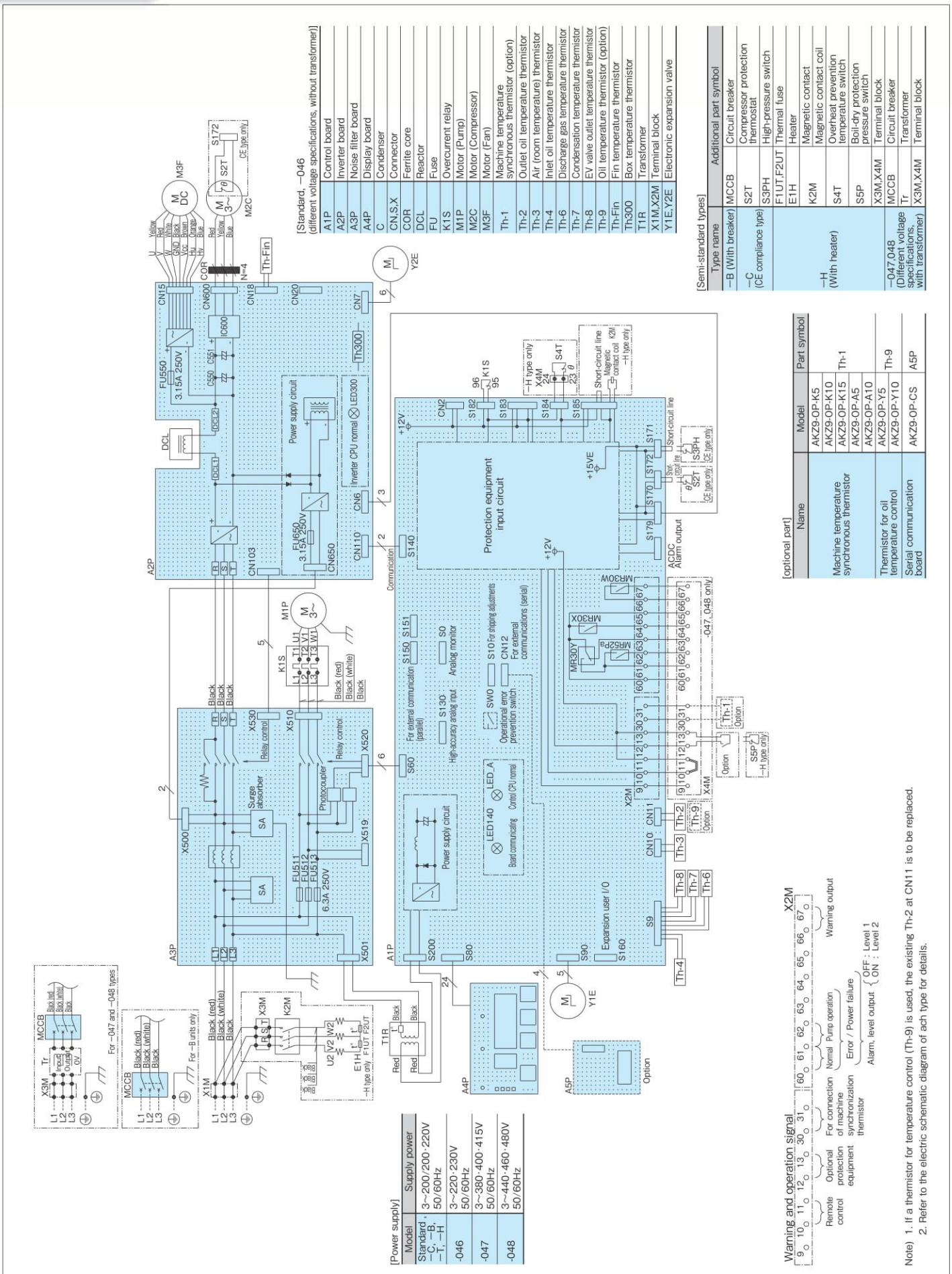
The following points can be checked in the monitor mode.

