A Laboratory Manual for

Oil Hydraulics and Pneumatics (2171912)

7TH Semester

Mechanical Engineering

SAL COLLEGE OF ENGINEERING, OPP. SCIENCE CITY,
SOLA-BHADAJ ROAD, AHMEDABAD

SAL COLLEGE OF ENGINEERING

CERTIFICATE

This is certify that Mr. /Ms. _____

Enrollment No. _____ Branch: ***Mechanical Engineering*** *Semester:* ***VII***

has satisfactory completed the course in the subject ***Oil Hydraulics and Pneumatics (2171912)*** *in this institute.*

Date of Submission: - _____

Staff In-charge

Head of Department

SAL COLLEGE OF ENGINEERING

DEPARTMENT OF MECHANICAL ENGINEERING

B.E. SEMESTER: - VII

OIL HYDRAULICS AND PNEUMATICS (2171912)

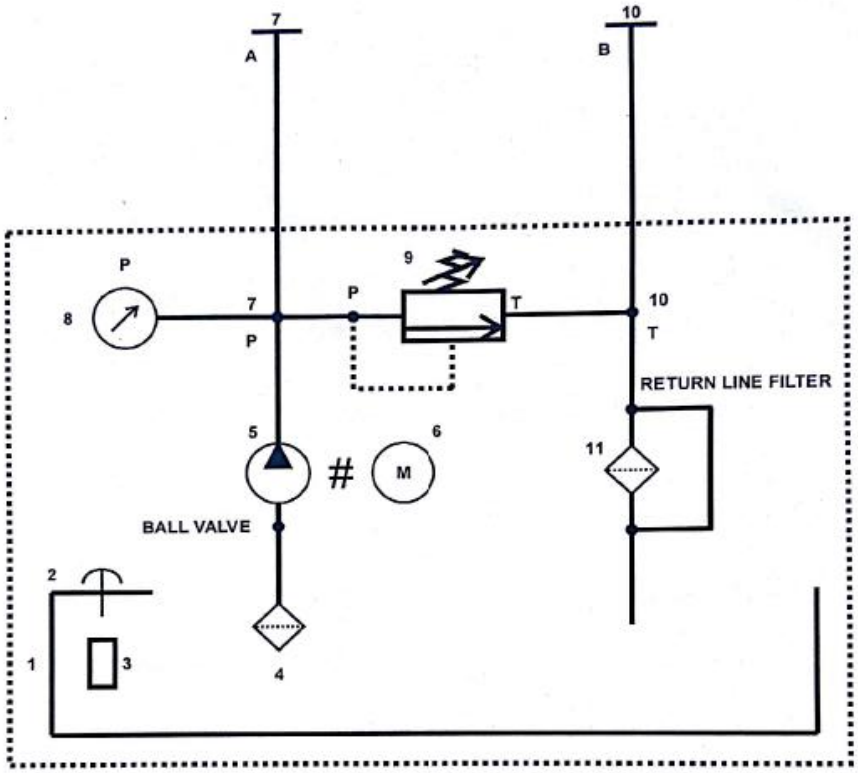
LIST OF EXPERIMENTS

Sr. No.	Title	Date of Performance	Date of Submission	Sign	Remark
1	To Study Hydraulic Power Pack System				
2	Extend-Retract And Stop System Of Linear Actuators				
3	Regenerative Circuit For Hydraulic System				
4	Speed Control Circuit: Meter In, Meter Out				
5	Sequencing Circuit For Hydraulic System.				
6	Use Of Solenoid Operated Direction Control Valve For Hydraulic System				
7	Reciprocating Motion Of Single & Double Acting Cylinder				
8	Speed Control Circuit For Pneumatic System				
9	Automatic To & Fro Motion Of Pneumatic Linear Actuator				
10	Sequencing Circuit For Pneumatic Circuit				

EXPERIMENT 1

TO STUDY HYDRAULIC POWER PACK SYSYTEM

AIM : To Study Hydraulic Power - Pack.

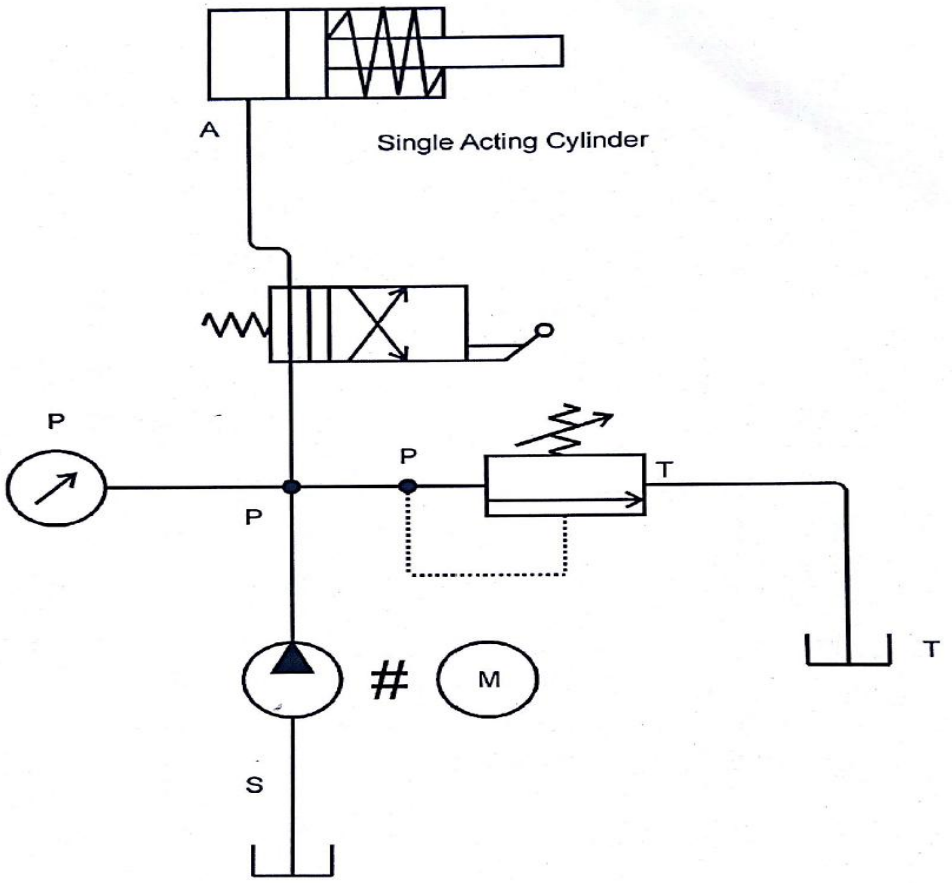


- ✓ Tank
- ✓ Breather
- ✓ Oil Level Indicator
- ✓ Inlet Filter
- ✓ Pump
- ✓ Motor
- ✓ Pressure Line Manifold
- ✓ Pressure Gauge
- ✓ Pressure Relief Valve
- ✓ Return Line Manifold
- ✓ Return Line Filter

