

## Hydraulic Motor Case Drain Line

### What is a Case Drain Line?

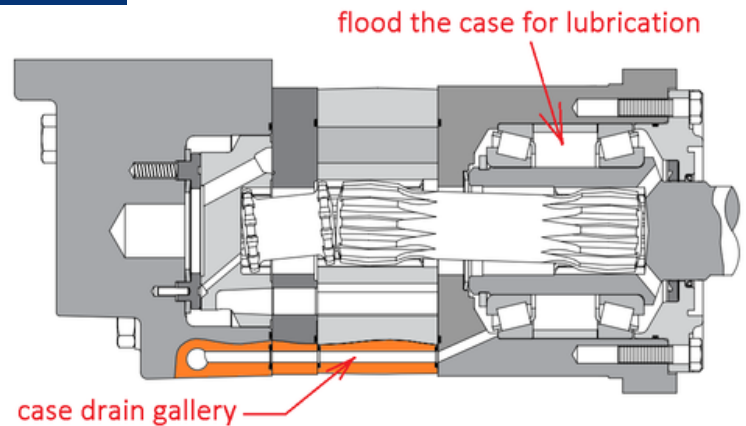
A case drain (sometimes called a "third line") is a small line that allows internal leakage (oil that seeps past gears/bearings/seals inside the motor housing) to escape rather than pressurize the motor case. It helps protect the shaft seal and other internal parts.

### Functions & Benefits of a Case Drain

- Relieves internal pressure inside the motor casing. If pressure builds up, it can blow out shaft seals or cause leaks.
- Helps with lubrication and cooling of internal parts. The leaked fluid can help cool or wash internal parts if it can flow freely.
- Reduces risk of premature failure of seals / leaks / shaft damage

### When it May Be Optional

- If the motor is a relatively simple gear (or internal/gerotor/geroller) type, operating in an open-circuit hydraulic system, return flow directly to tank with low back-pressure. In those cases the leakage in the case may be tolerable without a separate line.
- If the gear motor has a high-pressure shaft seal and/or internal check valves that prevent pressure from building in the case, redirecting leakage into the return line. These features can sometimes make a separate case drain less critical.



### When a Case Drain is Required or Strongly Recommended

- If the motor manufacturer specifies a case drain port or an external drain. Always follow the specs.
- If outlet/return pressure could exceed what the shaft seal can handle. If the motor's outlet is under high back-pressure, that pressure can force fluid into the case and over tax the seal.
- If the motor is used in reversing or bi-directional applications where pressure swings might be high. Seal and case pressure during reversing can damage seals without good drainage.
- If reliability is critical or the duty cycle is severe (high torque at low speed, high load, long run times) — more likely to benefit from the protection.



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### Key Design/Implementation Considerations

- If you do use a case drain, make sure the drain line is sized properly (the hose or fitting should match or exceed the outlet port size of the case-drain connection) to avoid back pressure.
- The return point (where the case drain dumps back into the system or tank) should have low pressure. If the return line is itself under high pressure, that negates the benefit.
- The case drain fluid is often hot; routing/sizing should accommodate this. Some systems route it through a cooler if necessary.

### Downsides / Trade-Offs of Adding a Case Drain

- Adds extra plumbing & hardware (hoses, fittings), complexity & cost.
- If installed incorrectly (undersized hose, too much back pressure, poor routing), it can do more harm than good (seal damage, overheating, leaks).
- Slight increase in potential leakage lines to maintain.

### Do You Need One?

- If you're designing for reliability, high load, high back-pressure, reversing, or critical operation → Yes, you should include a case drain line (or ensure your motor has equivalent internal check-valves / high pressure seals that can handle the case pressures).
- If it's a simple, moderate duty gear motor with low outlet pressure, consistent return to tank, open circuit, and minimal reverse loads, then you may be able to skip a separate case drain — but you're accepting more risk.

