

CAUTIONS ON USING PUMPS AND MOTORS

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PUMPS AND MOTORS

1. To avoid serious accidents and injuries!

- Thoroughly read “Cautions on Using Pumps” in the Operating Manual and make sure you understand the information in this section before operating a pump or motor.
- The cautions and warnings below do not cover all possible dangers. Read through the Operating Manual before using a pump / motor and give top priority to safety during use.
- To ensure safe use of the products, observe the applicable regulations.
 - Fire Service Act
 - Industrial Safety and Health Law

2. Use a Product of the Correct Type

- ⚠ WARNING There are many hydraulic devices that have the same or similar outside dimensions. When installing a pump / motor, check the specification indicated on the nameplate or the inscribed information to confirm that the pump / motor is the correct one.
- ⚠ DANGER When installing a pump / motor in an explosive or combustible environment, be sure to use a product suitable for this operating environment.

3. Handling of Products

- ⚠ CAUTION Wear appropriate protective gear when handling a pump / motor to avoid injury.
- ⚠ CAUTION A pump / motor is a heavy object and careless handling can cause hand crushing injuries or back injuries. Pay careful attention to your working method.
- ⚠ CAUTION Do not stand on a product, knock it, or drop it, and also avoid exerting external force on it. Failure to observe this instruction can cause malfunctioning, damage, oil leakage and other product failures.
- ⚠ CAUTION Completely wipe any hydraulic oil off the product and shop floor. Failure to observe this caution can cause an operator to drop the product or sustain injuries by slipping.

4. Installation / Removal / Piping / Wiring of Pumps / Motors

- ⚠ CAUTION Only personnel with sufficient knowledge are allowed to install / remove pumps and motors (including piping).
- ⚠ WARNING Connection of cables and other electrical work must be carried out by an authorized person.
- ⚠ WARNING Shut off the power supply to the pump / motor and ensure that the motor or the engine has stopped completely before starting work such as installation, removal, piping or connection of cables. Also release the residual pressure from the system and confirm that the system is completely free from residual pressure before starting the necessary work.
- ⚠ CAUTION The pump / motor mounting base must have sufficient rigidity.
- ⚠ CAUTION Avoid undue load being exerted on the pump from the piping (particularly on steel pipe connection). Even if the pump is centered at the installation, problems such as poor centering accuracy by deformation, poor performance of pump, decrease in life or breakage could occur if any excessive load is applied from the piping. The same care must be taken also on excessive load being exerted from the piping as a result of vibration on equipment or sudden changes in pressure during operation.
- ⚠ CAUTION The pump / motor mounting faces and holes must be clean.
- Soiling will cause trouble such as breakage and oil leakage due to insufficient tightening of bolts and damage seals.
- ⚠ CAUTION Confirm that the rotating direction of the pump, indicated by the arrow symbol nameplates or inscribed symbols, and the rotating direction of the motor or engine, operated independently, agree with each other. Install the pump only after confirming this.
- ⚠ CAUTION Before connecting the pump to the coupling, operate the motor independently to confirm that it rotates in the same direction as indicated on the arrow symbol nameplate, inscribed symbols, or other.
- ⚠ CAUTION Confirm that the runout of center or face at the installation of pump / motor is within the allowable value.
- Use a flexible coupling not to exert the radial or thrust load to the shaft.
- Unless the shaft is centered properly, it could damage the bearing or oil seal, or damage the shaft. Pay careful attention to the centering of shaft.

Coupling	Axial eccentricity	Angle error
Chain coupling	0.05 mm or less	Within 0.5°
Dry coupling	0.5 mm or less	Within 1°

Never use the belt drive.

