

Pilot operated check valve

Description of experiment




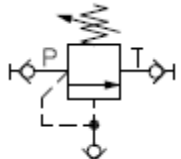

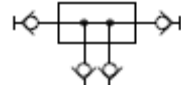
Check valves are poppet or seat style valves which allow flow in one direction only. Unlike a standard check valve, the pilot operated check can be opened via an external pilot signal to allow reverse flow across the valve. Since they are leak free due to their design the pilot operated check is often used to hold a load in position.

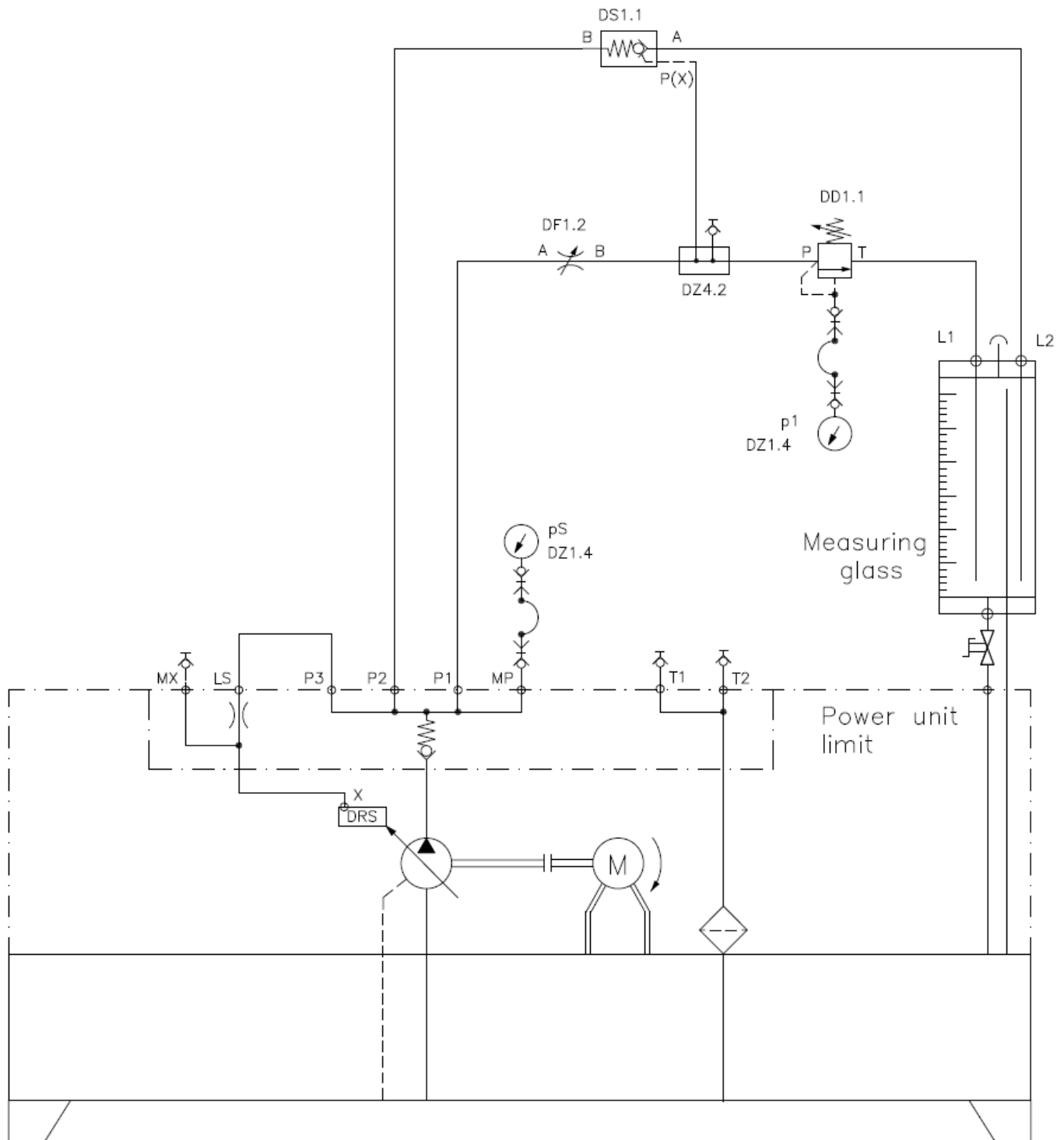
Description of exercise

Follow the experimental procedure to determine the relationship between working pressure and the pilot pressure required to open the pilot operated check valve.

Components:

You will require the following components:

Hose assembly			2x Pressure gauge DZ1.4		
1x	Pilot operated check valve DS1.1		1X Pressure relief valve DD1.1		
1X	Throttle valve DF1.2		1X Connection piece DZ4.2		



Before beginning the experiment read the **Rules for hydraulic trainer operation** sheet.

Setting up the experiment

Set up the circuit observing the following points:

1. Make sure the pump is switched off and the hydraulic circuit is not pressurized.
2. Mount the required components on the grid and lock them
3. Connect the separate units with pressure hoses according to the connection diagram. Take care that the connection hoses are not kinked or under undue stress.

