

3-way pressure reducing valve

Fundamentals:

Pressure reducing valves are utilized when it is required to limit the pressure in a portion of the hydraulic circuit. The pressure reducing valve is the only pressure control valve which is normally open in its at rest state. Although available in both 2-way and 3-way design the 3-way valve has the distinct advantage of being able to take away pressure surges occurring at its outlet port. This 3-way design is also often referred to as a reducing/relieving valve.

Objective:

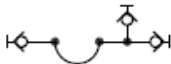
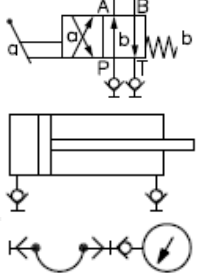
Illustrate the functionality of a 3-way pressure reducing valve.

Connections:

Mount the listed devices onto the grid and interconnect the circuit per the following hydraulic schematic.

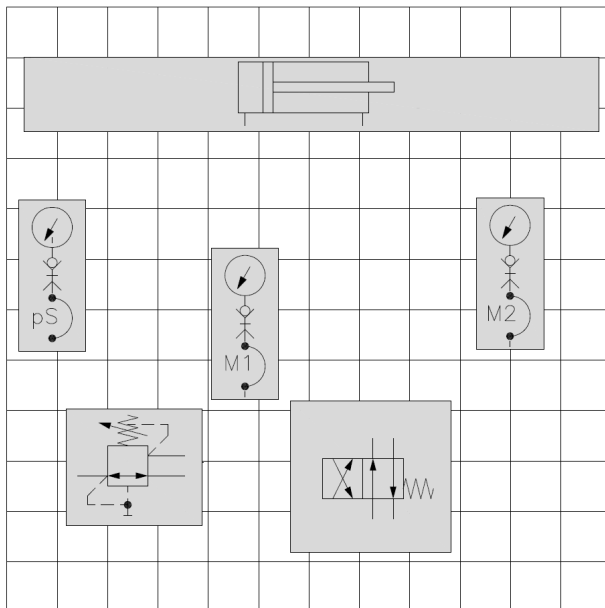
Components:

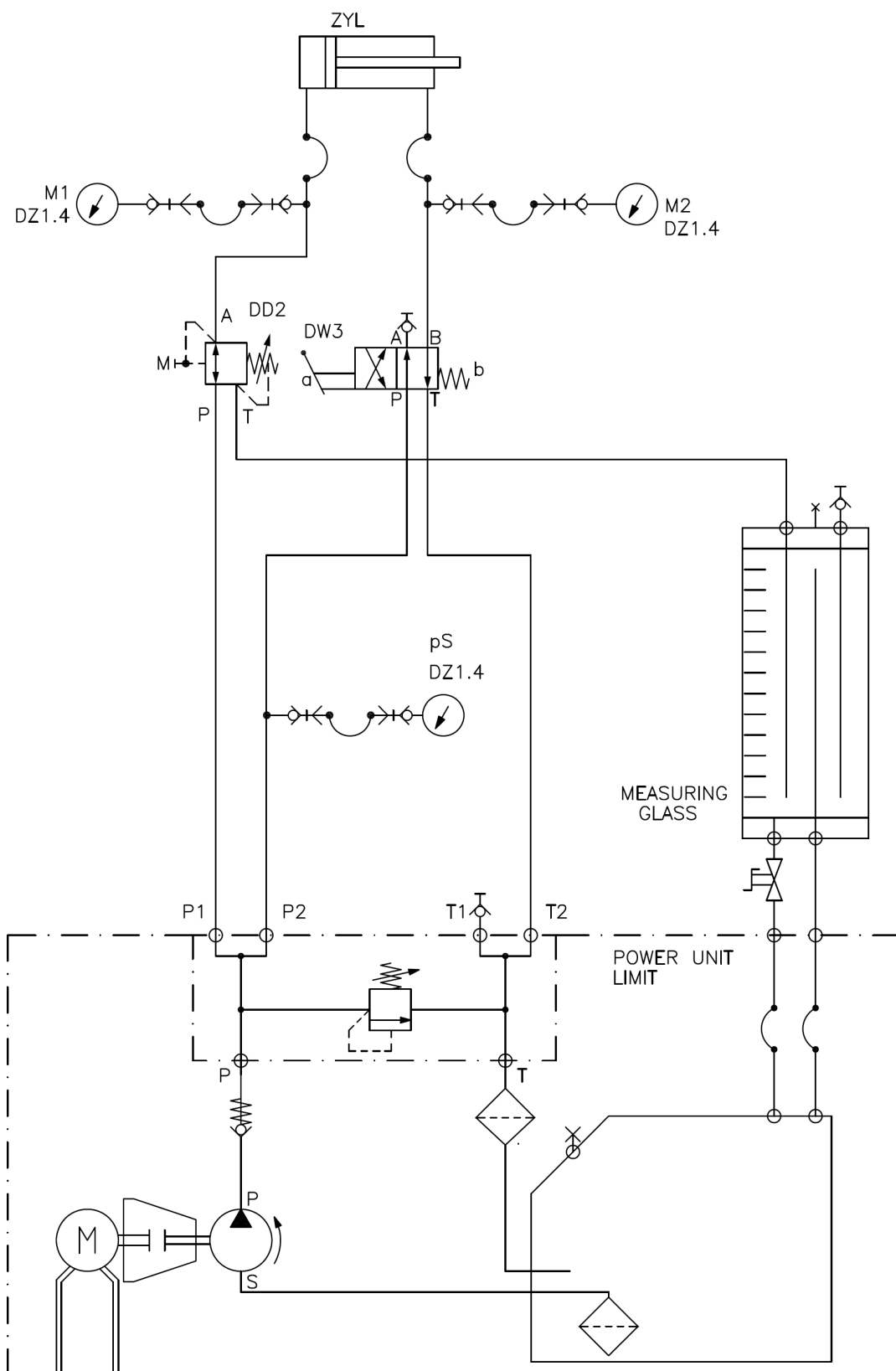
You will require the following components:

