INSTRUCTION MANUAL

TERAL

COOLANT PUMP

High Flow Rate Series
Long Head Series

Notice

Make sure that this Instruction Manual is delivered to the end user of this motor.

TERAL TAKU INC.

Coolant Pump

Safety Precautions

Thank you for purchasing the coolant pump.
This pump has been designed with an outstanding electrical and mechanical performance, and detailed caution has been taken during manufacture to ensure safe use.
Before starting use of this coolant pump (before starting installation, operation, maintenance or inspection, etc.), always read this manual and other enclosed documents thoroughly to ensure correct use. After reading, always store this manual where it can be accessed easily.
The safety precautions are ranked as "DANGER" and "CAUTION" in this instruction manual.

⚠ DANGER : When a dangerous situation may occur if handling is mistaken leading to fatal or major injuries.

⚠ CAUTION : When a dangerous situation may occur if handling is mistaken leading to medium or minor injuries, or physical damage.

Note that some items described as ⚠ CAUTION may lead to major results depending on the situation. In any case, important information that must be observed is described.

⚠ DANGER

[General]

- Do not use this coolant pump in an explosive atmosphere. Use an explosion-proof motor for that type of atmosphere. Failure to observe this could lead to injuries or fires, etc.
- Do not work with a live wire state. Always turn the power OFF before starting work. Failure to observe this could lead to electric shocks.
- Only trained persons must perform transportation, installation, piping and wiring, operation, maintenance and inspection. Failure to observe this could lead to electric shocks, injuries or fires, etc.

[Piping and wiring]

- Securely connect the power cable. (Make sure that the screws are not loose.) Failure to do so could lead to electric shocks or fires.
- Do not bend, pull or catch the power cable or motor lead wires with force. Doing so could lead to electric shocks.

⚠ DANGER

[Installation and adjustment]

- Always ground the grounding terminal. Failure to do so could lead to electric shocks.

[Operation]

- Do not operate the cooling pump with the terminal box cover removed. After work, return the terminal box cover to its original position. Failure to do so could lead to electric shocks.
- Never go near or touch the rotating parts (shaft, etc.) during operation. Failure to observe this could lead to entanglement or injuries.
- Always turn the power switch OFF if a power failure occurs. Failure to do so could lead to injuries.

⚠ CAUTION

[General]

- Do not use the pump outside its specifications. Failure to observe this could lead to electric shocks, injuries or damage, etc.
- Do not insert fingers or objects into the motor or pump openings. Failure to observe this could injuries or damage, etc.
- Do not use a damaged pump. Failure to observe this could lead to injuries or fires, etc.
- Modifications of the product by the user are not covered by the Taku Warranty. Thus, Taku will not bear any responsibility.

[Shipment and transportation]

- Dropping or falling of the pump during transportation will create a hazardous situation, so take special care.
- If the pump is provided with a hanging bolt, use the hanging bolt. Avoid lifting the entire machine with the hanging bolt after the pump is installed on a machine.
  Check the pump weight before lifting it, and do not lift a pump that exceeds the hanging bolt's rated weight.

[Unpacking]

- Confirm the orientation of the package. If the package is crated, take care to the nails when unpacking. Failure to do so could lead to injuries.
- Confirm that the delivered product is as ordered. Installation of an incorrect product could lead to injuries or damage, etc.

⚠ CAUTION

[Installation and adjustment]

- When using star-delta starter, select one with an electromagnetic switch (three-conductor type) on the primary side. Failure to do so could lead to fires.
- Do not drive the pump with an inverter. The motor load will fluctuate according to the coolant speed, and may cause overload operation. Furthermore, depending on the voltage, a strengthened insulation may be required. Thus, the pump for inverter drive must be an exclusive type.
- Do not place flammable objects around the motor. Failure to observe this could lead to fires.
- Do not place objects around the motor that will block the ventilation. Failure to observe this could lead to blocking of the cooling leading to abnormal overheating and fires or burns, etc.
- When installing the pump onto the machine, make sure that it is securely fix with a bolt, etc., into the installation holes on the pump flange. Incorrect installation could lead to damage of the device.
- Never get on the motor. Install a cover so that the rotary sections are not contacted. Failure to observe this could lead to injuries.