EXPERIMENT 2

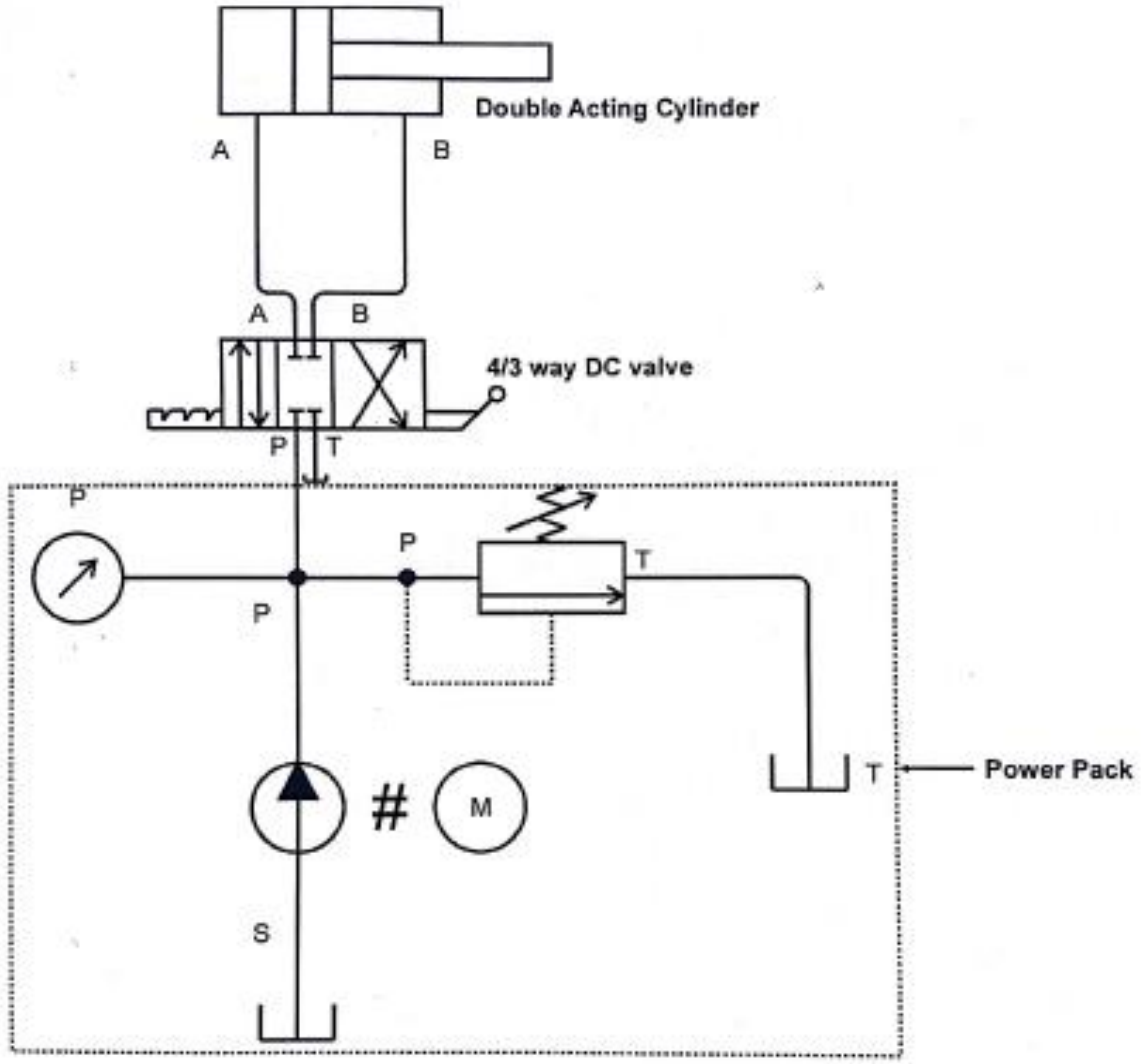
EXTEND-RETRACT AND STOP SYSTEM OF LINEAR ACTUATORS

AIM : To Study 4/2 Way DC Valve Using Single Acting Cylinder.