Experimental procedure

Steps in the experimental procedure:

1. Has your instructor checked the constructed circuit?
2. Check again that all connection hoses are firmly coupled. (pull/turn to test)
3. Open the throttle valve DF1.2 completely
4. Back out the setting (CCW) of relief valve DD1.1 until a setting of zero. This will ensure that there is minimum pressure on port 'X' of the pilot operated check valve
5. Open the shut-off valve on the measuring glass to allow it to drain to tank.
6. Ensure the red E-STOP button is not engaged on either of the starters. (rotate the button to reset)
7. Switch on the pump via the green START push button

Experiment

- a) You should initially see minimal pressure at gauge pS since all pump oil flow is allowed to pass across the throttle (DF1.2) and relief valve (DD1.1)
- b) Close off the throttle valve completely and then open it ½ turn
- c) Begin adjusting the setting of the pressure relief valve (DD1.1) until the pressure at gauge p1 begins to rise.
- d) Set the pressure at p1 according to the table and note if there is any flow from the pilot operated check valve.

System pressure pS = <u>725</u> psi					
p1 (psi)	100	150	200	250	300
Flow visible? No	X	X	X		
Flow visible? Yes				X	X

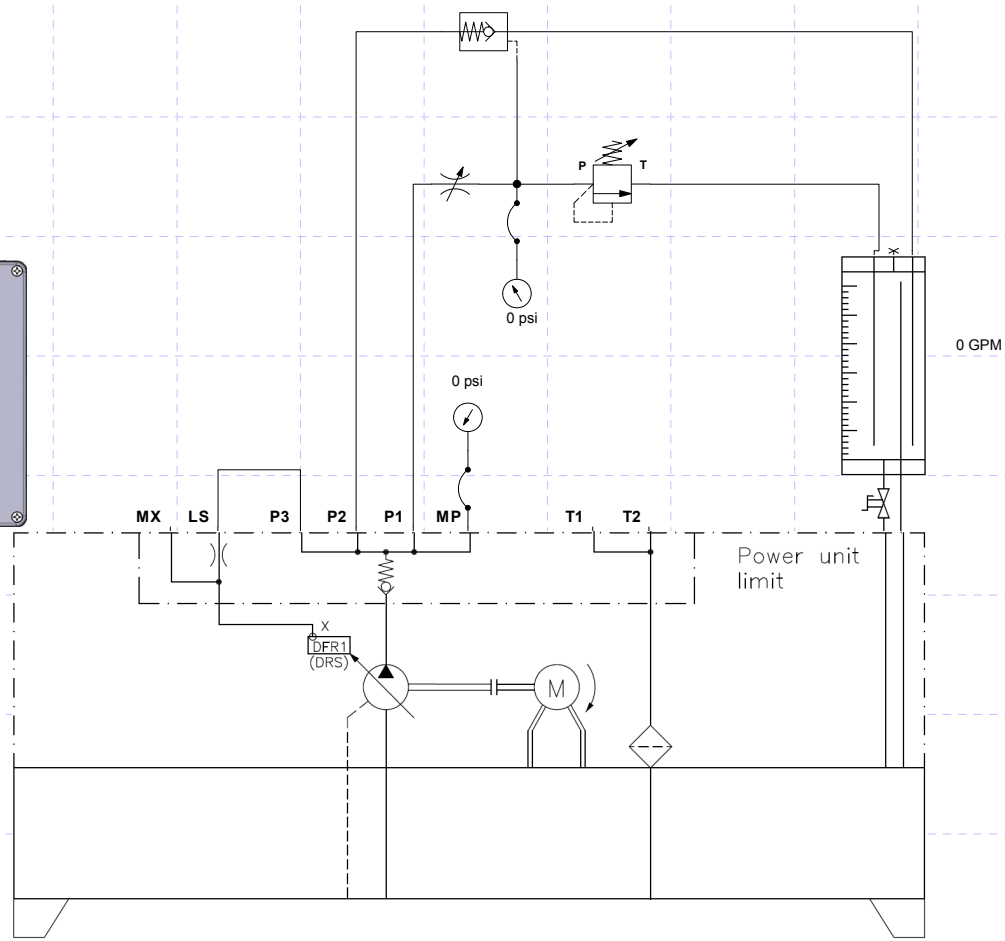
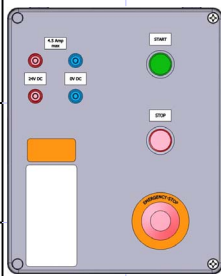
Conclusions

To open a pilot operated check valve requires a certain pressure at the pilot port. Depending on the valve design the ratio of system pressure and pilot pressure varies. With the check valve used the ratio:

$$\frac{pS}{p1} = \frac{725}{250} \quad 2.9:1$$

This ratio corresponds to the area of the piloting piston to the area of the poppet.

If the system pressure is increased, the pilot pressure must be increased as well.



Pilot Operated Check Valve