Coolant Pump
Instruction Manual

Multi-stage Immersion Type VKA Series

VKA Series

⚠ WARNING
• Do not hold the strainer (wire net) of the pump point at the handling of this product. Doing so may cause the strainer (wire net) to come off, resulting in injuries or damage.
⚠ CAUTION
• This instruction manual describes important information related to handling the pump. Before using the pump, be sure to read this instruction manual thoroughly for correct handling. • Be sure to provide this instruction manual to the operator who will actually install, operate, maintain, and inspect the pump. • Be sure to keep this instruction manual in the place where the operator can read it any time. • This product is subject to change without prior notice.

Atai Fuji Motor Co., Ltd.

Safety Precautions

- Prior to use of the pump (transporting, installation, maintenance, etc.), be sure to read this instruction manual thoroughly for correct handling. All information related to the pump itself and safe use of it are described in this instruction manual, and should be clearly be understood before using the pump.

  Appropriate handling at the stage from the product arrival to the beginning of the actual operation is necessary, in addition to the maintenance and inspection after the operation starts, in order to fully achieve the performance of the Coolant Pump, prevent the accident beforehand, and to continue an excellent operation for a long term.
- Safety Notices used in this instruction manual are divided into two ranks: "Danger" and "Caution".

 WARNING	Indicates a potential hazardous situation that, if not avoided, may result in death or serious injuries.

 CAUTION	Indicates a potential hazardous situation that, if not avoided, may result in moderate injuries and/or damage to the equipment.

Notices indicated by [ Caution] may lead to serious consequences in some situations.
All of the following are important. Be sure to observe them:

 WARNING	
General	• Transport, installation, piping, wiring, operation, and maintenance of the pump must be conducted by skilled personnel who thoroughly understand how to handle the pump. Failure to do so may result in electric shock, injuries, fire, etc. • Be sure to turn off the power switch of the pump before conducting any operation. Failure to do so may result in electric shock or fire. • Do not use the pump near flammable gas. Doing so may result in injuries or fire.
Installation adjustment	• Be sure to ground the grounding wire terminal. Failure to do so may result in electric shock or fire.
Piping Wiring	• Refer to the connection diagram inside the terminal box or this instruction manual for power cable connection. Incorrect wiring may result in electric shock or fire. • Do not forcibly bend, pull, or crimp the power cable or wires connected to the pump. Doing so may result in electric shock or fire. • Be sure to re-attach the cover of the terminal box correctly after wiring/piping is completed. Failure to do so may result in electric shock.
Operation	• Never access or touch moving parts (including external fan, impeller, etc.) during operation. You may be caught in any moving parts, resulting in injuries. • If power failure occurs during operation, turn the power switch off. Failure to doing so may cause the pump to start suddenly when power is recovered, resulting in injuries.

⚠ CAUTION	
General	• Be sure to comply with specifications on the nameplate or in this instruction manual. Failure to do so may result in electric shock, injuries, damages to the equipment, etc. • Do not use this pump if damaged. Doing so may result in electric shock, injuries, fire, etc. • Do not insert foreign objects or fingers etc. into openings (e.g. fan cover, discharge port, suction port, drain hole, etc.) of the pump. Doing so may result in electric shock, injuries, damage to equipment, etc. • We are not liable for modifications to the pump made by the user.
Transport Carrying	• Be extremely careful not to drop or overturn the pump when carrying it. Dropping or overturning the pump may result in injuries. • Before lifting the pump, check the exact mass of the pump, referring to the package box, catalog, nameplate, etc., and ensure that the lifting conditions satisfy the mass. Failure to do so may cause the pump to drop or overturn, resulting in injuries or damage.
Unpacking	• Place the package in the correct vertical direction to unpack it. Failure to do so may result in injuries. • Be careful of nails in wooden frame packing. Failure to do so may result in injuries. • Check that the correct product has been delivered. Using the incorrect product may result in injuries, damage, fire, etc. • Do not hold the strainer when you take out the product. Doing so may result in injuries or damage.
Installation adjustment	• Never place flammable objects near the pump. Doing so may result in fire. • Do not place objects around the pump that block ventilation. Doing so may affect the cooling effect, resulting in burns, fire, etc. due to excessive heating. • Before connecting the pump to equipment, check the rotation direction. Incorrect rotation direction may result in injuries or damages. • Do not touch the impeller of the pump. Do not touch the tightening belt, strainer, and the screw, etc. by bare hand. Doing so may result in injuries. • Do not touch the impellers of the pump. Do not touch the securing belts and strainer with bare hands. Doing so may result in injuries. • Never stand on the pump. Doing so may result in injuries. • Install the pump in such a direction that the information on the nameplate is clearly visible. Do not place objects in front of the nameplate. Do not remove the nameplate. • Do not operate the product exceeding the operating frequency 60Hz when driven with an inverter. Doing so may result in the pump burning out or fire. • Do not use a fluid with a higher viscosity than the maximum limit of viscosity. Doing so may result in the pump burning out or fire.