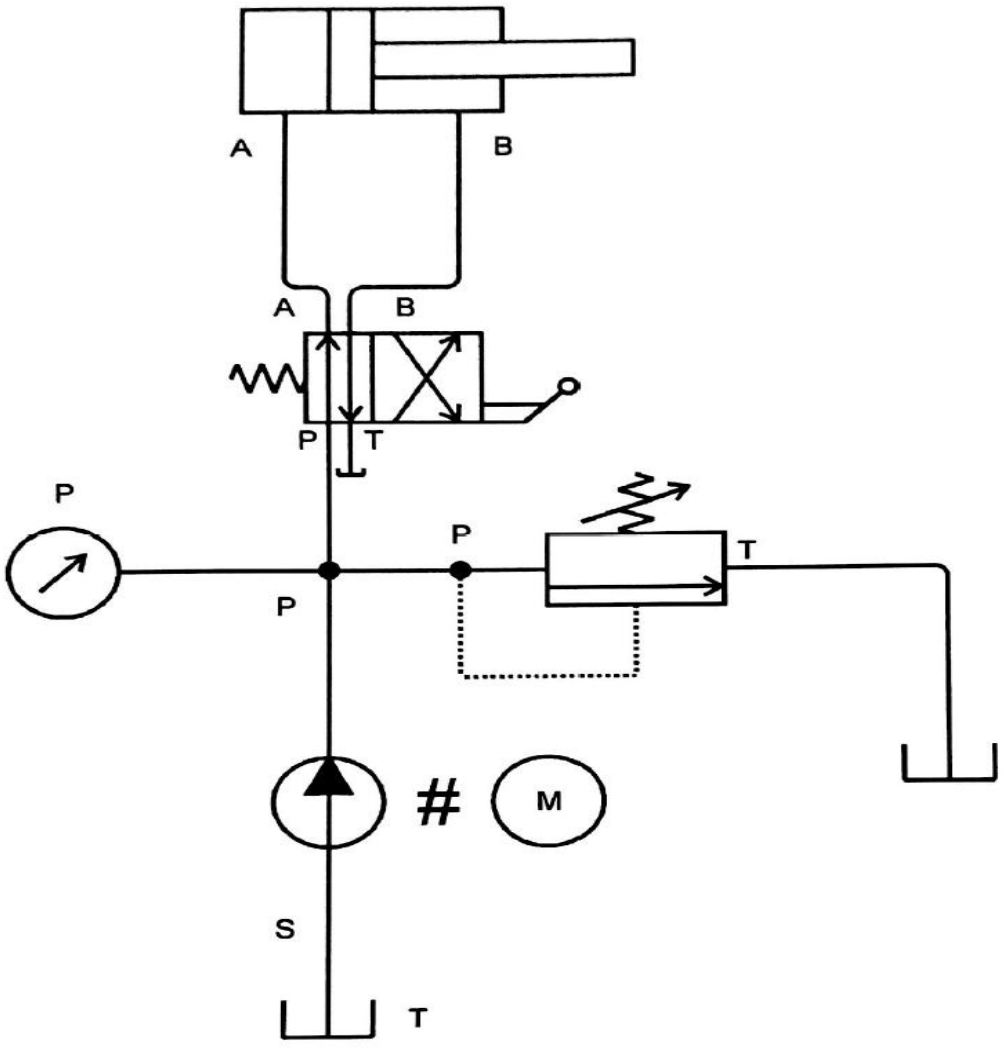
- ✓ Make connection as per the circuit.
- ✓ Switch ON the hydraulic power pack as explained in experiment.
- ✓ The moment you switch ON the system hydraulic cylinder starts extending.
- ✓ Operate the lever of 4/2 way DC valve and cylinder starts moving in reverse direction.
- ✓ Release the lever and it goes to original position due to spring inside the valve.

AIM : To Study 4/3 Way DC Valve Using Double Acting Cylinder.



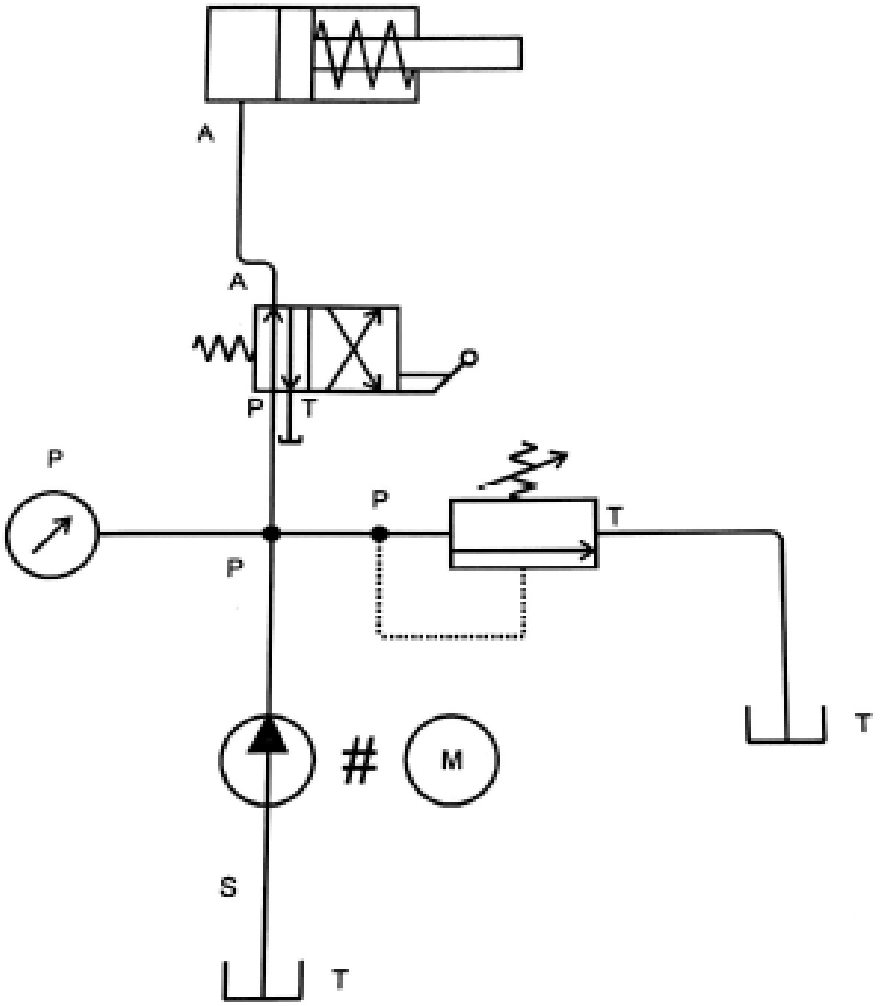
- ✓ Make connection as per the circuit.
- ✓ Switch ON the hydraulic system.
- ✓ If lever is in central position no movement of cylinder takes place.
- ✓ Operate the lever (push or pull) and see the effects.

AIM : To Control Double Acting Cylinder by 4/2 Way DC Valve.



- ✓ Make connection as per the circuit.
- ✓ Switch ON the hydraulic system.
- ✓ The moment you switch ON the system hydraulic cylinder starts extending.
- ✓ Operate the lever cylinder starts moving in reverse direction.
- ✓ Release the lever, it goes to original position due to spring inside the valve.

AIM : To Control Single Acting Cylinder by 4/2 Way DC Valve.