- ⚠ CAUTION Do not subject the pump shaft or motor shaft to shock by tapping them with a hammer during installation or removal. Failure to observe this instruction can cause damage to the product or deteriorate its functions significantly.
- ⚠ CAUTION Make sure that the shaft end will be inserted in the coupling more than 2/3 of the length of coupling.
- ⚠ CAUTION When installing a pump or a motor, always use the specified bolts and tighten them to the specified torque. Installation of a pump or a motor not meeting the specification may cause operation failure, break and or oil leaks.
- ⚠ WARNING Securely fix the part that connects the rotating shafts of the pump and motor so that they will not become disconnected or fly out during operation. Also provide a protective cover to prevent entangling of hands, clothing, etc.
- ⚠ WARNING Shut off the power supply before starting electric cable connection work. Failure to observe this instruction cause electric shock.
- ⚠ CAUTION If drain piping is necessary, turn the drain pipes such that the pressure in the casing does not exceed 0.03 MPa. Return the drain directly to the reservoir with care to release in the oil.
- ⚠ CAUTION If the space within the casing has to be filled with hydraulic oil during operation, runt the drain pipes so that the space in the casing is always filled with hydraulic oil and air is not allowed to enter. Consideration must also be paid to the design of the drain pipe run so that the space within the casing is filled with hydraulic oil even if the pump is not operated for a long time.
- ⚠ CAUTION When a pump other than one with a pressure compensation function (with the maximum pressure adjustment function) is used, install a relief valve that regulates the maximum hydraulic circuit pressure near the pump outlet.
- ⚠ CAUTION When connecting a pipe to the suction side, supply a pressure within -0.02 to +0.03 MPa and a flow rate within 2 m/sec to the suction side. Also install a suction filter or strainer of 150 mesh at the suction side.
- ⚠ CAUTION It is recommended to provide a circuit that can make the discharge pressure no load, on the pipe at the discharge side in order to facilitate air bleeding from the pump and suction pipe at starting. If a line filter (10 to 40μ) is installed on the return circuit to the reservoir, it is effective to prevent failure by contamination of hydraulic oil and extend the pump life.

5. Running the Pump / Motor

- ⚠ WARNING Before operating the equipment where the pump and motor are installed, confirm that the hydraulic circuit and electric cable connection are correct and that there is no looseness in the coupling.

- ⚠ WARNING Never operate the system without installing covers on rotating parts.
- ⚠ WARNING Take measures to ensure that clothing and accessories will not be caught by rotating parts. Never try to touch these parts.
- ⚠ WARNING Start the system with pressure controlling devices such as relief valves at a low pressure setting. Confirm the pressure setting with pressure gauge or other appropriate device. Run the system only after confirming that it has started correctly at a low pressure setting; and check that the system is running at the correct pressure.
- ⚠ WARNING Press the emergency stop switch or shut off the power supply if an abnormality is found at the start of system operation.
- ⚠ WARNING If the pump / motor has an oil filler port in the casing, fill the casing with hydraulic oil by supplying fresh hydraulic oil through the oil filler part in the following cases – when starting operation for the first time, after inspecting / repairing the hydraulic circuit, or when starting the system after a long stoppage. Wipe spilled oil cleanly not to mistake it as a leakage from the pump or motor.
- ⚠ CAUTION Repeat inching operation until the pump draws in hydraulic oil correctly. If the pump fails to draw in hydraulic oil correctly even after repeated inching operation, bleed the air from the hydraulic pipes (air bleed valve HAB3-T*-02). If air bubbles and hydraulic oil flow through the air bleed plug or the pump operation sound changes, tighten the air bleed plug immediately and keep running the pump in the no-load state for approximately 5 minutes.
- ⚠ CAUTION Start the motor at a low load and confirm that it is rotating in the correct direction.
- ⚠ CAUTION Operate the pump / motor correctly according to the pressure, flow, rotational speed, oil type, oil temperature, viscosity and other specifications stated in the operating manual, catalog, drawing, specification and other documents.
- ⚠ CAUTION If the pump operation sound is louder than normal, it may be an indication of cavitation. If the sound is loud, check the level of hydraulic oil in the reservoir, and check for clogging of the suction strainer and filters and looseness of the suction pipe.
- ⚠ CAUTION Check that the surge pressure generated when the system starts and stops and when the speed is changed is within the allowable range.
- If the operation sound differs from that observed during normal operation, the pump / motor may be faulty. The operation sound changes if the pump suction side strainer and filter are clogged or if component parts are abnormally worn or point to break.
- Remember the normal system operation sound so that you can detect changes in the operation sound at an early stage and find abnormality quickly.
- ⚠ CAUTION Grease used during assembly may come out from the pump shaft or joint between the pump and the motor at the beginning of use of motor and pump. Take care not to mistake it as an oil leak.
- ⚠ WARNING Do not touch the pump / motor casing during operation since they may become hot.
- ⚠ WARNING Stop operation immediately and take necessary corrective measures if any abnormality, such as abnormal noise, abnormal heating, abnormal vibration, oil leakage, smoke or an abnormal smell, is detected. It is advisable to use sensors that detect abnormalities. Failure to observe this instruction can cause damage, fire, and injury.
- ⚠ CAUTION Do not run the system in normal loaded operation while using a high-viscosity oil. Failure to observe this instruction can cause failure of the system.
- ⚠ WARNING Check if the system is running under an excessively high load by reading an ammeter. An excessively large load is caused by faulty installation, seizure and other factors. Eliminate the cause of the trouble before operating the pump / motor.

