

PUMP Brief

Hydraulic Pump Division

AS-0054

Gold Cup Solution Series: Part 11

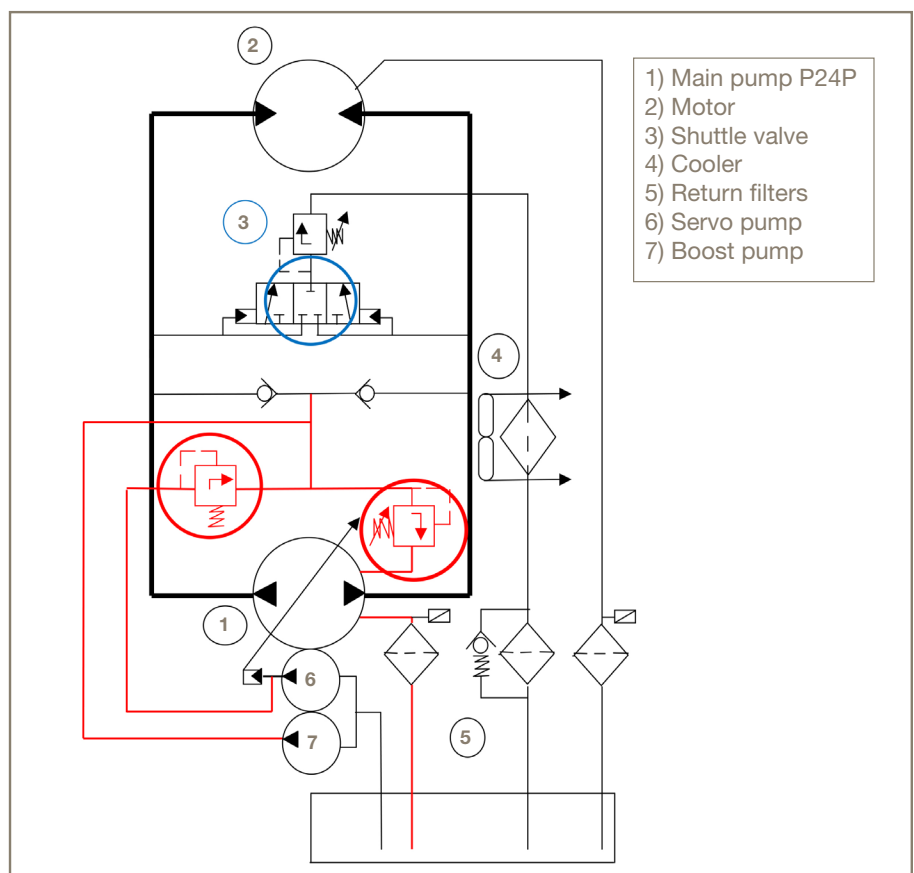
Modifications To Improve Gold Cup Closed Circuit Systems

Typical closed circuit applications are cranes, conveyors, winches and process machinery. Generally these systems are designed to work when the electric motor/diesel is running. But, in reality, there are many instances where the motor keeps running while waiting for an activity to conclude to return to a working mode.

While these wait times are supposed to be minimal, they can stretch into hours, and sometimes days, when the motor keeps running. This creates a lot of heat within the hydraulic system and is very inefficient. The following are modifications that can be made to improve closed circuit systems.

Circuit Diagram 1

This is a standard closed circuit schematic that in neutral shows the hot oil shuttle blocked (Item 3 in blue). As such, there is no oil going from the circuit back through the cooler and filter to the tank. In fact, all of the oil from the servo and boost pumps (Items 6 & 7) is going across the servo and boost relief valves and into the case. This causes the oil to heat up. And, at the same time there is no oil at all going through the cooler (Item 4).



Circuit Diagram 1

The only advantage to this situation is that the pump case gets flushed to help keep the case temperature down. But, eventually the tank temperature will rise to the point where the system overheats.

To prevent this from happening, the circuit has to be modified so that regardless of the pump being left in a neutral, non-working mode with the electric motor or diesel running, there is as much cooling as possible. This easily can be achieved with the addition of a 5-bar check valve and a few hoses. *Reference Circuit Diagram 2.*