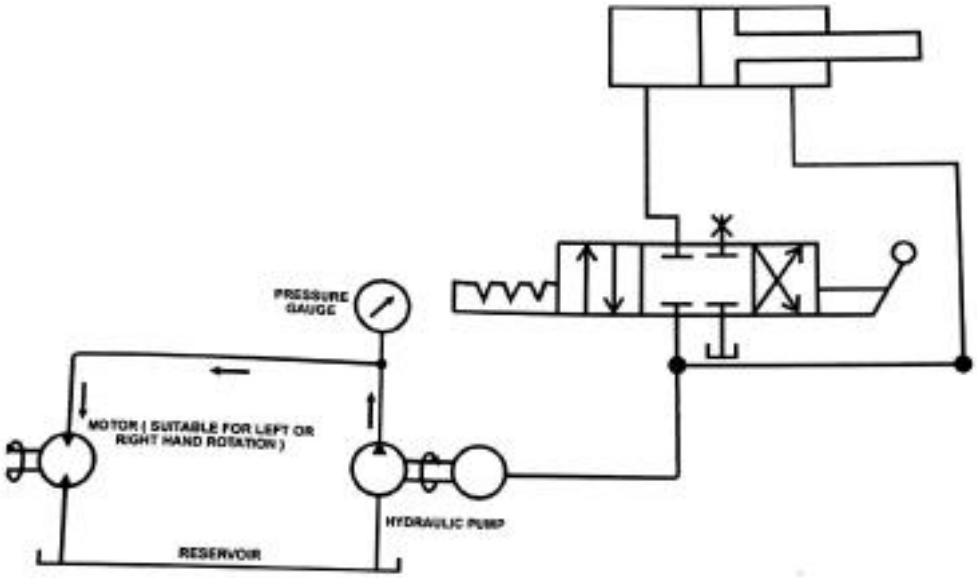


- ✓ Make connection as per the circuit.
- ✓ Switch ON the hydraulic system.
- ✓ The moment you switch ON the system hydraulic cylinder starts extending.
- ✓ Operate the lever cylinder starts moving in reverse direction.
- ✓ Release the lever, it goes to original position due to spring inside the valve.

EXPERIMENT 3

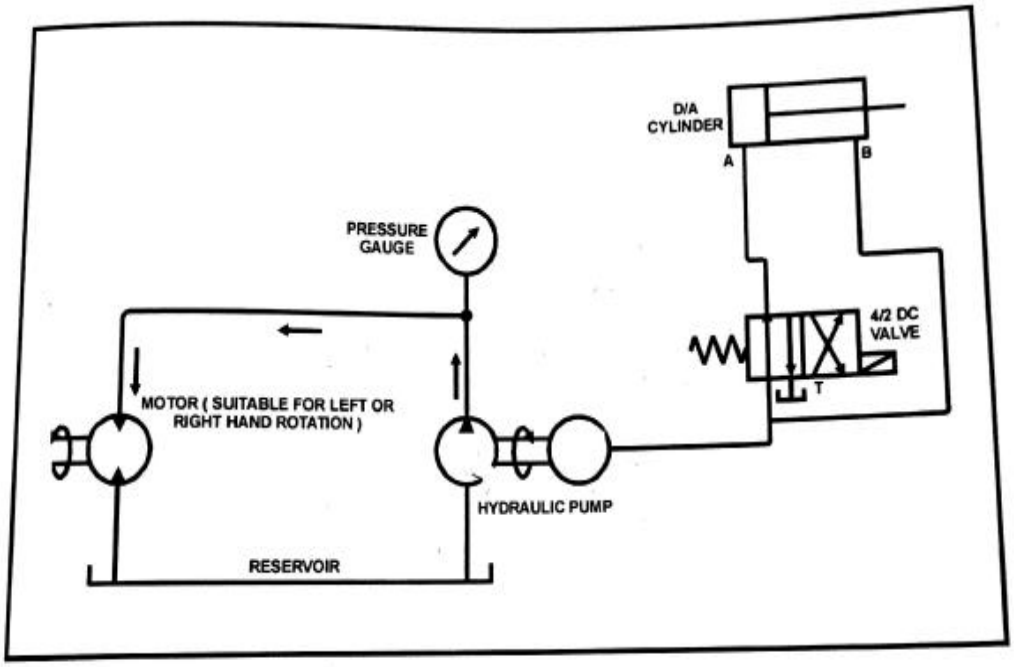
REGENERATIVE CIRCUIT

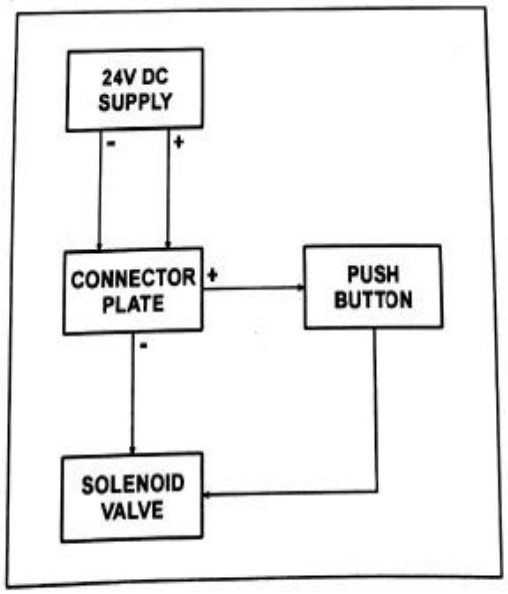
AIM : Regenerative Circuit.



- ✓ Make connections as shown in the circuit.
- ✓ Switch on the system.
- ✓ Operate DCV
- ✓ Note that now cylinder moves faster in forward direction as compared to normal connections to DCV.
- ✓ Cylinder rod end connection is connected to pressure line.
- ✓ As both the sides are pressurized cylinder starts extending as Capacitive side has larger cross sectional area compared to rod end side.
- ✓ Speed also increases as rod end outlet flow is added back to cap end.
- ✓ Force in this circuit is reduced in forward direction which is equivalent to rod area multiplied by system pressure.
- ✓ This circuit with little modifications is used where greater speeds are required and force requirement is not critical.