Monitor No.	Description	Note
0	Machine body temperature【Th1】	*1
1	Outlet oil temperature or return oil temperature【Th2】	*1
2	Room temperature【Th3】	*1
3	Inlet oil temperature【Th4】	*1
4	Reserved【Th5】	*1

Monitor No.	Description	Note
5	△T(Th4~Th2)	*1
6	Cooling capacity control command value (%)	—
7	Compressor inverter rotational speed (rps)	—
8	Power consumption (kW)	*3
9	Extended DIN (hundreds digit), DOUT (tens digit) status	*2

*1. If the thermistor is not connected or has a broken wire, −99.9 is displayed.
*2. With the default setting, 0 is displayed. Note that display is enabled when parameter n020 is "1" or the optional communication expansion board is installed.
*3. This is the value obtained by rough calculation under the following conditions (the error is around 20%): power supply voltage of 200 V, pump discharge pressure of 0.2 MPa (VG32: oil temperature 25℃). Contact us separately about pumpless units.

Electric schematic diagram (Typical diagram)



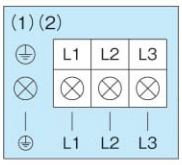
Supplement information

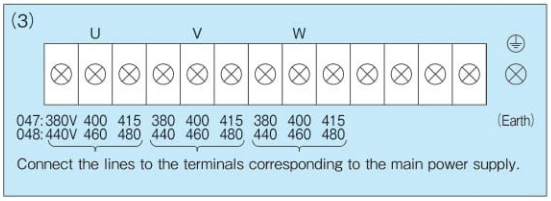
Electric wiring connection instruction diagram

1 Power supply capacity ··· Refer to the max. power consumption and max. consumption current of the specification sheet of each type.

2 Connection to power supply terminal block (X1M, Tr)

(1) In the case of the standard type and semi-standard type (−C,−H,−T,−046), connect the line to X1M.
(2) In the case of "with breaker" (−B) specifications, connect to the circuit breaker.
(3) In the case of the semi-standard type (with transformer:−047,−048), connect the line to the terminal block supplied with the transformer.



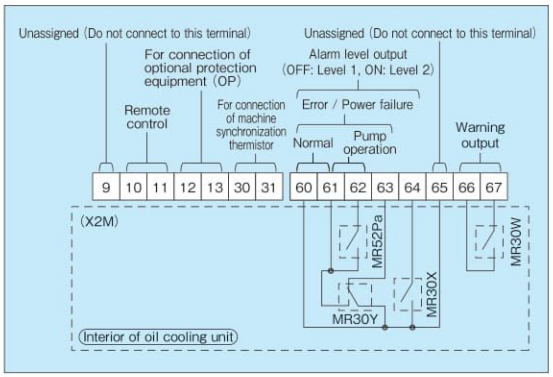


1. Screw terminal and wiring diameter

Series	Terminal block	Screw terminal	Wiring diameter JIS cable	IEC cable	UL cable
AKZ 149,329,439,569	X1M	M4	2.0mm² or more	2.5mm² or more	AWG#14 or more
	Breaker	M5			
AKZ 909	X1M	M5	3.5mm² or more	4.0mm² or more	AWG#12 or more
	Breaker	M5			

2. Use a round crimp-style terminal for connection.
3. The terminal block is for three poles and the earth wire is to be secured on the enclosure with a screw

3 Connection to signal terminal block (X2M)



1. Straight crimp terminal and wiring diameter

Straight pin terminals	Wiring diameter JIS cable	IEC cable	UL cable
*	0.25mm²~1.25mm²	0.3mm²~1.5mm²	AWG#22~#16

2. Use a straight crimp-style terminal for connection.
3. Use stranded wires for electric connection.
4. The wiring size is 0.5 mm² to 1.5 mm² in the case of duplex cable according to IEC. If using stripped wire, make the stripped length 9 mm to 10 mm.

*Recommended models and manufacturers:
TGN TC−1.25−9T (NICHIFU Co., Ltd.)
APA−1.25N (DAIDO SOLDERLESS TERMINAL MFG. CO., LTD.)

DANGER

1. Always install an all-pole (3-pole) circuit breaker (to be prepared by you) of the specified capacity on the main power supply.
*All contact distances must be at least 3 mm.
2. Always ground the unit. Since a noise filter is installed, there is a risk of electrical shock without proper grounding.
3. Before opening the electric component box, always turn off the power, and wait for 5 minutes until internal high voltage has been discharged.
4. Do not energize the equipment with the electric component box kept open.

CAUTION

1. To avoid the effects of noise, connect the power wire by cutting it to the proper length so that no excess wire comes into contact with the control board or others.
2. To perform remote control, remove the short-circuit wire between [10] and [11] and install an operation switch (to be prepared by you).
3. The mode is set to "Lock mode (Stop mode)" by default. Before starting operation, follow the procedure to release the Lock mode from the operation panel. Refer to the operation manual for the unlocking procedure.
4. The unit is provided with a misoperation prevention switch (PROTECT) to reject setting from the operation panel. If you want to use this function, make the necessary setting referring to the operation manual.