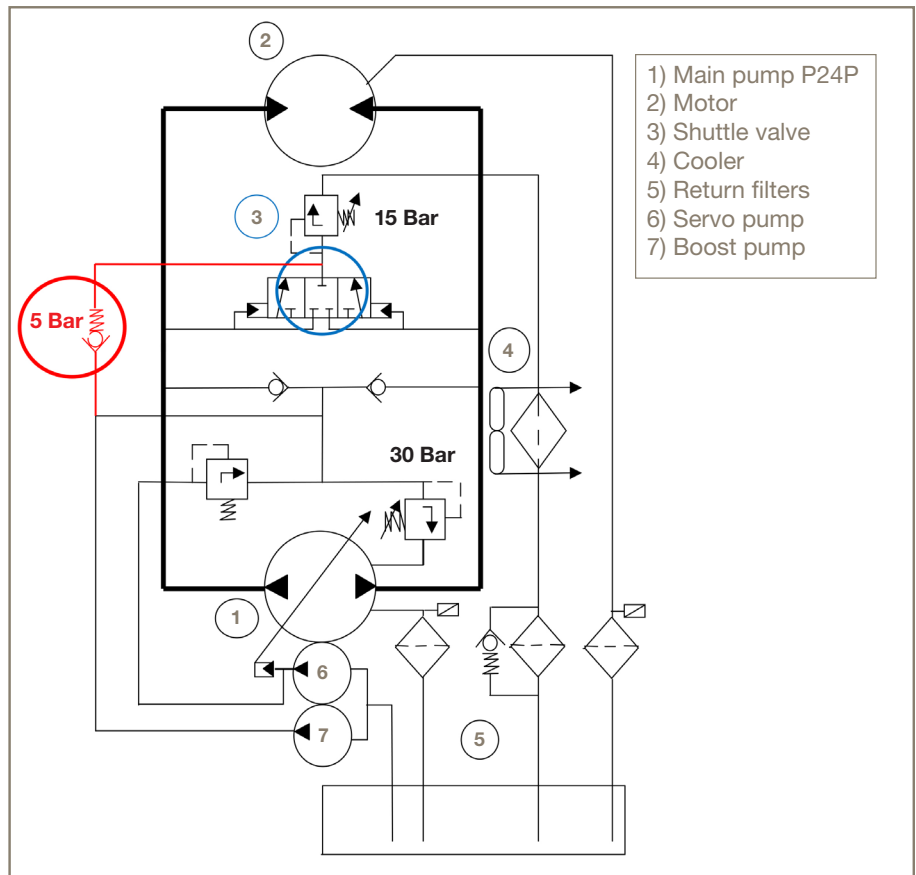
Circuit Diagram 2

This circuit shows that the boost and servo flow is going across the 5-bar check valve (red line), through the shuttle relief, cooler and filter, and back to the tank – with no oil flowing through the case of the pump. In this situation the case will run hot and the life of the unit will be reduced.

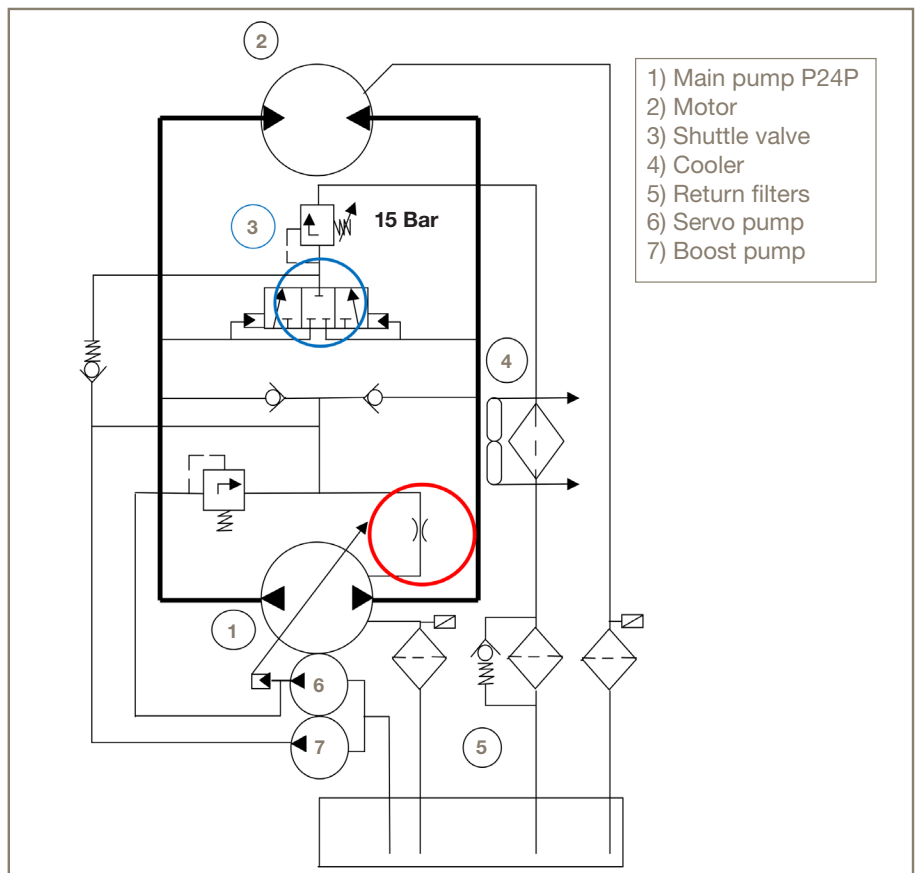
This can be corrected by removing the internal pilot valve and filter from the valve block and introducing an orifice sized to suit the application. However, a standard 2 mm (0.080") orifice with a 15-bar charge pressure is sufficient to flush the case with approximately 7 l/min. *Reference Circuit Diagram 3.*

