



Issue 55 -- External Valve Drains

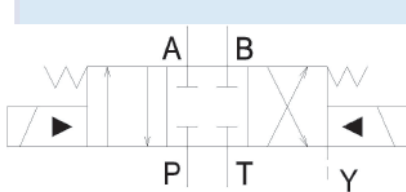
There are several components used in hydraulics that may come equipped with an external drain. These are used to allow pilot flow or internal leakage, such as with a piston pump case drain, a path back to the reservoir at low resistance. On some components this is an option and is normally only used when required, to simplify the circuit connection.

General rule: An external drain on a valve must be used when pressure at the exhaust of the valve will affect its operation.

Therefore some valves must have an external drain in order to function while for others it is optional, depending on the circuit operation. The external drain option can be specified on directional control valves and pressure control valves. Let's look at some examples:

Solenoid Controlled, Pilot Operated (Two Stage) Directional Control Valves

Two stage d.c.v.s use a small solenoid valve to control pilot fluid that is then used to shift the large main stage of the valve. When the main stage is shifted by pilot fluid the exhaust fluid from the other end of the spool



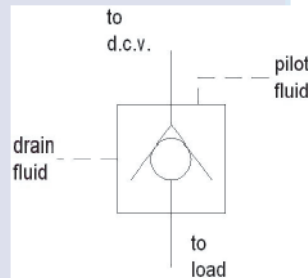
must have a place to go. This fluid can be "drained"

into the tank port of the main stage if there is low resistance in the return fluid to the reservoir. If not then the pilot fluid drain can be connected to back to the reservoir separate from the main tank line using the Y drain port.

The symbol below left panel is a composite symbol for a two stage d.c.v. with an external drain which is commonly designated as the Y port.

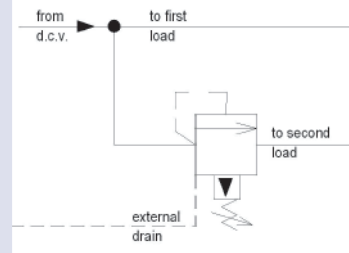
Pilot to Open Check Valves

A pilot to open check valve has a small piston with a pin that can be shifted with pilot fluid to open the check valve. If there is resistance at the exhaust port of the valve then this will work against the pilot piston and the valve may not open. An external drain can be used that connects the pin side of the pilot piston back to tank separately so it can not be pressurized.



Sequence Valves

A sequence valve is used to create a pressure based sequence with two or more actuators. It is installed in the flow path going to the second load and is set slightly higher than the first load. Internally a sequence valve and a relief valve function the same, the only difference being that the exhaust port of a sequence valve is connected to a load and therefore the port can be pressurized. For this reason the spring chamber on a sequence valve is always drained separately back to tank.



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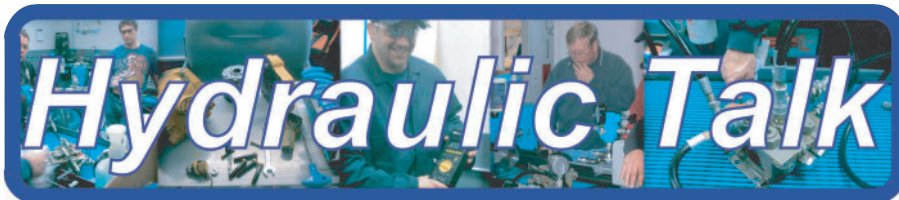
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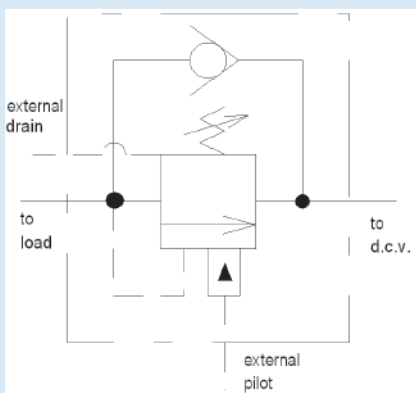
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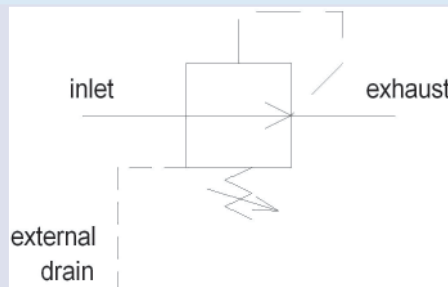
Counter Balance Valves

Counterbalance valves are used to hold a load and provide controlled lowering. As with any pressure control, if there is resistance to fluid flow out the exhaust port then this will pressurize the internal spring chamber drain and require the valve to have an external spring chamber drain. This can happen with counterbalance valves if they are retro-fitted in a hydraulic circuit that has a d.c.v. spool machined to meter-out to control the load lowering speed. (Remember that a spool valve can't hold a load and thus if load holding is a safety requirement then counterbalance valves can be fitted.).



Pressure Reducing Valves

A pressure reducing valve limits pressure at its exhaust port by controlling how much fluid can flow into the circuit, depending on the load and its pressure setting. Since the exhaust of the valve is pressurized then an external spring chamber drain is always required.



Note: Some manufacturers have valve designs where the spring chamber is sealed from the hydraulic fluid and open to atmosphere through a small hole or screen. This is called an atmospheric spring chamber drain. While easier to install, corrosion of the spring and the exposed end of the moving element may limit application to less corrosive environments.

CFP- Latest News

CFP is developing a training program that may be of interest to your company. This will be a roughly one year program that will be a combination of hydraulic and electrical-PLC with system specific training to drill rigs, rovs and other oil and gas related electro-hydraulic equipment. It is tentatively being called Electro-hydraulic Operation, Maintenance and Troubleshooting (OMT). Potential course candidates will need to have strong mechanical background/aptitude.

By filling out a brief survey you will give us the knowledge we need to tailor the course to industry demands. You will find the link to this on clearly on the corporate home of our website.

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