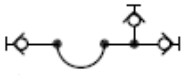
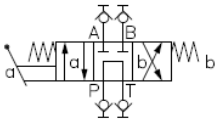
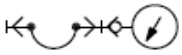
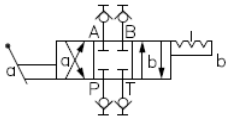
4/3 Directional Control Valve

Objective:
This exercise will demonstrate the operation of 4/3 directional control valves

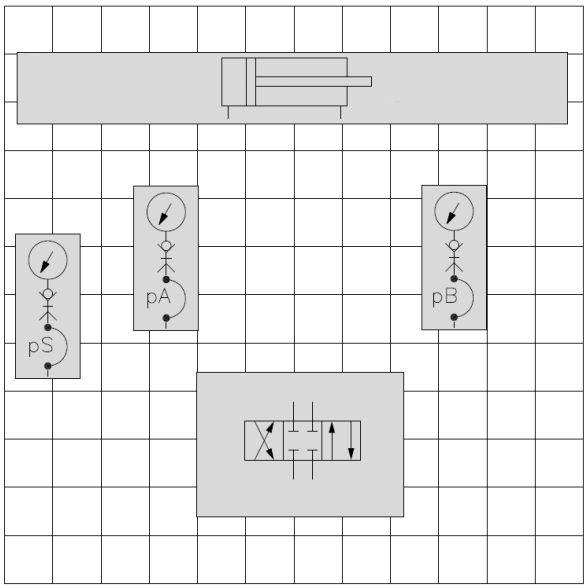
Fundamentals:
Four port directional control valves are typically used to control bi-directional actuators (cylinders or motors). We utilize a three position valve when we would like an actuator such as a cylinder to have the capacity to stop in some intermediate condition. In this case the positions of the valve could be identified as STOP (centre position) FORWARD and REVERSE.
The configuration (port connections) of the centre condition are determined by the type of pump we are using (fixed or variable displacement) and the type and operation of actuator being used.

Components:
You will require the following components:

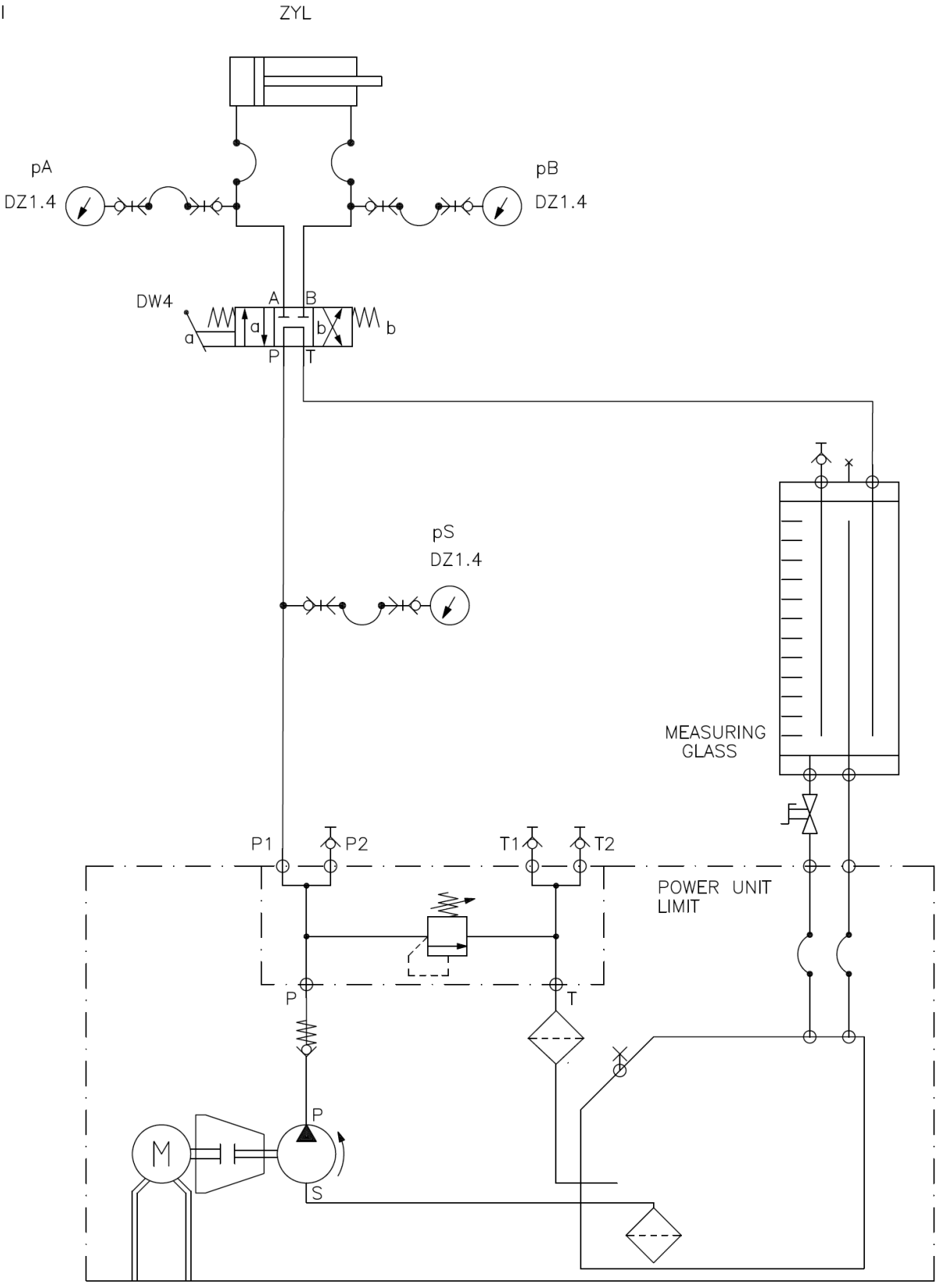
	Hose assembly	
3x	Hose assembly c/w gauge connection	
1x	Directional control valve DW4 (part I)	