4 Signal output time chart

(1) Alarm/operation status output chart

Signal output \ Operation status			Remote operation (between【10】and【11】) ON: Normal	ON: Level 1 error or Lock	ON: Level 2 error	ON: Power failure (Power OFF)	OFF: Normal	OFF: Level 1 error or Lock	OFF: Level 2 error	OFF: Power failure (Power OFF)
Normal (NO contact)	60−61	ON								
		OFF								
Error / Stop (Power OFF) (NC contact)	60−63	ON								
		OFF								
Error level (NO contact)	60−64	ON								
		OFF								
Pump operation (NO contact)	61−62	ON								
		OFF								

(2) Warning output chart

Signal output \ Operation status			Non-warning status: Normal	Non-warning status: Level 1 error or Lock	Non-warning status: Level 2 error	Non-warning status: Power failure (Power OFF)	Warning status: Normal	Warning status: Level 1 error or Lock	Warning status: Level 2 error	Warning status: Power failure (Power OFF)
Warning output (NO contact)	66−67	ON								
		OFF								

CAUTION

1. The following electric wires can be used on the terminal block for straight crimp-style terminals.
Single wire: φ0.57~φ1.44 (AWG#22~#16)
Stranded wire: 0.25mm²~1.25mm² (AWG#22~16)
2. Load applicable to [60 - 64] and [66 - 67] is as follows:
Min. applicable load: 10mV DC, 10μA or more
Max. applicable load: 30V DC, 2A (Resistance load)
3. For [10] to [13], please prepare contacts to meet the condition of minimum applicable load 12V DC and 5mA.
4. When the length of the thermistor to be connected to [30] − [31] is longer than 10m, or the wiring is routed in a poor noise environment, use shielded wire.

Notes for installing external piping

If the external pressure loss (site piping resistance) exceeds the specified use range, there may occur phenomena such as abnormal noise of the pump (relief noise, noise of cavitation), decrease of cooling capacity and control failure of oil temperature. Keep the external pressure loss within the specified use range.

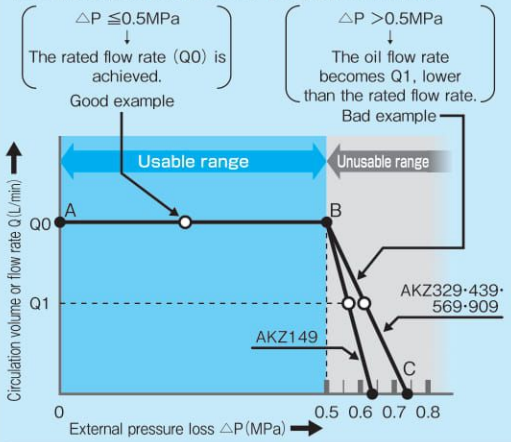
1. Suction-side piping
   Keep the suction vacuum pressure within the range between -30.7 and 0kPa.
   The use of a suction filter of 100 to 150 mesh is recommended.
2. Discharge-side piping
   Keep the pressure loss of the discharge-side piping at 0.5 MPa or less.
3. Do not install a stop valve on the suction or discharge side. When a stop valve must be installed on the discharge side out of necessity, use a 0.5Mpa relief valve along with the stop valve.
4. Calculation of piping resistance
   Determine the oil piping size by calculating the piping resistance according to the following equation:

   Piping resistance $\triangle P=0.595 \times \nu \times Q \times L / D^4$
   (For use of general hydraulic oil and lubricant)

   $\triangle P$: Piping resistance (MPa)
   ν : Dynamic coefficient of viscosity (mm^2/s)
   —Refer to the Viscosity / Temperature Chart.
   Q : Flow rate (L/min)
   L : Piping length (m)
   D : Internal piping diameter (mm)