AIM: Regenerative Circuit Using Solenoid Valve

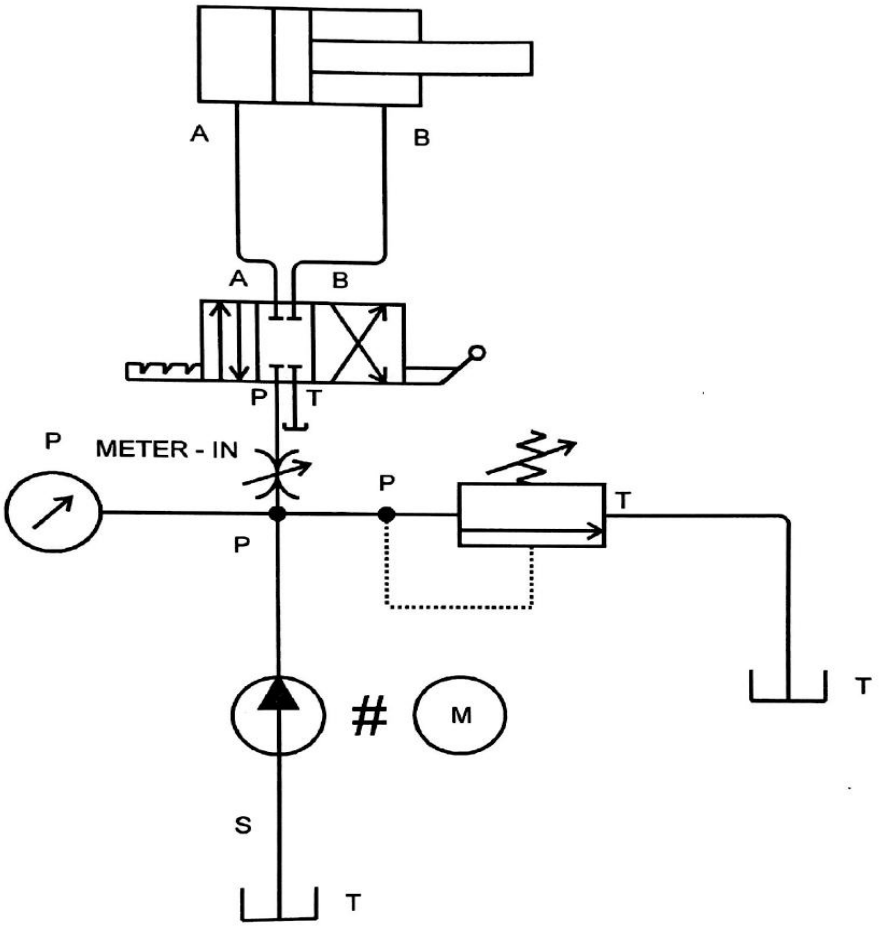




EXPERIMENT 4

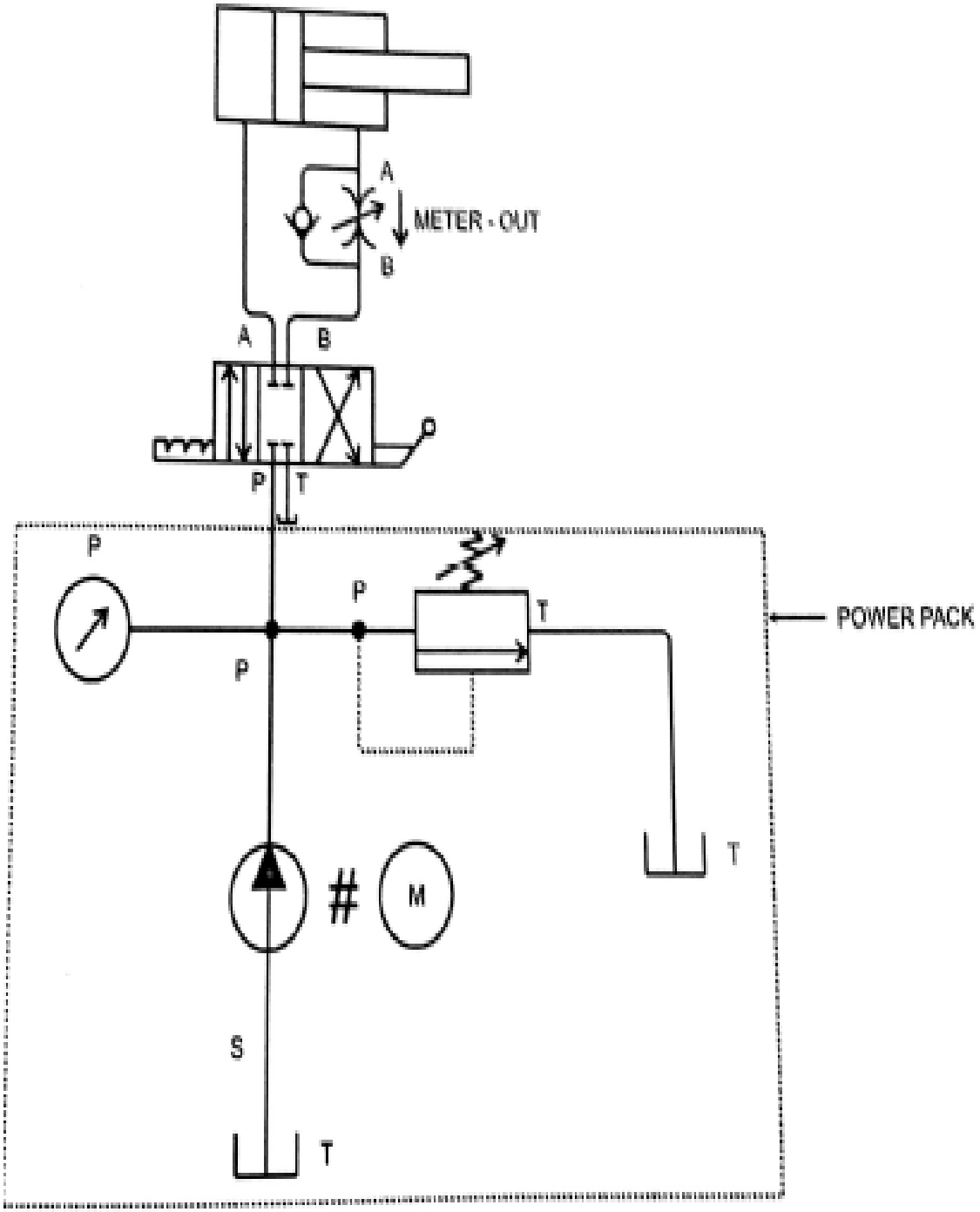
SPEED CONTROL CIRCUIT: METER IN, METER OUT

AIM : To Study Meter - In Flow Circuit.