3x	Pressure gauge DZ1.4	
1X	Hydraulic cylinder	
1x	Directional control valve DW5 (part II)	

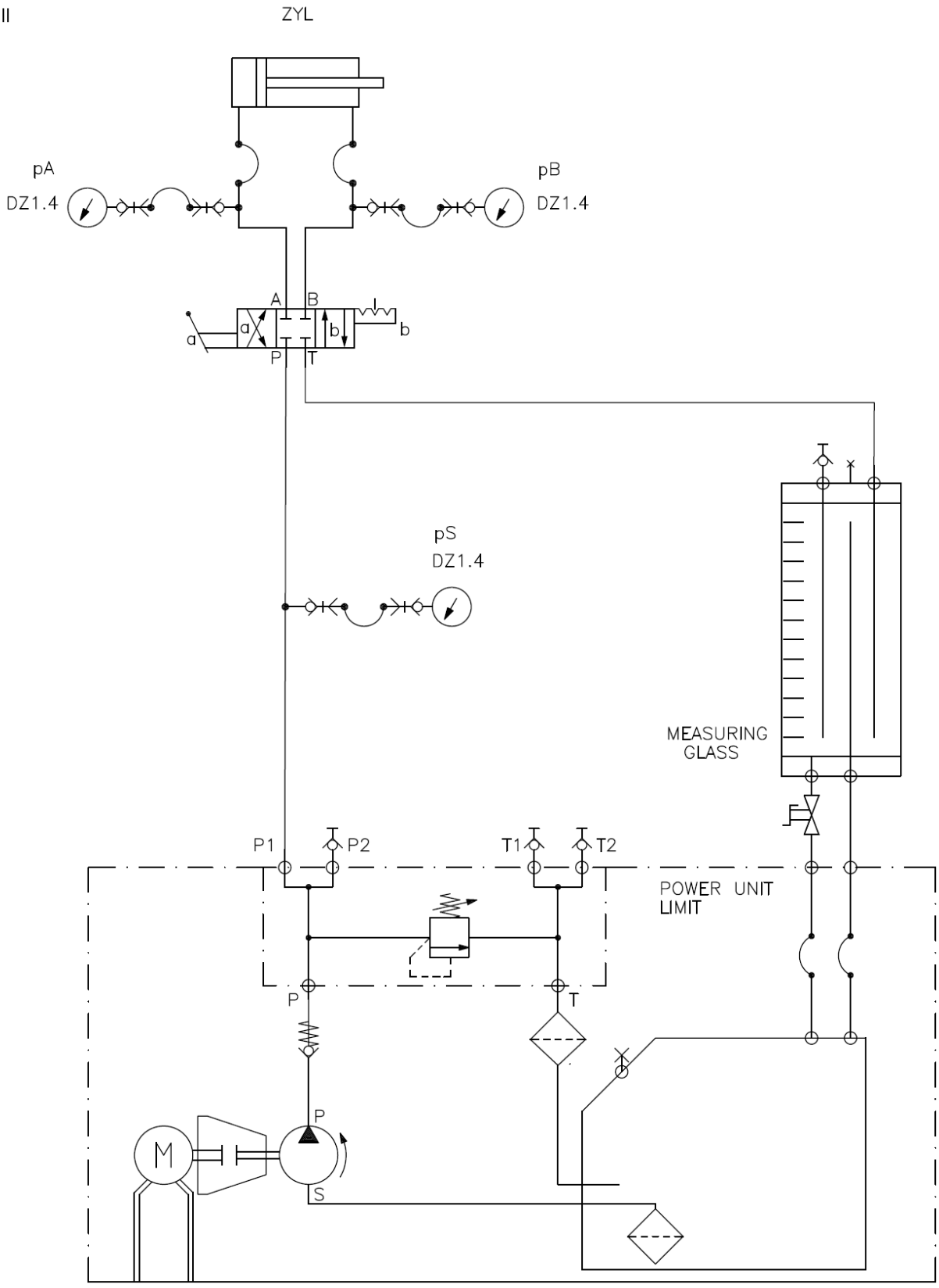
Proceedure:
Mount the individual components on the training stand grid and connect them according to the circuit diagram. Compare the operation of the two circuits and answer the questions posed at the end of the exercise.