6. Management of Hydraulic Oil

- ⚠ CAUTION Use the R&O type and abrasion-resistant hydraulic oil, ISO VG32 to 68, or equivalent and in the recommended proper ranges of oil temperature and viscosity.
- Recommended proper viscosity is 20 to 100 mm²/s for the pump. Use the oil in the following range.
- ISO VG 32: Oil temperature 0 – 60°C (350 – 15 mm²/s)
- ISO VG 46: Oil temperature 6 – 65°C (350 – 18 mm²/s)
- ISP VG 68: Oil temperature 13 – 65°C (350 – 25 mm²/s)
- ⚠ CAUTION Operate with a circuit configuration that will maintain always the degree of pollution of hydraulic oil to be used within the recommended value, and check the pollution and the filter regularly. Also inspect regularly conditions of oxidizing, deterioration and water content of hydraulic oil, and replace the oil if it exceeds the recommended values of the maker of hydraulic oil.

Recommended control standard of hydraulic oil (Replacement standard)

Property	Petroleum base oil	Water-glycol	Fatty acid ester
Specific gravity 15/4°C	0.05 or less		
Viscosity change %	10 to 15	10 to 15	10 to 15
Total oxidation mgKOH/g	0.5 or less		
Insoluble part N pentane %	0.5 or less		
Water %	0.1 or less	35 or less	0.1 or less
PH		09 or less	
Contaminants mg/100 ml	10 or less	10 or less	10 or less

- Replace when it emulsifies due to mixed water, even if it is within the control standard value.
- Recommended pollution level is within NAS12 for general hydraulic line and NAS6 or less for servo valve line.

- ⚠ CAUTION Flash the inside of circuit sufficiently before changing the hydraulic oil to be used. Avoid also mixing with a different kind of hydraulic oil.
- ⚠ CAUTION Use within the operating ambient temperature at 0 to 60°C.

7. Maintenance and storage

- ⚠ CAUTION Refrain from modifying, disassembling or reassembling the pump and motor. It may fail to achieve the specified performance, resulting in failure or accident. Please consult us when it is obliged to modify, disassemble or reassemble.
- ⚠ CAUTION When transporting or storing the pump and motor, take care of the environment conditions such as ambient temperature, temperature and ensure the prevention of dust and rust.
- ⚠ CAUTION When using the pump and motor after a long time stoppage, it may be necessary to replace seals.
- ⚠ CAUTION Oil leaks from hydraulic devices or equipment, if they are unattended, could cause serious accident. Repair or take other appropriate measures.