- ✓ Make connection as per the circuit.
- ✓ Operate DCV to move cylinder in either direction.
- ✓ Adjust flow control and notice the change in speed.
- ✓ Here you are controlling (Mertering) the oil flow entering into the cylinder. That is why it is called meter - in flow.
- ✓ This type of control is used when load is opposing the motion of cylinder.

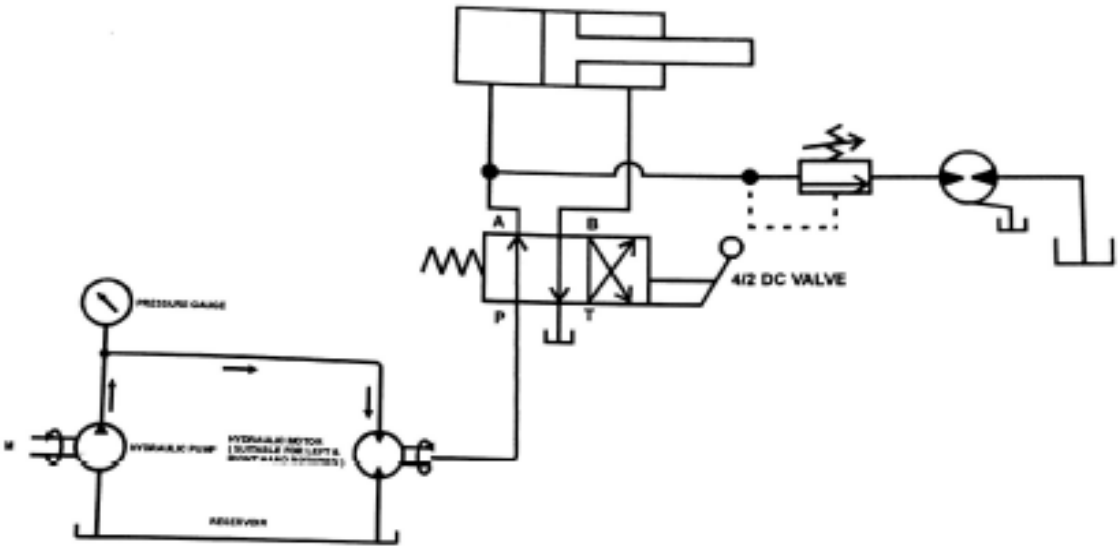
AIM: To Study Meter Out Circuit



EXPERIMENT 5

SEQUENCING CIRCUIT

AIM : To study sequence valve.

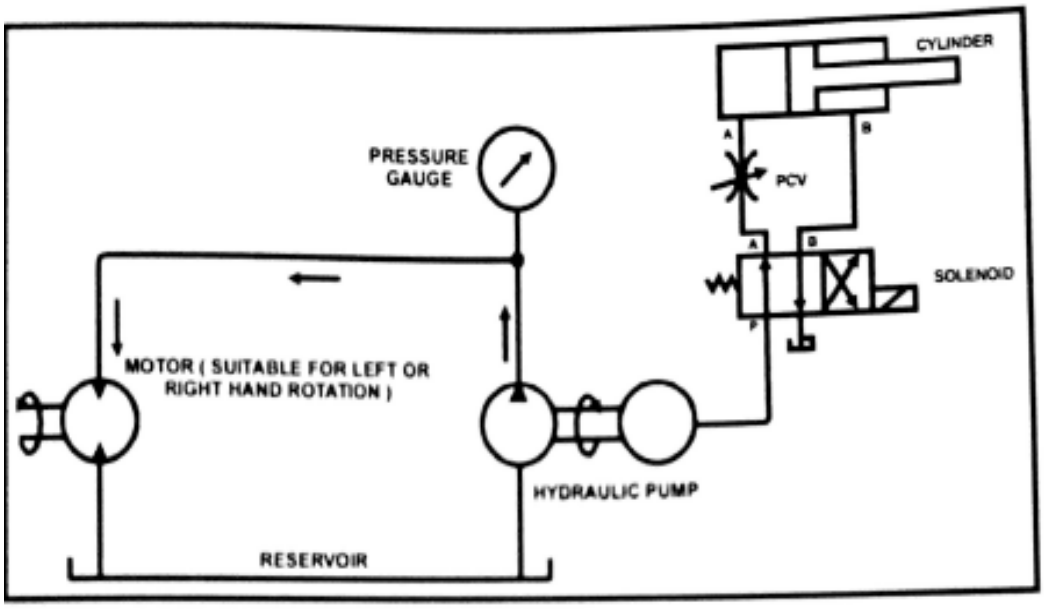


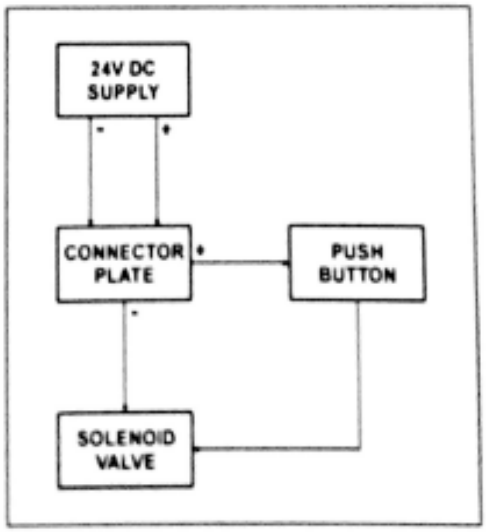
- ✓ Make connections as shown in the circuit.
- ✓ Keep the sequence valve spring fully open.
- ✓ Start the system.
- ✓ You will notice the movement of cylinder / motor when you operate DCV.
- ✓ If you want motor to operate only when cylinder is fully extended or retracted start screwing in sequence valve.
- ✓ At a particular stage movement of motor will stop.
- ✓ Unscrew the valve by quarter / half / one turn till motor starts rotating.
- ✓ Operate DCV. Now you will notice that first cylinder moves fully forward / retracts fully and then only motor rotates.
- ✓ Sequence valve is used to control sequence of motions.
- ✓ This circuit can be used for clamping of workpiece and the rotation of chuck.