Part I


ZYL
pA
DZ1.4
pB
DZ1.4
DW4
A
B
a
b
P
T
pS
DZ1.4
MEASURING
GLASS
P1
P2
T1
T2
POWER UNIT
LIMIT
P
T
P
S
M

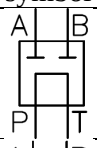
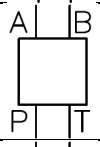
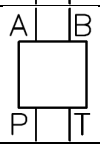
Part II


ZYL
pA
DZ1.4
pB
DZ1.4
A
B
a
b
P
T
pS
DZ1.4
MEASURING
GLASS
P1
P2
T1
T2
POWER UNIT
LIMIT
P
T
P
M
S

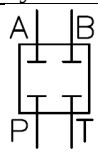
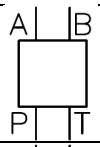
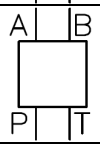
Instructions

- Prior to starting the power unit the directional control valve should be in its default position (position 0)
- Start the hydraulic unit and note and record in the following table the system pressures as well as any motion noted at the hydraulic cylinder
- Shift the directional control valve to the various positions and describe the resultant cylinder motion. Record the pressures while the cylinder is in motion.
- Change the circuit to match that shown in part II and repeat the above steps
- The last column in the table is for you to draw in the relevant valve envelope symbol for each position of the directional valve based on the observed cylinder movement.

Part I

Lever position	pS	pA	pB	Cylinder movement	Valve symbol
Centred					
Shifted left					
Shifted right					

Part II

Lever position	pS	pA	pB	Cylinder movement	Valve symbol
Centred					
Shifted left					
Shifted right					

Do not disconnect the circuit.

Conclusion

4/3 directional control valves control the START, STOP and _____ of a bi-directional actuator.

When would it be advantageous to use a directional control with a valve centre condition similar to the one used in part I of the experiment?