[Piping and wiring]

- Wire the pump according to Electrical Facility Technology Standards or local electricity laws. Failure to observe this could lead to burning or fires.
- This motor does not have a protection device. Installation of an overload protection device is mandatory under Electrical Facility Technology Standards. Installation of a protection device (leakage breaker, etc.) besides an overload protection device is recommended.

[Operation]

- The motor will become quite hot during operation. Take care not to touch the motor with your hands or body. Failure to observe this could lead to burns, etc.
- Stop operation immediately if an abnormality occurs. Failure to observe this could lead to electric shocks, injuries or fires, etc.

[Maintenance and inspection]

- Always turn the power OFF and never touch the terminals directly with bare hands when measuring the insulation resistance. Failure to observe this could lead to electric shocks.
- The motor frame will become quite hot during operation. Do not touch it with bare hands. Failure to observe this could lead to burns, etc.

[Repairs, disassembly, modification]

- All repairs, disassembly and modification must be done by a specialist. Failure to do so could lead to electric shocks, injuries or fires, etc.

[Disposal]

- Treat the motor as general industrial waste when disposing of it.

Contents

Quality Assurance Period and Scope

- As a rule, Taku Electric will repair faults found to be the fault of Taku Electric free of charge for one year from the date of product delivery.
- The product warranty applies only to the delivered product unit.

1. Type and Structure

Table 1 Type and Structure

Type	Model	Structure and features
High flow rate series (Immersed type)	NQD-e751H NQD-e1502H NQD-e2203H NQD-e3004H NQD-e3705H	This type, as having high discharge rate and high pump head, can respond to demands from a wide range of pump characteristics. All models are small in size and light in weight, having the same mounting dimensions. Also, highly resistant to slurry, ensuring long service life.
Long head series (Immersed type)	NQH-403H NQH-e753H NQH-e1104H NQH-e1505H	These pumps are characterized by very high pump head. Very small in size and light in weight. Also, highly resistant to slurry, ensuring long service life.

2. Transportation and Storage

(1) Transportation

An eye bolt is attached to the heavy models. Be sure to use this for transportation. As this eye bolt can serve only for lifting the pump, avoid using this in a state where the pump is mounted on the other machine.

(2) Storage

When not using the coolant pump in the immediate future, be sure to store it while observing the following:

(a) Store it in a clean and dry place.

(b) When storing it in the open air or in a humid environment, be sure to cover the entire product with waterproof sheet to prevent rainwater and dust from entering.

3. Installation

(1) Installation

The pump needs to be immersed in oil.

Be sure to feed oil so that the oil level falls between the max. and min. oil level heights indicated in the dimensional outline drawing. Further, as the suction port is provided with an Rp thread, you can extend the suction pipe length of the pump by adding extra pipes. So long as the oil level is above the min. oil level at the time of start-up, oil discharge can continue even if the oil level is lowered.

(2) Piping

For connection of the delivery outlet and the suction inlet when extending the pump length, be sure to select the appropriate pipes according to Table 2. Air leak, if taking place on the suction side, deteriorates pump performance, resulting in oil leak on the delivery side. Be sure, therefore, to completely seal the connections (thread parts) with sealing tape, etc.

(3) Oil Tank

Be sure to attach an overflow device to the tank to prevent cutting chips, etc. from entering.

Also, bubbles, if existing many, can cause a decrease in pump performance.

As the suction port is located at the pump bottom, be sure to create a space between the suction port and the tank bottom. This also applies to the end when pipes are connected.

Table 2 Piping Table

Type	Model	Delivery side		Suction side		Pump installation bolts
		Pipe size	Thread size	Pipe size	Thread size	
High flow rate	NQD-e751H NQD-e1502H NQD-e2203H NQD-e3004H NQD-e3705H	Gas pipe 1 ½ B	Rp 1½ thread (pipe thread)	Gas pipe 2B	Rp 2 thread (pipe thread)	M10 (×4)
Long head	NQH-403H NQH-e753H NQH-e1104H NQH-e1505H	Gas pipe 3/4 B	Rp ¾ thread (pipe thread)	Gas pipe 1 ½ B	Rp 1½ thread (pipe thread)	M10 (×4)

(4) Filter

Cutting chips, by being sucked into the pump, blocks up impeller clearance and can restrict motor operation.