●Relationship between oil flow rate and external pressure loss

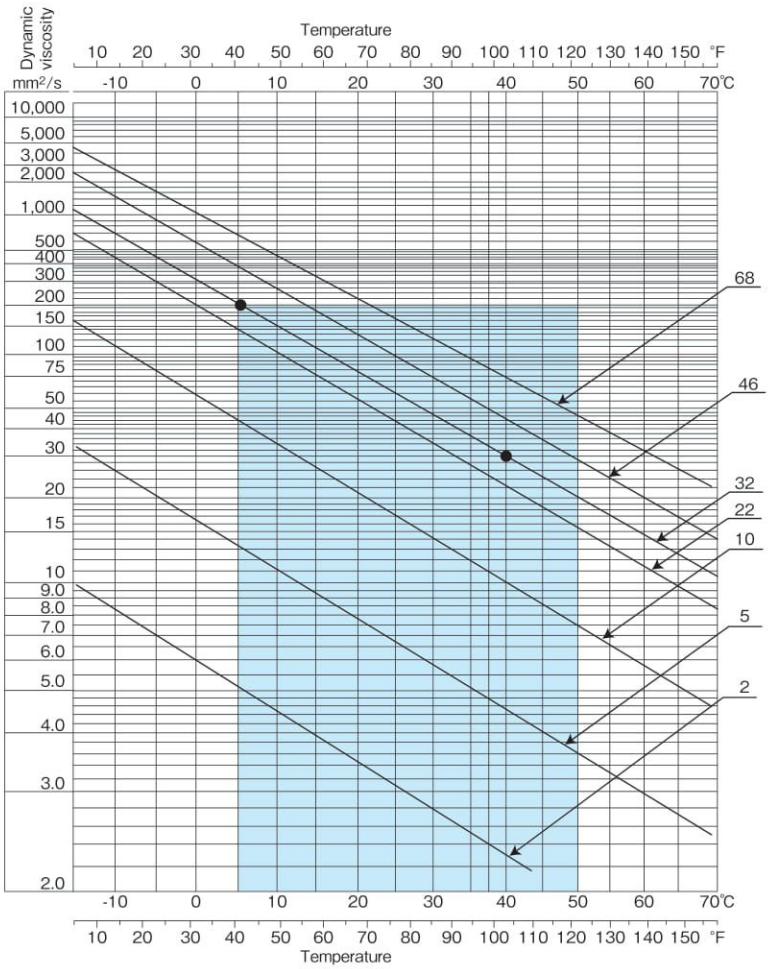
An AKZ 9 series Oil Cooling Unit incorporating a pump of the circulation type has the characteristics shown below. When the external pressure loss ($\triangle p$) is 0.5 MPa or less, the rated flow rate (Q0) is achieved, but when the external pressure loss exceeds 0.5 MPa, the flow rate becomes lower than the rated flow rate.



Q (L/min) : Flow rate (Q0: Rated flow rate)
△P (MPa) : External pressure loss
A : Status when the external pressure loss is "0"
B : Status when the external pressure loss is "0.5Mpa"
(Cracking pressure of relief valve)
C : Status when the external pressure loss is large and the oil flow rate is "0".

Note) Design the site piping to withstand a pressure of at least 1.0 MPa.

■Viscosity / Temperature Chart



Example of viscosity
(dynamic coefficient of viscosity)
In winter: 195mm²/s
ISO VG32 Oil
(temperature 5℃)
In summer: 29mm²/s
ISO VG32 Oil
(temperature 40℃)

Supplement information

Notes for handling

●Important notes to be observed regarding the machine side (machine tools and industrial machine)

1. When adverse transport conditions are expected in transporting the machine overseas or elsewhere, special precautions should be taken in the packaging and transportation method so as to avoid the application of excessive force on Oil Cooling Unit (this unit).
2. Oil Cooling Unit (this unit) does not incorporate a flow switch for checking the oil supply and a temperature switch for abnormal supply of oil temperature (high temperature or low temperature). So, please provide a protection device such as a flow switch and a temperature switch on the machine side.

Notes for operation and cooling capacity

1. Do not use Oil Cooling Unit for cooling a liquid at 50℃ or more. Start to operate Oil Cooling Unit at the same time as the machine or before liquid temperature rises to 40℃.
2. Do not place an object that hinders ventilation within 500mm of the suction port or discharge port.
3. If the air filter is clogged, the cooling capacity is reduced. Clean the air filter (wash with hot water or clean with air) periodically once every two weeks to prevent clogging.

Notes regarding liquid usable with Oil Cooling Unit

1. The notes are given in the table below. (○ symbol ··· Can be used, × symbol ··· Cannot be used)
2. Do not use the liquid listed below as "not usable" (Marked with "×").