⚠ CAUTION	
Piping Wiring	• Conform to the Electric Facility Technical Standard authorized by the government and the Interior Wiring Code of the electric power company. Failure to do so may result in the pump burning out or fire. • Do not touch terminals when measuring insulation resistance. Doing so may result in electric shock. A protective device is not equipped. An over-current protective device should be attached to the pump as required by the Electrical Facility Technical Standard. In order to prevent fire or damage due to the pump burning out, we recommend that you consult us and install other protective devices (e.g. Earth-leakage circuit breaker, etc.).
Operation	• If any problem occurs, stop operation immediately and turn the power switch off. Failure to do so may result in electric shock, injuries, or fire. • Do not touch the pump during operation, as the temperature of it becomes considerably high. Doing so may result in burns. • Do not operate the pump while the strainer removed. Doing so may result in injuries or damage. • Do not insert foreign objects or fingers etc. into the openings of the pump. Doing so may result in electric shock, injuries, or fire. • Do not operate the pump without fluid for 10 seconds or longer. Doing so may result in damage or fire.
Maintenance	• Do not touch terminals when measuring insulation resistance. Doing so may result in electric shock. • During operation, do not touch the frame of the pump, as the temperature of the frame becomes considerably high. Doing so may result in burns. • Do not touch the screw when you remove the strainer. Doing so may result in injuries. • Be careful when using solvent or similar to clean the pump. Inappropriate use of solvent may result in poisoning. In addition, the use of thinner and/or benzine may cause a change or abruption of painting color of the pump.
Repair Disassembly Modification	• The pump must be repaired, disassembled, or modified by skilled personnel. Failure to do so may result in electric shock, injures, or fire.
Disposal	• Dispose of the pump as general industrial waste.

Acceptance checks ----------

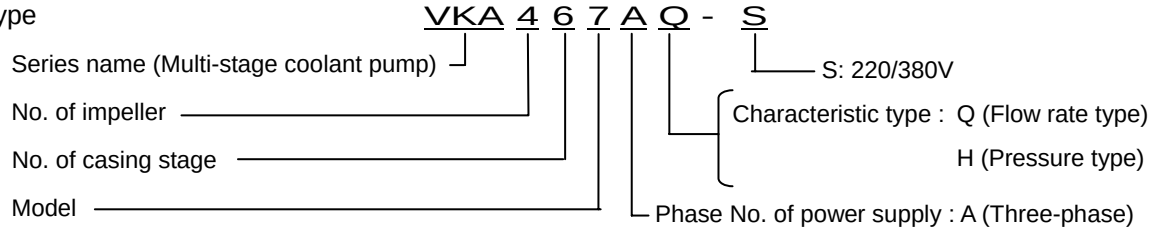
Please check the following when the coolant pump is delivered.

1) Check the type, output, voltage, frequency, etc. of the delivered pump in reference with the nameplate to verify that the correct product has been delivered.
2) Check that the coolant pump has not been damaged during transport and that bolts are firmly tightened. If any problems are found, please consult the dealer where you purchased the coolant pump.

Specifications ----------

Refer to the nameplate for the coolant pump's head, flow rate, frequency, voltage, current, etc. Other specifications are described below.