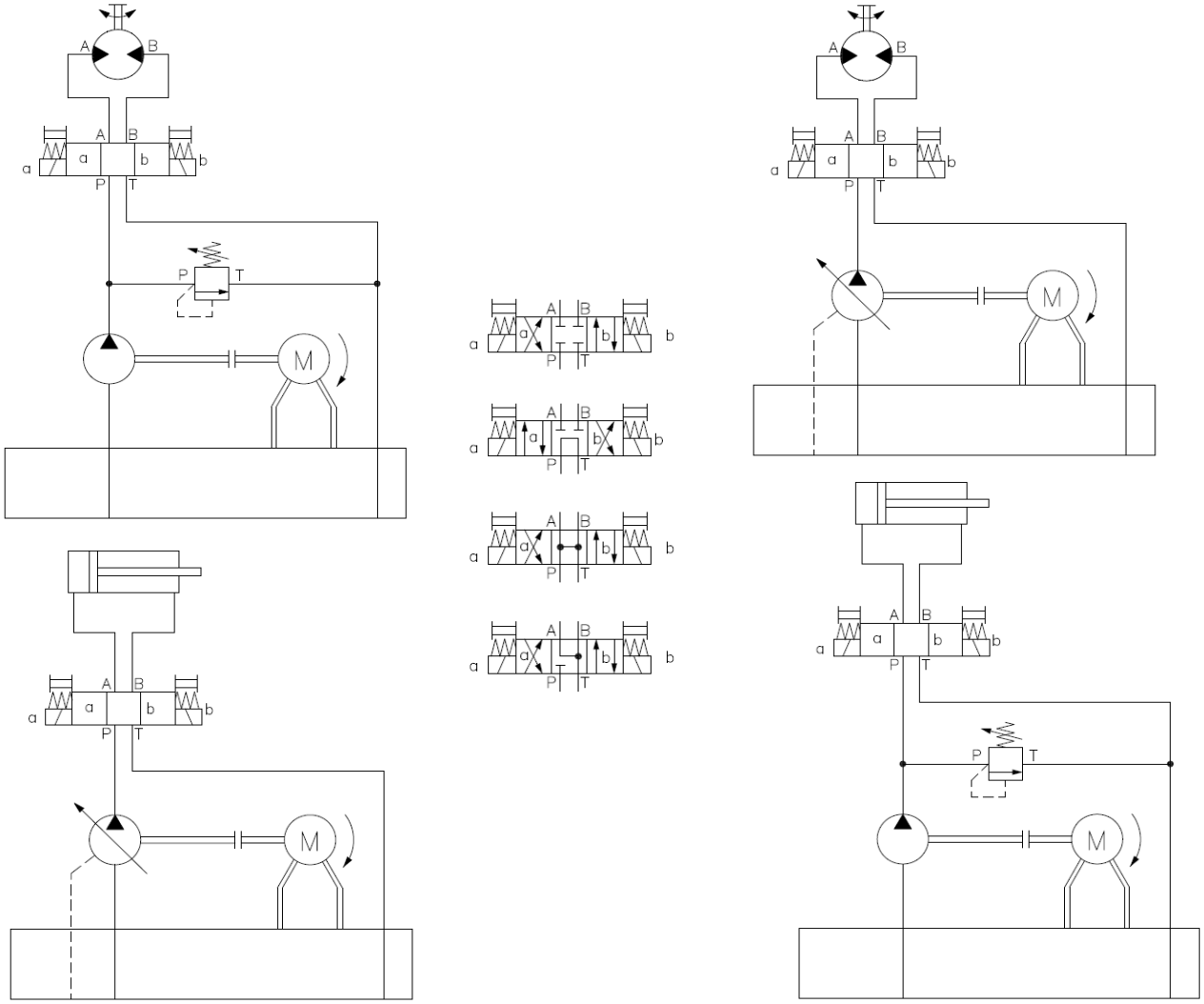
_____

_____

_____

_____

Match the most correct valve spool to each of the applications below



Part III

- Utilizing the circuit from part 2 start the hydraulic unit and move the cylinder until it is at some mid-stroke position
- Leave the handle of the directional control valve so stat the valve remains in the centre condition
- Note and record the position of the cylinder from the scale as well as the pressures at gauges pS, pA and pB
- Allow the circuit to run in this condition for 5 minutes and then again note and record the position of the cylinder from the scale as well as the pressures at gauges pS, pA and pB
- Explain what you observe.

	pS	pA	pB	Cylinder position
Start				
5 minutes				