EXPERIMENT 6

USE OF SOLENOID OPERATED DIRECTION CONTROL VALVE

CONTROL OF DOUBLE ACTING CYLINDER USING 4/2 SINGLE SOLENOID VALVE

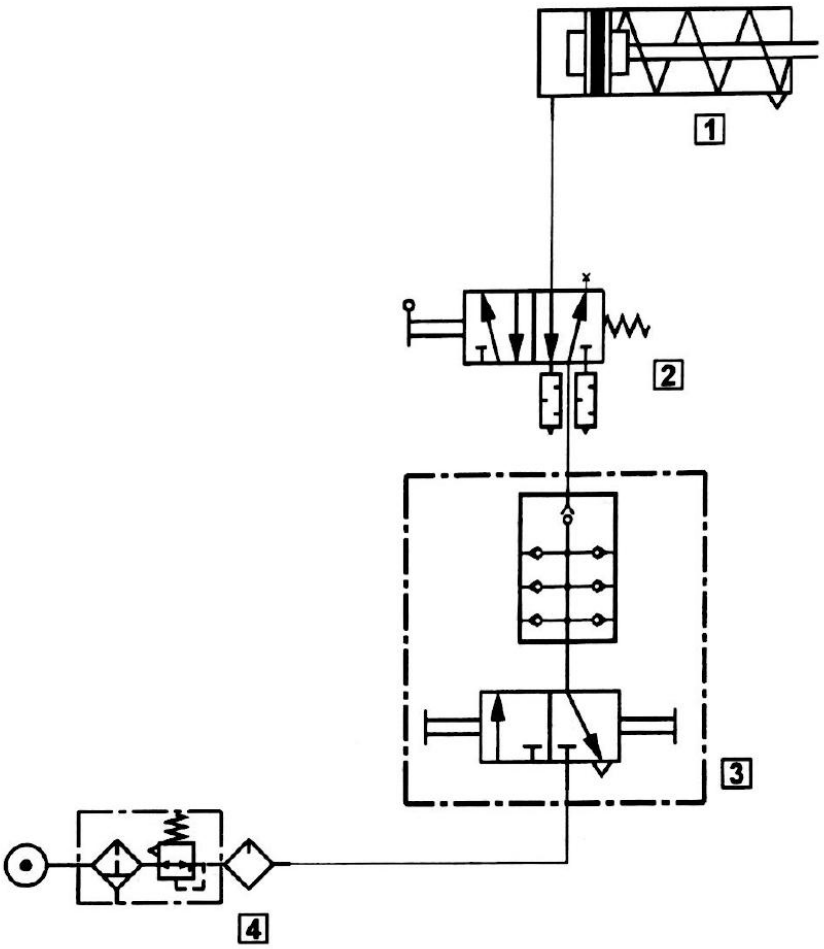




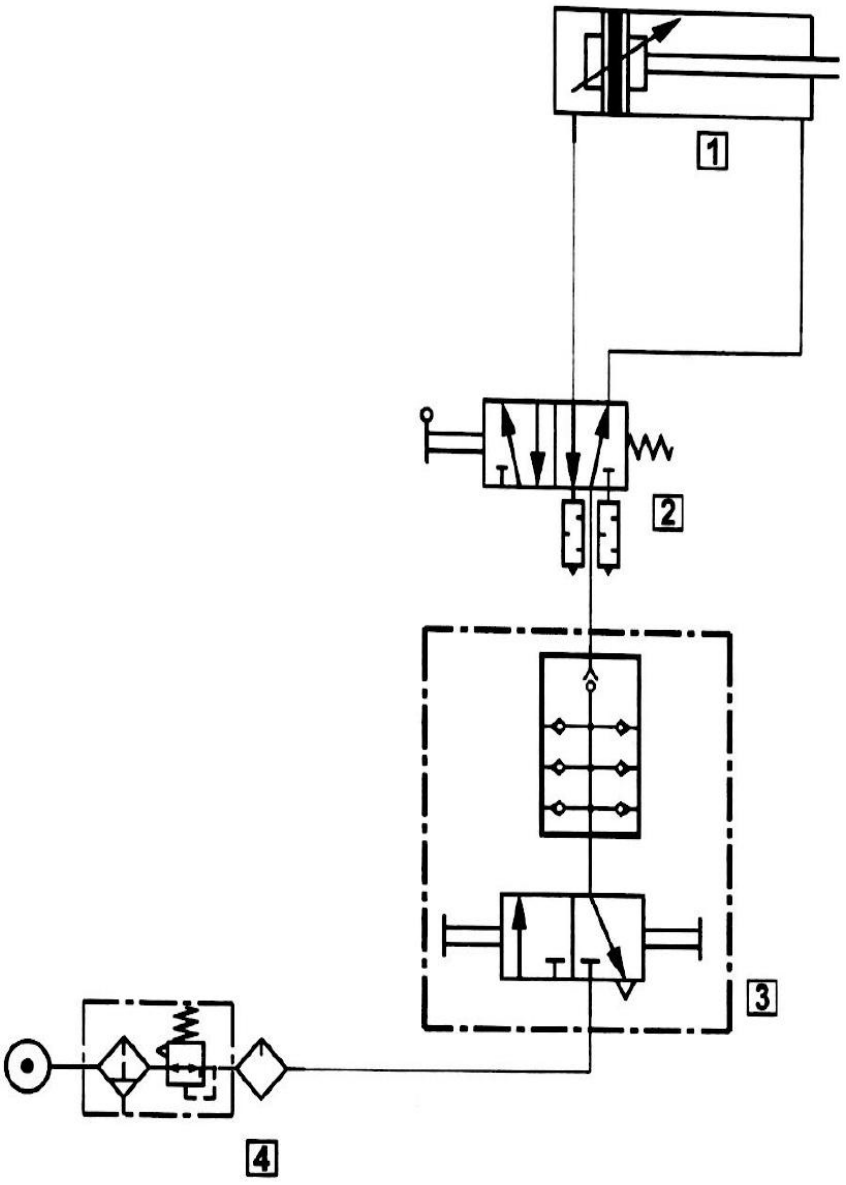
EXPERIMENT 7

RECIPROCATING MOTION OF SINGLE & DOUBLE ACTING CYLINDER