1) Type



2) Fluid

The Coolant Pump (standard product) is designed for use with coolant, including grinding oil and cutting oil. However, since the life of the pump might decrease, when the fluid contains large quantities of hard sludge (e.g. abrasive powder, abrasive grain, diamond grain, etc.), install the filter (e.g. magnet filter, paper filter, etc.).

Be sure to apply water –soluble coolant fluid, water containing additives (anti-rust agents) and the like, and liquid of similar viscosity. In addition, the pump cannot be applied to fresh water or special fluid, such as printing fluid, acids. When you want to use other special fluid (e.g. high viscosity fluid, ceramic etc.), inquire of your dealer or our sales branches.

Notes

The rated head and flow rate indicated on the nameplate is when the viscosity is 1 mm^2/s.

3) Fluid temperature 0 to 60°C

4) Installation location Always use the pump indoors in a location free of flammable gas or vapor and at an altitude of 1,000 m or less.

5) Ambient temperature -20 to 40°C

Installation ----------

1) Select a well ventilated location with little dust and humidity. Do not install the pump where fluid splashes onto the motor.
2) Install the pump so that cooling air for the motor can be taken in.
3) Install the pump on a flat surface to prevent any clearance.
4) Select a location where servicing can be performed easily. (Secure sufficient space.)
5) The pump is resistant to externally applied vibration acceleration up to approximately 4.9 to 6.9m/s^2.
6) Because the pump section of the VKA type coolant pump is installed in a tank, an mounting hole larger than the outer diameter of the pump needs to be made. See the outline drawing.
7) Because the suction port is on the bottom of the pump in the pump section of the VKA type coolant pump, secure at least 5 mm between the bottom of the tank and the suction port. Secure the largest separation possible to prevent the strainer being clogged with cutting chips and dust.

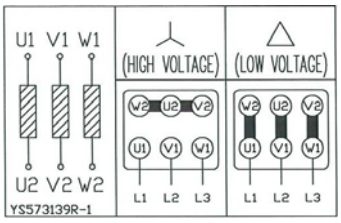
Piping ----------

1) Make the piping as short as possible with the minimum number of elbow bends, joints, valves. Use standard sized pipes. Thin pipes, or those with an excessive number of bends, may reduce the amount of discharge.
2) Support pipes to prevent the weight of the pipes being loaded directly onto the pump.
3) Do not forcibly screw the pipes into the pump. Doing so may damage the joints.
4) Use seal tape, fluid packing, etc. for threaded sections to prevent fluid and air leaks. Wind the seal tape correctly so that the port of the pipe is not blocked.
5) Use the largest fluid tank possible.
    * The recommended tank capacity is at least three times of discharge amount per minute. Using a tank with excessively small capacity may cause problems, such as the fluid temperature increasing, the strainer clogging with cutting chips faster than usual, reduction in the amount of discharge due to generation of bubbles, etc.
    * Put the fluid quietly so that air should not mix when you pour the fluid into the tank.
6) Prevent cutting chips and dust from entering the pump.
    * We recommend that you pass the cutting fluid through an overflow section and filter at least three times. Cutting chips entering the pump may damage the pump. Be extremely careful.
7) Take appropriate preventive measures to prevent water hammer (e.g. install an accumulator etc.).

(Reference data)
- Pump discharge port (outlet) size: PS3/4 (for piping)
- Pump mounting bolt: M6 (4 locations)

Wiring ----------

1) Wiring must conform to the Electric Facility Technical Standard authorized by the government and the Interior Wiring Code of the electric power company.
2) For standard voltage products, see the drawing on the right and connect the motor terminals to the power supply terminals correctly.
3) Ground the wire in case of earth-leakage.
4) We recommended that you use a thermal overload relay to protect the motor from overload and burn out.



5) You can change the position of the terminal box relative to the discharge port of the pump in 90-degree increments by shifting the motor frame.

   Change the position of the terminal box depending on the installation location.

6) When using connectors, glands, etc., take sufficient precautions to prevent cutting chips, coolant, etc. from entering the terminal box through the lead-in port. Do not remove the grommet from the lead-in ports that are not used.
7) Note that the electric current will increase and the motor may be burnt out when the voltage drop is remarkable. Or else, the thermal overload relay may trip.