3x	Hose assembly c/w gauge connection		1x	Directional control valve DW3	
1x	Pressure reducing valve DD2		1x	Cylinder	
Pressure hoses		3x	Pressure gauge DZ1.4		

Before beginning the experiment read the **Rules for Hydraulic Trainer Operation** sheet

Mount the components on the grid and connect the circuit according to the schematic diagram





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. Ensure the red E-STOP button is not engaged on either of the starters. (rotate the button to reset)
4. Back out the setting of the pressure reducing valve completely (fully CCW) and open the drain valve on the measuring glass
5. Switch on the pump via the green START push button.

Instructions:

- a) Begin turning in the adjustment of the pressure reducing valve until the cylinder starts to extend
- b) Once the cylinder has reached the fully extended position adjust the pressure reducing valve until you read 200 psi at gauge M1
- c) Shift directional control valve DW3. Record the pressure as gauges M1 and M2 as well as what happens to the hydraulic cylinder and if there is any flow to the measuring glass.
- d) Shift the directional valve back to its normal position to allow the rod end to connect to tank
- e) With the cylinder extended set the pressure reducing valve to the pressures noted in the following table and then repeat step c) and record your observations. Repeat for all of the various pressure settings

Setting of DD2		200 psi	250 psi	300 psi	350 psi	400 psi	450 psi	500 psi
Pressure	M1 (psi)	320 psi	350 psi	370 psi	380 psi	400 psi	450 psi	500 psi
	M2 (psi)	500 psi	540 psi	600 psi	730 psi	730 psi	730 psi	730 psi
Cylinder movement/ flow to meas. glass?		Yes	Yes	Yes	Yes	No	No	No

Conclusions:

1. What was the pressure setting of the reducing valve when the cylinder would no longer retract?
350 psi
2. If the available supply pressure is at a level of 725 psi why did the cylinder stall at this point?
350 psi acting on the cap end area of the cylinder creates an equal force of 725 psi acting on the annulus area
3. With a 3-way pressure reducing valve, if the pressure present at the downstream port of the valve is higher than the valve setting the valve Opens/relieves to the T port.