

MACHINING QUICK TIPS:

Exploring the Tools

Causes of Shaft Seal Leaks in Char-Lynn S Series Hydraulic Motors

By David Briggs, Sr. Controls Engineer at CLIMAX - July 2021

I have been using Char-Lynn hydraulic motors for over 30 years, long before I came to work at CLIMAX. These motors are simple in design, well built, rugged, and very reliable. Even the most reliable motors can sometimes have failures. Although not very often, oil leakage at the shaft seal is the most common failure on these motors.

You will see even fewer failure rates on these motors when used with the CLIMAX hydraulic power units (HPU). The CLIMAX HPU's are designed to have low pressure in the return lines. You will also find the CLIMAX machines do not run continuously for long periods under conditions that contribute to premature seal failure.

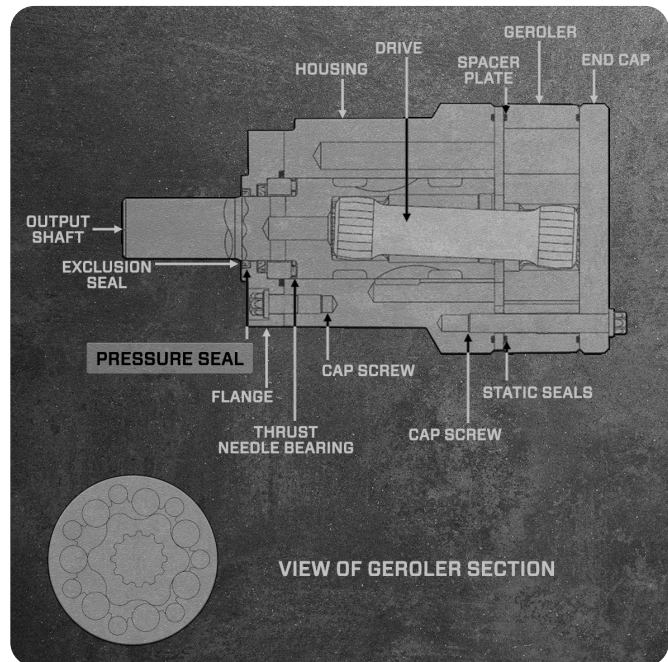
The most common causes of premature shaft seal failure are:

1. **Exceeding the maximum rated oil flow through the motor.** These motors are rated for 15 GPM continuous and 20 GPM intermittent flow (intermittent is not more than 10 seconds every minute). Forcing higher flow rates through the motor causes increased heat and high-pressure drop across the motor.
2. **Exceeding the maximum rated pressure.** High pressure in the system is caused by running the motor at pressures higher than the rated pressure for long periods. Please note that the pressure of the motor rating goes down as the size of the motor increases, and the three largest motors have substantially lower pressure ratings.

Maximum rated pressure

Motor Displacement Cu-In/Rev	Maximum Rated Pres-sure (Continuous)
3.6	2000 PSI (13.8 Mpa)
4.5	2000 PSI (13.8 Mpa)
5.9	2000 PSI (13.8 Mpa)
7.3	2000 PSI (13.8 Mpa)
8.9	1900 PSI (13.1 Mpa)
9.7	1900 PSI (13.1 Mpa)
11.3	1850 PSI (12.6 Mpa)
14.1	1700 PSI (11.7 Mpa)
17.9	1500 PSI (10.3 Mpa)
22.6	1300 PSI (9.0 Mpa)

3. **High oil temperature.** If the hydraulic oil temperature is too high (above 180 degrees F), then the seal will get hard very quickly and begin to leak.
4. **High pressure on the return side of the hydraulic circuit.** Two hoses connect to the hydraulic motor. One hose is for high-pressure, and the other hose is for low-pressure return. All hydraulic motors leak internally from the high-pressure working part of the motor into the low-pressure outer housing. The leaking oil automatically drains from the motor through the low-pressure return hose. If the low-pressure return hose pressure is high, it adds pressure behind the



shaft seal and causes leaks. On these Char-Lynn motors, the pressure on the low-pressure return hose should not be more than 1000 PSI (6.9 Mpa) or so.

5. **Internal wear of the hydraulic motor.** These motors do not have internal rubber seals. The oil in the high-pressure working group is contained by tight metal to metal internal parts. As the motors wear, the tolerances get loose and allow more oil to escape into the motor's housing, putting pressure on the shaft seal. Replacing the seal will not solve the problem. The new seal will begin to leak if the motor has worn out. **How to test if the motor is worn-out:**
 - a. Remove both hoses from the motor so that the ports are open
 - b. Grab the motor output shaft with pliers that are about 6-inch long
 - c. Turn the shaft
 - d. If the shaft turns easily by hand, the motor is worn out internally. If the shaft is resistant to turning with the pliers, the motor is good.

By far, the most common cause of shaft seal leaks is that the motor is worn out and is leaking excessive amounts of hydraulic oil into the low-pressure side of the housing.

Special tools needed to repair seal:

Seal kit (CLIMAX part number 95942)
5/16-inch, 12-point socket

About the Author: David Briggs is the Senior Controls Engineer at CLIMAX, the world's foremost manufacturer of portable machining, welding, and valve testing equipment. For the past 20 years, David has been working closely with on-site machinists, helping them to be successful in their most challenging projects..

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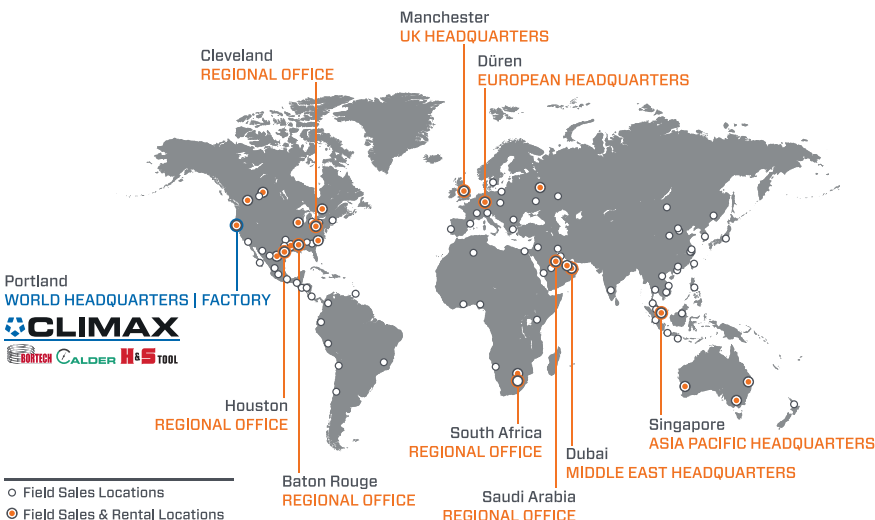
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