Circuit Diagram 3

If cooling for the motor is also required, add another line with an orifice in the valve block to ensure that the motor is flushed with cool oil. *Reference Circuit Diagram 4.*



Circuit Diagram 2



Circuit Diagram 3

Circuit Diagram 4

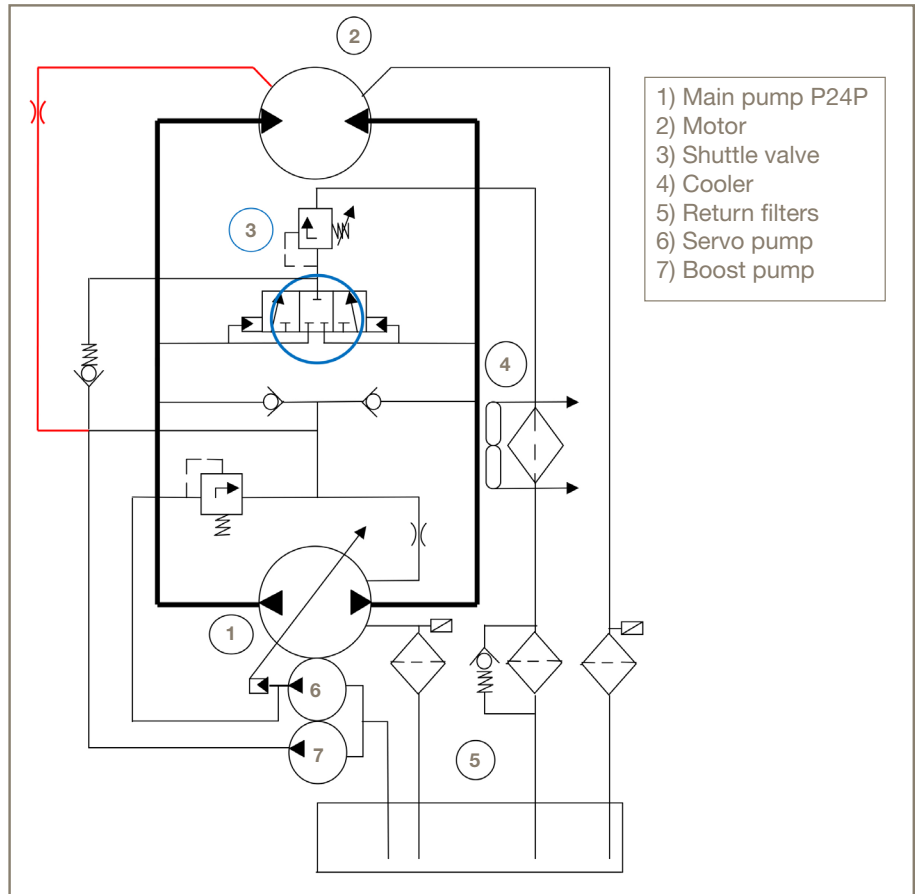
Flushing the motor with cool oil also requires that the boost pressure is set on the shuttle valve. *Example:* Set at 15-bar (220 psi) when the pump is in neutral, the pressure rises to $15 + 5 = 20$ bar (291 psi), but will drop again when the pump is stroked.

Carefully note: Making these modifications also changes the size requirement for the filters in the circuit. These are all low-pressure filters, which makes them relatively inexpensive. To make interchangeability and stock easier, it is best to size these filters to the maximum flow available from the total of the boost and servo pumps.

It is also recommended that the case drain filters for the pump and motor cases do not have by-pass check valves. Rather they should be fitted with a pressure switch for warning and shutdown.

Support

Call the Technical Support Team at **937.644.3915** or contact pumptechsupport@parker.com.



Circuit Diagram 4