	Special notes	AKZ 9 Series
Lubricant Mineral hydraulic oil	·The third class petroleum and fourth class petroleum of the fourth group hazardous materials specified according to the Fire Defense Law, and oil equivalent to discoloration No. 1 according to the copper corrosion test method (JIS K2513) of petroleum products ·Oil equivalent to NAS 10 level according to the pollution level	○
Nonflammable hydraulic oil ● Ester phosphate series ● Chlorinated hydrocarbon series ● Water - Glycol series ● W-O & O/W emulsion series (High-aqueous hydraulic oil)	——	×
Coolant fluid ● Water-soluble cutting and grinding liquid ● Non water-soluble cutting and grinding oil	——	×
Ethylene glycol (Antifreeze liquid)	——	×
Water(Industrial water)		×
Inflammable liquid like fuel	Liquid equivalent to special flammables, alcohol, first class petroleum and second class petroleum of the fourth group hazardous materials specified according to the Fire Defense Law	×
Drugs	——	×
Liquid for food products	Drinking water, water for cooling food products, etc.	×

Notes for handling

*Before operating this unit, be sure to read the operation manual and properly understand it.

●Instructions for safe operation

Signs and Instructions

⚠DANGER･･･Failure to observe the instruction may cause an imminent hazardous situation that may result in personal death or serious injury.
⚠WARNING･･･Failure to observe the instruction may result in personal death or serious injury.
⚠CAUTION･･･Failure to observe the instruction may result in personal injury or damage to the property.

① General instructions

[⚠DANGER] ① Use the equipment only in accordance with the intended specifications (specified in brochure, specification sheet, operation manual, caution plate).
[⚠DANGER] ② Never operate the equipment in an explosive atmosphere
[⚠DANGER] ③ Do not disassemble, repair or modify the equipment by yourself.
[⚠DANGER] ④ Always comply with the laws and regulations for safety (Industrial Safety and Health Law, Fire Defense Law, JIS B 8361 Guidelines of Hydraulic System).
[⚠WARNING] ⑤ Caution in the event of refrigerant leak
・Ventilate a room adequately (to avoid the risk of suffocation).
・Avoid direct contact of the refrigerant with skin (to avoid the risk of frost injury).
・In the event of inhalation of a great deal of refrigerant, contact with skin, and refrigerant in the eye, seek medical attention immediately.
[⚠WARNING] ⑥ In the event of an abnormal condition, stop operation promptly, investigate the cause of the problem and take appropriate remedial measures.
[⚠CAUTION] ⑦ Do not use the unit in atypical environments (locations subject to high temperatures, high humidity, or a lot of dust, contamination, particulate matter, steam, oil mist or corrosive gases: H_2S,SO_2,NO_2 or CL_2).
[⚠CAUTION] ⑧ Install a flow switch and temperature switch on the machine to protect the main shaft and others.
[⚠CAUTION] ⑨ Do not get on the equipment or place an object on the equipment.
[⚠CAUTION] ⑩ Operate the cooling unit at altitude of 2,000 m or less. If the altitude exceeds 1,000 m, the cooling capacity will be reduced by about 20% to 30% due to the Atmospheric pressure drop. Select a model with sufficient margin for cooling capacity.

② Instructions for transportation

[⚠DANGER] ① When hoisting the equipment, check its weight and use the eye plates and hangers on the equipment properly.
[⚠WARNING] ② Do not get approach the equipment while it is being hoisted and moved.
[⚠CAUTION] ③ When moving the equipment, take appropriate measures for fall prevention.
[⚠CAUTION] ④ Do not tilt the equipment 30 degrees or more while transporting the equipment (including during storage).

③ Instructions for installation

[⚠WARNING] ① Install the equipment on a rigid, level foundation and secure it appropriately.
[⚠CAUTION] ② Do not place an object near the suction port and discharge port of the equipment.

④ Instructions for wiring and piping installation

[⚠DANGER] ① Wiring and piping installation should be performed by a person with specialized knowledge and skills.
[⚠DANGER] ② Always use a commercial power supply for the power source. (The use of an inverter power supply may cause burn damage).
[⚠DANGER] ③ Connect the wiring for power supply in accordance with the electric wiring instruction diagram of the specification sheet and operation manual.
[⚠DANGER] ④ Ground the equipment properly.
[⚠WARNING] ⑤ Install the wiring in accordance with the standard by checking the electric schematic diagram.
[⚠CAUTION] ⑥ Always install a dedicated breaker (molded case circuit breaker) appropriate for the capacity of Oil Cooling Unit on the main power supply on site.
[⚠CAUTION] ⑦ Check to see that the oil piping has the pressure resistance of 1MPa or more and install the piping appropriately.