Use of the filter specified in Table 3 is recommended.

Table 3 Filter

Series	Filter size
High flow rate /Long head	50 meshes (wire diameter ϕ0.24) or more

(5) Power Source Connection

The terminal box of the coolant pump can be freely changed in all directions. All except a few models are fitted with a terminal blocks which facilitates connection of power lead wires.

Tightly connect the power cable and the motor lead wire so that the terminals are not loosened. Failure to do this can cause electric shock, personal injury, fire disaster, etc.

(6) Protection

Install a switch and a fuse in accordance with regulations of the power company.
When using a switch commercially available, be sure to use it by placing a fuse of capacity which is 3 to 4 times as much as the current specified on the name plate. Further, excessively high oil viscosity can cause burning of the motor in single phase operation or in the case of entry of foreign matter. Where such danger is expected, you are recommended to use the Mitsubishi MS-K type electromagnetic switch for overload protection and for motor start-up. For thermal current setting, be sure to use the max. allowable current specified in the catalog. Also, be sure to use the earth terminal which is provided inside the terminal box.

(7) Voltage

When voltage drop is excessive, not only expected pump performance is not obtainable but also reduction in motor torque takes place, increasing current. Please pay attention as this can result in motor coil burning.

(8) Rotation Direction

The rotation direction is clockwise when viewed from above. When it is in reverse rotation, interchange two of the three terminals.

(9) Oil Volume Control

Oil volume can easily be controlled on the delivery side by use of the stop cock and the gate valve. (Use of the stop valve is not recommended because of excessive resistance involved.) Use current which is below the max. allowable level specified in the catalog.

(10) Fluids Used

Although the pump performance is indicated in values taken from tests using clean water, water cannot be used for actual operation due to rusting problem. When you want to use cutting fluid other than the one specified in the JIS K2241, be sure to contact Manufacturer beforehand.

(11) Dry Operation (without water)

Avoid dry operation. (It leads to damaged parts and pump failure.)

4. Maintenance

(1) Temperature Increase

Motor temperature increases after starting of operation and becomes stable at a certain level in 2 or 3 hours. The coolant pump can withstand up to [ambient temperature] + [coil temperature increase (resistance method)] = 120°C through use of Class B insulation. When using ambient temperature above 40°C, contact Manufacturer.

(2) Shielded Ball Bearing

Because of use of the shielded ball bearing enclosing best quality grease, good lubrication performance is ensured to minimize maintenance task and promises long service life.
When a ball bearing becomes defective, select one from Table 4 for replacement.
(Place an order for shielded ball bearings with our distributor, specified agent, dealer, or service center.)

Table 4 List of Ball Bearings

Series	Type	Ball bearing	
		Upper bearing (Opposite side of pump)	Lower bearing (Pump side)
High flow rate	NQD-e751H	6203CXZZ	6306ZZ
	NQD-e1502H	6204CXZZ	6306ZZ
	NQD-e2203H	6204CXZZ	6306ZZ
	NQD-e3004H	6204CXZZ	6306ZZ
	NQD-e3705H	6206ZZ	6308ZZ
Long head	NQH-403H	6203CXZZ	6305ZZ
	NQH-e753H	6204CXZZ	6306ZZ
	NQH-e1104H	6204CXZZ	6306ZZ
	NQH-e1505H	6204CXZZ	6306ZZ

(3) Daily Maintenance

Besides paying attention to the operation state during daily use, not much maintenance is required. However, the cooling performance will drop if dust accumulates on the outer surface of the motor. Periodic cleaning, therefore, is necessary. Also, periodically clean the oil tank or exchange oil so that no foreign matter remains in oil.

When using a filter, accumulation of cutting chips on the filter results in an increase in pressure loss during suction, lowering performance. Periodic cleaning is therefore required.