Operation ----------

1. Before starting operation

   Do not operate the pump without fluid. Doing so may damage the pump.

   Check that the fluid is above the specified level, and confirm that the discharge port is open.

2. When starting operation (When conducting test run)
   1) Check that the pump rotates counterclockwise (to the left) when viewed from the top.
   2) Check that there are no problems, such as overcurrent, vibration, or noise. If any problem is identified, see the "Troubleshooting" section for appropriate measures.
3. Operation
   1) An volute pump is used for the Atai Coolant Pump, meaning the flow rate can be adjusted by opening and closing the valve on the discharge side.

      Although the motor is not overloaded with the valve fully closed, the temperature of the fluid in the pump will rise, which may damage the pump. Do not operate the pump with the valve fully closed. If unavoidable, provide a bypass route to maintain a minimum flaw rate (2 L/min or more) or stop the motor when not operating the pump. When the temperature of the fluid rises excessively, the service life of the motor and pump parts may be shortened.
   2) Air may be taken in if the fluid level is too low, lowering the amount of discharge or preventing the fluid being pumped. Make the fluid level higher than "Minimum flued level". Note that the minimum fluid level differs depending on the viscosity of the fluid. For safety, keep the fluid level as high as possible.
   3) If power failure occurs during operation, turn the power switch off.

Maintenance ----------

1. Daily checks

   Check for abnormal vibration or sound when starting operation and during operation.

2. Periodic checks

   1) Remove dust, oil, etc. on the external surface of the coolant pump.
   2) Accumulation of cutting chips in the tank may cause pump failure. Clean the inside of the tank periodically.
   3) Check that the pump's strainer is not clogged with cutting chips. Clean the strainer when it is clogged with cutting chips.

3. Maintenance of bearing

   Using shielded type grease-sealed bearings reduces the bulk of maintenance work including replenishing grease. Exchange the bearing when an abnormal sound or vibration occurs from the bearing.

4. Maintenance of oil seal

   Pumps have oil seals to prevent fluid leakage at the discharge casing. Replace the oil seals with a new one when fluid leakage was found or replacing the bearing.

   * Parts replacement

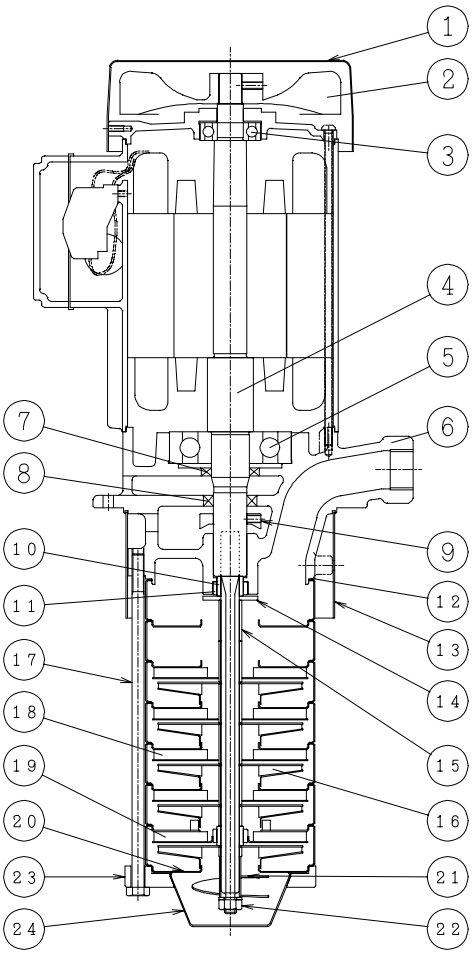
   The service life of parts is determined by the type, atmospheric conditions, and working conditions. We recommend that you replace parts referring to the table below:

Replacement frequency of consumable parts

Part name	Model	Replacement frequency (Note Not guaranteed)
Bearing	All	Each 1 to 3 years
Oil seal	All	Each 1 to 2 years
Bearing ring	All	Each 1 to 3 years
Sleeve		Each 1 to 3 years
Impeller	All	When worn out
Rubber parts	All	Each 2 to 3 years
Gasket	All	Each time pump is disassembled
Others (screw etc.)	All	When necessary