⑤ Instructions for trial run

[⚠CAUTION] ① Check to see that the machine is in a safe status (not activated) before starting the trial run.
[⚠CAUTION] ② Check to see that the oil piping and electric wiring are correctly connected to the machine and that there is no looseness in connections and joints.
[⚠CAUTION] ③ Disable the operation lock of the equipment (Oil Cooling Unit) before starting the machine.
[⚠CAUTION] ④ Check to see that the required amount of oil is in the oil piping system and that the piping is not blocked in the middle.

⑥ Instructions during operation

[⚠DANGER] ① Do not splash water or liquid on the equipment.
[⚠WARNING] ② Do not push your finger or an object into gaps of the equipment.
[⚠CAUTION] ③ Do not touch the heated exhaust port of the equipment.

⑦ Instructions for maintenance and inspection

[⚠DANGER] ① Perform maintenance and inspection with the equipment kept open. Working in a closed status may result in suffocation due to the leak of refrigerant.
[⚠DANGER] ② Always turn off the main power supply before starting maintenance and inspection.
[⚠DANGER] ③ Wait for five minutes after turning off the main power supply and start maintenance and inspection operation.
[⚠DANGER] ④ Do not operate the equipment with the cover of the equipment opened.
[⚠CAUTION] ⑤ Wear protective gear such as gloves and an eye protector when performing maintenance, inspection and cleaning.
[⚠CAUTION] ⑥ Clean the air filter periodically (once every two weeks in general).
[⚠CAUTION] ⑦ Keep oil cleanliness to NAS 10 level or less according to the pollution level.
[⚠CAUTION] ⑧ Check the oil level in the tank and ensure that it is between the yellow line and the red line.
[⚠CAUTION] ⑨ Inspect the underneath (drain pan) of the oil cooling unit once every six months, and if oil has accumulated, discharge it through the oil drainage port.

Supplement information

Method of selection of Oil Cooling Unit

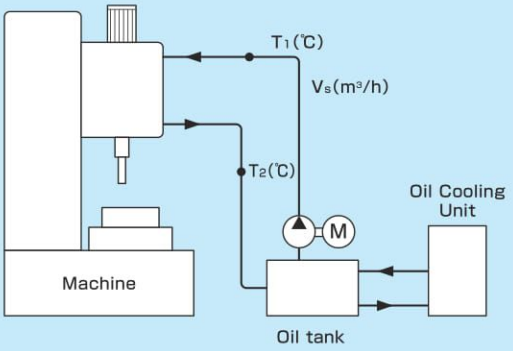
Unit conversion formula ●1kW=860kcal/h

1.Select Oil Cooling Unit having a cooling capacity 20 to 30% larger than the heat release value from the machine tool.
2.Since the cooling capacity of Oil Cooling Unit varies with the change of liquid temperature (inlet liquid temperature) and room temperature, it is necessary to clarify the liquid temperature and room temperature conditions to select appropriate Oil Cooling Unit.
3.Three methods are shown below as a guide for estimating the heat release value from the machine tool. For determining the heat release value eventually, it is necessary to conduct tests and determine the exact heat release value for selecting appropriate Oil Cooling Unit.

●Calculation method of heat release value from machine for the selection of appropriate Oil Cooling Unit (as a general guide)

In the case of cooling of main shaft of machining center

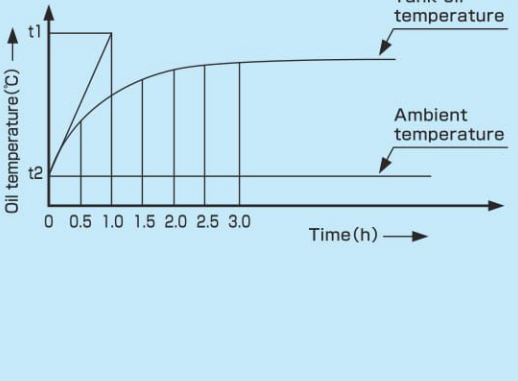
●Method 1: To estimate the heat release value from the temperature difference between the supply oil and return oil



$$Q=2.778\times10^{-7}Cp\cdot\gamma\cdot Vs\cdot\triangle T$$

Q : Heat release value(kW)
Cp : Constant pressure specific heat(J/kg℃)…1967.4(J/kg℃)
γ : Weight volume ratio(kg/m³)…876(kg/m³)
Vs : Oil flow rate(m³/h)
△T : Temperature difference(℃)…T2−T1
E.g.) When "Vs" is 1.8m³/h(30L/min) and "△T" is 5℃
Q=2.778×10⁻⁷×1967.4×876×1.8×5
=0.479×1.8×5≒4.3(kW)