(4) Cleaning Inside Pump Chamber

Cleaning inside the pump chamber is not especially required. When motor restriction, emission of abnormal noise, sharp drop in pump performance, etc. has occurred caused by inclusion of foreign matter, disassemble the pump and remove attached foreign matter by air blow or using soft rags, etc.

◎ How to disassemble pump (See the structural drawing.)

Loosening the installation bolt (21) and the nut (20), remove the suction bracket (17), the impeller (15) and the casing (16).

5. Pump Performance

As for pump performance, see the Characteristics Drawing in the catalog. The value on the name plate indicates the discharge when clean water is used. (A slightly higher performance is obtained when 220 V/60 Hz is used than when 200 V/60 Hz is used.) However, pay enough attention as a large change in discharge rate can occur in the following cases:

(1) Friction Loss of Piping

The discharge rate is obtained by subtracting the actual head and the head loss due to friction, etc. in the piping and joints from the "discharge rate — total head" curve. As it can vary depending on smoothness of the inside surface of the piping, discharge rate, and viscosity, see the catalog for further details.

(2) Viscosity and Pump Performance

As viscosity of the oil used increases, motor load also is increased and the discharge rate is lowered. For the coolant pump, you can use oil whose viscosity conforms to Table 5. Oil viscosity changes substantially according to temperature, which is increased during wintertime as oil temperature is lowered, leading to increased motor load. To this, you are requested to pay attention. The permissible viscosity stated in Table 5 should be assumed as the oil viscosity in 1 hour from start of machine operation. Especially, when using oil with very high viscosity, be sure to contact Manufacturer beforehand.

Table 5 Permissible Viscosity

Series	Permissible viscosity
High flow rate	75 mm^2/S {cst} (Approx. 300 Redwood seconds)
Long head	32 mm^2/S {cst} (Approx. 130 Redwood seconds)