Configuration ----------

Cross sectional view of VKA-AQ



	Parts name	Material
1	Fan cover	SPCC
2	External fan	Resin
3	Bearing	
4	Shaft	S45C + SUS431
5	Bearing	
6	Discharge Casing	FC200
7	Oil seal	NBR
8	Oil seal	FKM
9	Deflector	SS400
10	Bearing Sleeve	SiC
11	Bearing Ring	SiC
12	Packing	PTFE
13	Outer Sleeve	SUS304
14	Washer	SPCC
15	Sleeve	SUS304
16	Impeller	SUS304
17	Tight bolt	SUS304
18	Casing (with guide vane)	SUS304
19	Casing (with Bearing Ring)	SUS304
20	Casing (without guide vane)	SUS304
21	Screw	SUS304
22	Impeller Nut	SUS304
23	Suction Chamber	FC200
24	Wide strainer	SUS304

Note 1: Above drawing shows construction of typical example pump.

Note 2: ⑭Washer is used only for the AQ type product.

The construction etc. may be modified without any preliminary notice.

Troubleshooting

- Troubleshooting

If any problem is identified, see "Troubleshooting quick reference" below for appropriate measures.

Troubleshooting quick reference

Failure conditions		Cause	Solution
Rotation disabled	No sound	Cables are disconnected or connected incorrectly.	Check cables and connections.
		Fuse is blown or thermal overload relay is tripped.	Replace fuse or check thermal overload relay.
		Stator coil is disconnected.	Contact authorized dealer for repairs.
	Knocking sound	Voltage is too low.	Adjust voltage.
		Cables are disconnected or connected incorrectly.	Check cables and connections.
		Fuse is blown or thermal overload relay is tripped.	Replace fuse or check thermal overload relay.
		Stator coil is disconnected.	Contact authorized dealer for repairs.
		Stator contacts rotor due to worn bearing.	Replace bearing.
		Foreign matter caught in impeller.	Eliminate foreign matter.
Rotation enabled	Motor overheats /overcurrent	Voltage is too high or too low.	Adjust voltage.
		Voltage is unbalanced.	Check circuit.
		Stator coil is disconnected, short-circuited, or grounded.	Contact authorized dealer for repairs.
		Stator contacts rotor due to worn bearing.	Replace bearing.
		Viscosity of fluid is too high.	Use fluid with lower viscosity.
	Pumping fluid disabled	Suction port is above fluid level.	Adjust fluid level.
	Insufficient discharge	Large amount of bubbles in fluid.	Prevent bubble generation/suction.
		Rotation direction is incorrect.	Connect terminals correctly.
		Piping loss is high.	Review piping.
		Fluid does not run smoothly.	Eliminate foreign matter. Check connections.
		Impellers are worn out.	Replace impellers.
	Abnormal sound Excessive vibration	Bearing is worn out.	Replace bearing.
		Pump is in single-phase operation.	Check circuit.
	Water hammer occurrence	Water hammer occurs when a valve is closed suddenly.	Install an accumulator.

• Scope and period of guarantees

The guarantee period of the pump is one year after delivery to the place indicated in the purchase order. When failure occurs during the guarantee period, under normal use within the range of the product specifications according to this instruction manual, damaged parts will be replaced or the pump will be repaired for free, excluding failure due to any of the following:

(1) Inappropriate handling or operation by the user

(2) Any cause other than the pump

(3) Incorrect repair or modification

(4) Any occasion out of control of the supplier such as natural disaster or casualty

This guarantee applies to delivered pumps only, and does not apply to other equipment damaged due to failure of the pump. This guarantee is effective in Taiwan only.

• Investigation and repair

After the guarantee period elapses, all diagnosis and repair fees are charged. Even during the guarantee period, we also provide repairs or diagnosis of failures due to causes not included in the free services listed above at a charge. When you need repairs or replacement parts, contact your dealer or our sales branches.

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