●Method 2: To estimate the heat release value from the increase rate of oil temperature in the tank



Find the maximum gradient of oil temperature increase

(To find the maximum gradient of the oil temperature, it is necessary to measure △t every one minute during the first 10 minutes.)

$$Q=2.778\times10^{-7}Cp\cdot\gamma\cdot V\cdot\triangle t/H$$

Q : Heat release value(kW)
Cp : Constant pressure specific heat(J/kg℃)…1967.4(J/kg℃)
γ : Weight volume ratio(kg/m³)…876(kg/m³)
V : Total oil quantity(m³)
△t : Temperature difference(℃)…t1−t2
H : Time(h)
E.g.) When the total oil quantity is 300L (0.3m³) and "△t"is 10℃.
Q=2.778×10⁻⁷×1967.4×876×0.3×10
=0.479×0.3×10≒1.4(kW)

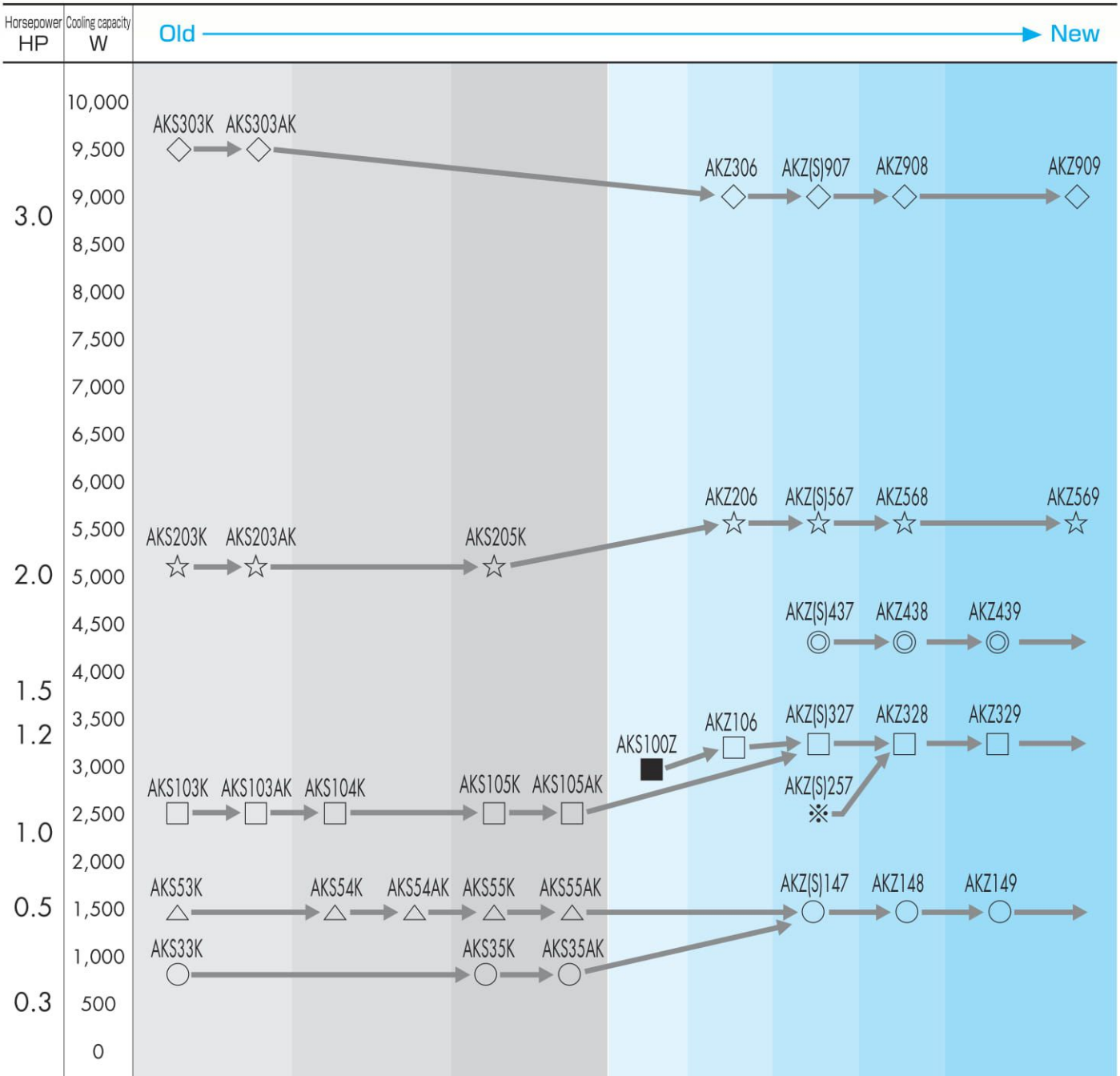
●Method 3: When motor output loss is considered to be the heat release value