6. Troubleshooting

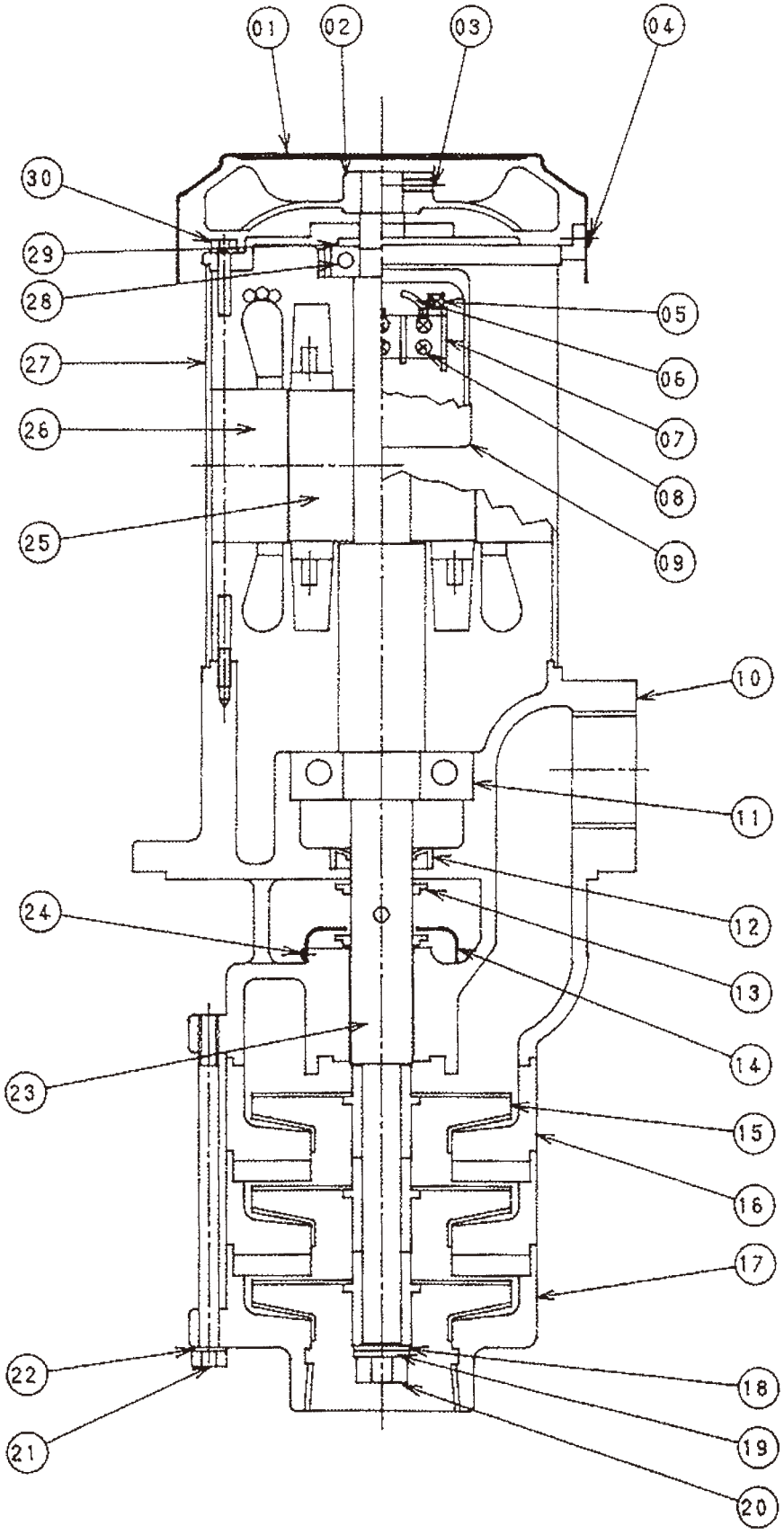
Table 6 Troubleshooting

Description	Cause	Measures
Pump does not rotate and no sound is heard.	Breaker has tripped.	Return the breaker lever.
	Connecting cable is cut off.	Replace the cable.
	Stator coil is disconnected.	Have a specialist repair.
	Switch contact is defective.	Adjust the contact section.
Pump does not rotate and groan is heard.	Voltage is low.	Contact the power company.
	One phase of the cable is broken.	Replace the cable.
	Stator coil is disconnected.	Have a specialist repair.
	Rotor and stator are contacting due to bearing wear.	Replace the ball bearing.
	Switch contact is defective.	Adjust the contact section.
Pump is rotating in reverse.		Interchange two of the three terminals.
Pump rotates and groan is heard.	Rotor and stator are contacting.	Have a specialist repair.
	Gap between rotor and stator is unbalanced.	
	One phase of the stator coil is short circuited.	
Oil flows but discharge rate is low.	Foreign matter has entered the suction pipe.	Perform inspection and cleaning.
	Air leak exists in the suction side piping.	Repair the piping.
	A large quantity of bubbles exist in the oil tank.	Remove the cause of the bubbles.
	Impeller is worn.	Replace the impeller.
	Foreign matter is sticking to inner wall of pump chamber.	Clean inside of the pump chamber.

7. Construction/Parts Names

Table 7 Parts Table

Reference No.	Parts name
1	External fan cover
2	External fan
3	External fan installation screw
4	External fan cover installation screw
5	Terminal box installation screw
6	Lead wire
7	Terminal block
8	Terminal screw
9	Terminal box
10	Bracket
11	Ball bearing
12	Oil seal
13	Fringer
14	Cover
15	Impeller
16	Casing
17	Suction bracket
18	Plane washer
19	Spring washer
20	Nut
21	Installation bolt
22	Spring washer
23	Shaft
24	Cover installation screw
25	Rotor
26	Stator
27	Frame
28	Ball bearing
29	Preload spring
30	Installation bolt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Should you have any difficulties or questions, feel free to contact your nearest distributor, specified agent, dealer, sales office, or service center.

Also, when you place a request for repairs or an order for spare parts, please specify the following items. (As for the names of spare parts, please refer to "7. Construction/Parts Names".)

(1) Type as stated on the name plate

(2) Serial number

(3) Period of service

(4) Name of machine on which the pump is mounted

(5) Location/state of failure

(6) Parts names and necessary quantity

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