

Cooling Tube Description

The internal cooling tube accessory is a network of finned cooling tubes, factory installed in the base of a gear drive housing for heat removal. The cooling tubes operate submerged in the oil of the drive sump. The revolving elements provide the necessary oil flow around the cooling tubes for efficient heat transfer. No oil pumps are required. The external requirement for the cooling tube system is a clean water hookup supplying a flow rate of two gallons (7.6 liters) per minute at a maximum temperature of 70°F (21°C) to obtain the system catalog thermal horsepower rating with a sump oil temperature of 200°F (93°C).

The number of cooling tubes required varies with drive size, type and number of reductions. Cooling tubes are connected in series to maintain the optimum water flow velocity in the tubes with the specified water flow rate of two to five gallons (7.6 to 19 liters) per minute. NOTE: A typical PC cooling assembly requires between two to 30 gallons (7.6 to 113 liters) of water per minute, depending upon PC size and cooling requirements.

All cooling tube system connections are made outside of the housing to eliminate the possibility of water leakage into the drive sump. Seal rings are used at all connections for ease of disassembly and reassembly. The standard cooling tubes are 90/10 copper nickel alloy with aluminum fins. Cooling tube connections are cadmium plated mild steel with “Buna-N” seal rings.

Water connections are .500”-14 NPT fittings. The water inlet connection is a straight fitting located on the lowest cooling tube in the drive.

The water outlet connection is a right angle fitting (faced up) located on the uppermost tube in the drive. The cooling tube system connections are selected and located so that the cooling system is always full of water during operation for maximum heat transfer. The water inlet and outlet connections may be moved to the opposite end of the drive by removing the water inlet, outlet and all “loop end” fitting assemblies and by reinstalling them on the same tubes at the opposite end of the drive. Refer to the Maintenance Instructions on Page 2 and Figures 7 & 8 on Page 3 for disassembly and reassembly.

Installation & Operation

1. Connect the .500”-14 NPT straight water inlet fitting to a source of clean fresh water. Water must be regulated to a minimum of two gallons (7.6 liters) per minute and must not exceed 70°F (21°C).
2. Connect the .500”-14 NPT right angle water outlet fitting (faced up) to an open drain. Do not pressurize the cooling tube system. The turned up water outlet fitting ensures that the system is always full of water during operation.
3. Control water flow rate to between two and five gallons (7.6 and 19 liters) per minute to minimize fouling at low flow rates or tube erosion at high flow rates. The water flow rate may be reduced to one gallon (3.8 liters) per minute if clean fresh (drinking quality) water is used and the sump oil temperature can be maintained within the maximum limit of 200°F (93°C).
4. For shutdowns at ambient temperatures less than 32°F (0°C), drain the cooling tube system by removing the “loop end” assemblies on the end of the drive opposite the water inlet. Refer to Figure 8 on Page 3 for typical assemblies and record location of assemblies for reinstallation purposes.

Assembly of Seal Ring Fittings

NOTE: For disassembly of seal ring fittings, reverse the steps of the following assembly procedure.

1. Figure 1 — Deburr tube end to prevent cutting the rubber seal ring during assembly.
2. Figure 2 — Slide nut and tapered split ring on tube. The large end of the tapered split ring must face the fitting body.
3. Figure 3 — Lubricate the rubber seal ring. Insert the tube into the fitting body past the rubber seal ring.
4. Figure 4 — Slide the tapered split ring against the fitting body. Lubricate O.D. of tapered split ring with #2 bearing grease.
5. Figure 5 — Assemble nut to fitting and tighten hand tight. Turn nut with a wrench one turn or until the tapered split ring is flush with the end of the nut.

Figure 1

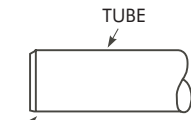


Figure 2

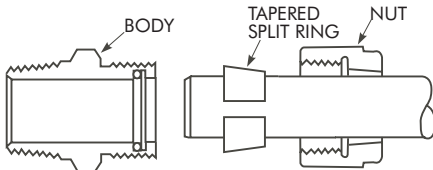


Figure 3

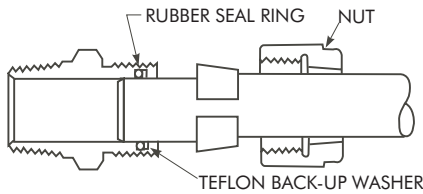


Figure 4

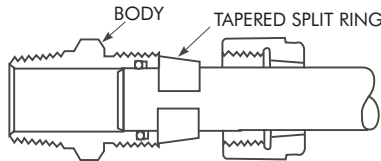
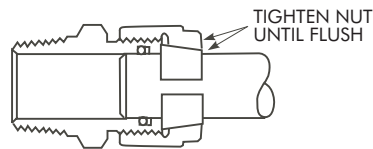


Figure 5



Maintenance Instructions

The cooling tube system is designed to be removed from the drive housing without disturbing the drive or its foundation, provided sufficient room is available at either end of the housing for tube withdrawal. All tube connections are outside the drive and are of the seal ring type for ease of maintenance and reusability.

Light coatings of sludge or scale will cause a reduction in heat transfer capacity of the system. Therefore, periodic cleaning of the system may be required to restore the heat transfer capacity.

The cooling tube system may be cleaned by flushing with commercially available cleaning compounds such as "oakite" or "dowell." The commercially available cleaning compounds are corrosive and must be used in accordance with their manufacturer's recommendations. Cleaning may also be accomplished by means of a rod or wire brush. Remove the tube end seal ring fittings (Figures 7 and 8 on Page 3) and pass a .500" diameter rod or wire brush through the tubes (tube I.D. is .527") to remove the scale. After cleaning all tubes, reinstall the tube end seal ring fittings.