$$Q=H\cdot\frac{\eta}{100}$$

Q : Heat release value(kW)
H : Motor output(kW)…For driving the main shaft
η : Motor output loss(%)
E.g.) When the output loss is 30% for the motor output 7.5 kW → The output loss is 30% or so in general (Cooling of main shaft head)
Q=7.5×0.3=2.3(kW)

Table of history of Oil Cooling Unit for cooling main shaft (Circulation type)

AKS→AKZ



Series name	AKS 3 series		AKS 4 series		AKS 5 series		AKS-Z	AKZ 6 series	AKZ 7 series	AKZ 8 series	AKZ 9 series	
Sales starting time	—	'87.5	'86	'87	'88.1~10	'98.12	'88	'96.8~10	'01.10~'02.2	'02~	'10~	'12~
Discontinuation time	'87.5	'02.3	'88	'88	'93.3	'02.3	'97.3	'02.9	'05.3	'12.12	Current model	
	ON—OFF type						Inverter type					

Note) 1. The larger the last number of a model name, the newer the series (For instance, AKS35K is newer than AKS33K).
In addition, a model having the last alphabetic characters "AK" is newer than a model ending with "K" only. (For instance, AKS35AK is newer than AKS35K).
2. The cooling capacity is represented by the value at the standard point and at 60 Hz for all models.
3. The dimensions of the equipment may be changed on a newer type and older type on some models. Please check the dimensions on the brochure and specification sheet (outline drawing) for selecting your equipment.
When you are about to buy new equipment due to a failure of the equipment or for other reasons, please check the conditions of new equipment and select an appropriate type.
4. All the models have been changed to the inverter type since 2002.
5. AKSZ(S)"7" series uses new refrigerant R407C, AKZ "8", AKZ "9" series uses new refrigerant R410A, and all other models use R22.
6. Existing units of 1HP class (AKS105AK, AKZ(S) 257 class) were integrated into AKZ328 of 1.2HP class.

Supplement information

Daikin Oil Cooling Unit service network

What Daikin can offer as a global manufacturer of air conditioning equipment

Daikin can offer you speedy delivery and reliability through a worldwide.

Overseas service network

Please contact Daikin Sales Partners for servicing of Oil Cooling Unit in countries outside Japan. Daikin is ready to offer you service in conjunction with the sales agents of our Air-conditioning and Hydraulic Divisions located in seven countries and regions worldwide.

Country/Region	Locations	Company name
China	Shanghai	◎凱灵液压科技（上海）有限公司 KAILING HYDRAULICS TECHNOLOGY (Shanghai) CO.,LTD.
		大金空調技術（上海）有限公司 DAIKIN AIR CONDITIONING TECHNOLOGY (Shanghai) CO.,LTD.
	Beijing	大金空調技術（北京）有限公司 DAIKIN AIR CONDITIONING TECHNOLOGY (Beijing) CO.,LTD.
	Guangzhou	大金空調技術（広州）有限公司 DAIKIN AIR CONDITIONING TECHNOLOGY (Guangzhou) CO.,LTD.
Korea	Seoul	◎KD HYDRAULICS,LTD.
Taiwan	Taipei	HO TAI SERVICE & MARKETING CO.,LTD.
Singapore	Singapore	◎ZICOM PRIVATE LTD.
Thailand	Bangkok	SIAM DAIKIN SALES CO.,LTD.
Indonesia	Djakarta	◎PT. ETERNA KARYA SEJAHTERA
India	New Delhi	DAIKIN AIR CONDITIONING INDIA
Germany	Ulm	◎SAUER BIBUS GMBH
U.S.	Illinois	◎ALL WORLD MACHINERY SUPPLY INC.
Mexico	Querétaro	◎ALL WORLD MACHINERY SUPPLY INC. Mexico Branch

◎Sales agents of hydraulic equipment.
Others are the sales agent of air conditioning equipment.

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