The outside of the cooling tubes (aluminum fins) may be cleaned by removing the tubes from the housing and cleaning with steam or a suitable solvent. To remove the tubes from the housing, remove all seal ring fittings from the tubes. Remove the 1.250-11 NPT x .750-14 NPT pipe bushings from one end of the drive. A special deep well, thin wall socket (1.812 hex by 7" deep) may be required to remove and reinstall the pipe bushings.

CAUTION: Take care not to damage cooling tube ends during disassembly, cleaning and reassembly.

Withdraw the tubes from the housing through the 1.250-11 NPT holes using a .375" diameter rod through the tube as a disassembly and reassembly aid. After cleaning, reinstall the tubes in the drive. Coat pipe bushing threads with thread sealant and reinstall the pipe bushings and tube fittings in the reverse order of disassembly. Install the loop end assemblies in the same positions as before disassembly.

Refer to Column 1 for seal ring fitting assembly procedures. Seal ring fittings use standard No. 114 (.625 I.D. x .812 O.D. x .094 W) Buna-N seal rings readily available locally if replacements are required.

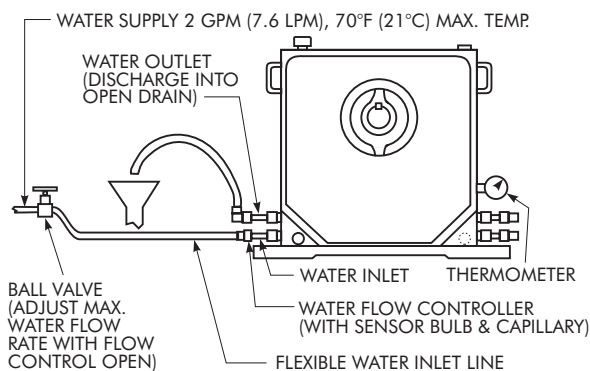
Accessories

A sump temperature sensing water flow controller and sump temperature indicator (thermometer) are available accessories for the internal cooling tube system. It is recommended that a thermometer be used with a water flow controller. Additional holes in the housing are required for these accessories and should be referred to the Factory at the time of order.

Water Flow Control Valve

A water flow control valve is recommended where the availability or cost of water is at a premium or where automatic water shutoff or constant temperature is desired. The standard water flow control valve is an adjustable capillary type temperature sensing flow modulating valve. The flow control valve should be installed in series with a ball valve to limit maximum water flow. Refer to Figure 6 for recommended plumbing diagram. The water flow control valve will control water flow rates to less than two gallons (7.6 liters) per minute, consequently, the cooling tubes will be subject to increased fouling and may require cleaning at more frequent intervals.

Figure 6

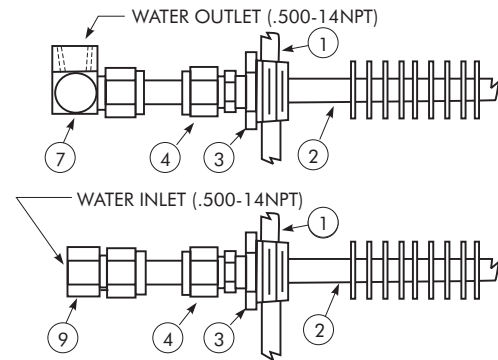


Thermometer

The standard thermometer is a bimetallic dial type instrument.

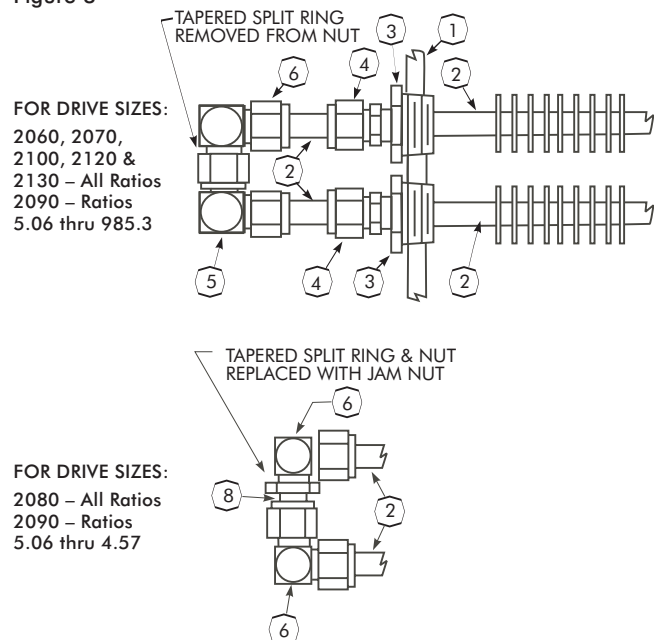
Cooling Tube Inlet & Outlet Connection Assemblies

Figure 7



Cooling Tube Loop End Connection Assemblies

Figure 8



- ① Drive Housing Wall
- ② Cooling Tube
- ③ Pipe Bushing (1.250 x .750)
- ④ Male Connector (Lenz 100-10-12)
- ⑤ Special Lenz Elbow Fitting (Falk Part #1199037)
- ⑥ Union Elbow (Lenz 500-10)
- ⑦ Female Elbow (Lenz 450-10)
- ⑧ Tubing (.625 O.D.)
- ⑨ Female Connector (Lenz 250-10)
- ⑩ Jam Nut-Hex (Lenz 208-10)