Exercise 1. Operation of a single acting cylinder



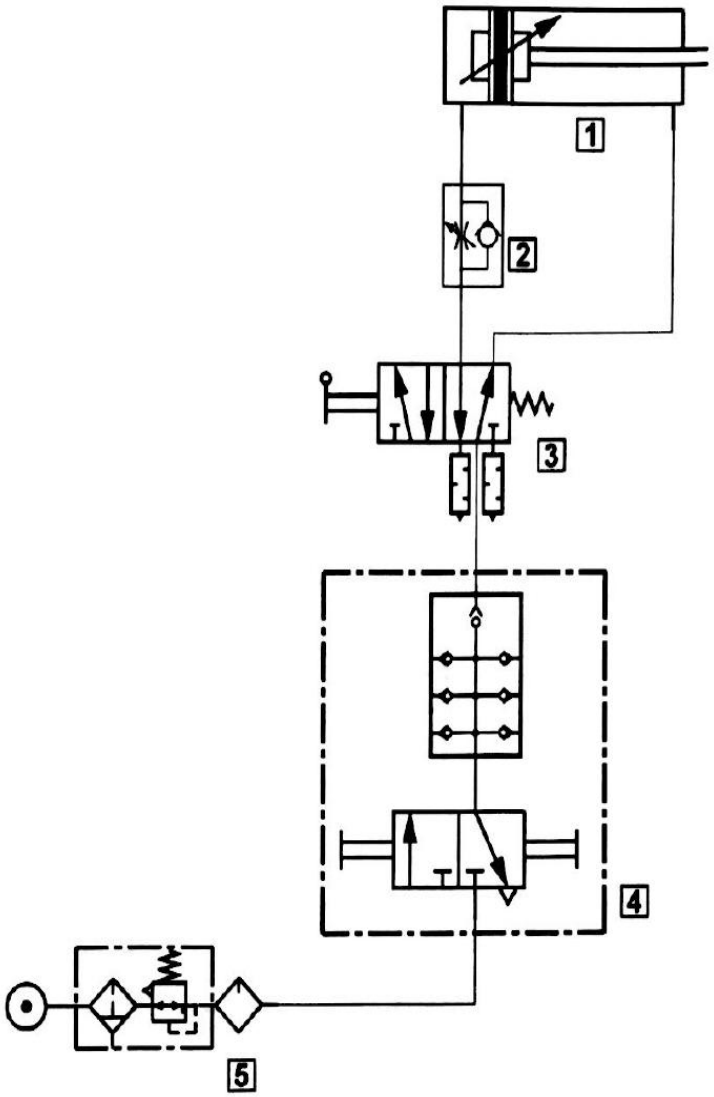
Exercise 2. Operation of a double acting cylinder



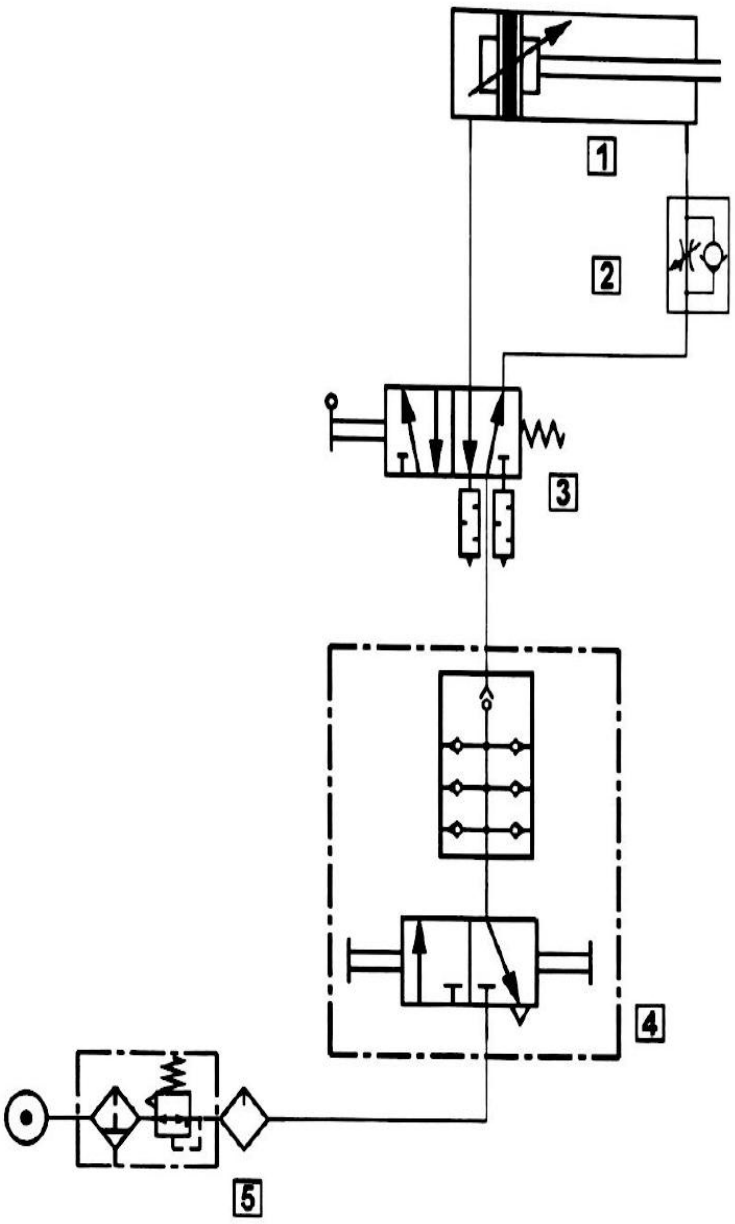
EXPERIMENT 8

SPEED CONTROL CIRCUIT

Exercise 9. Controlling the speed of a double acting cylinder using METERING IN valve



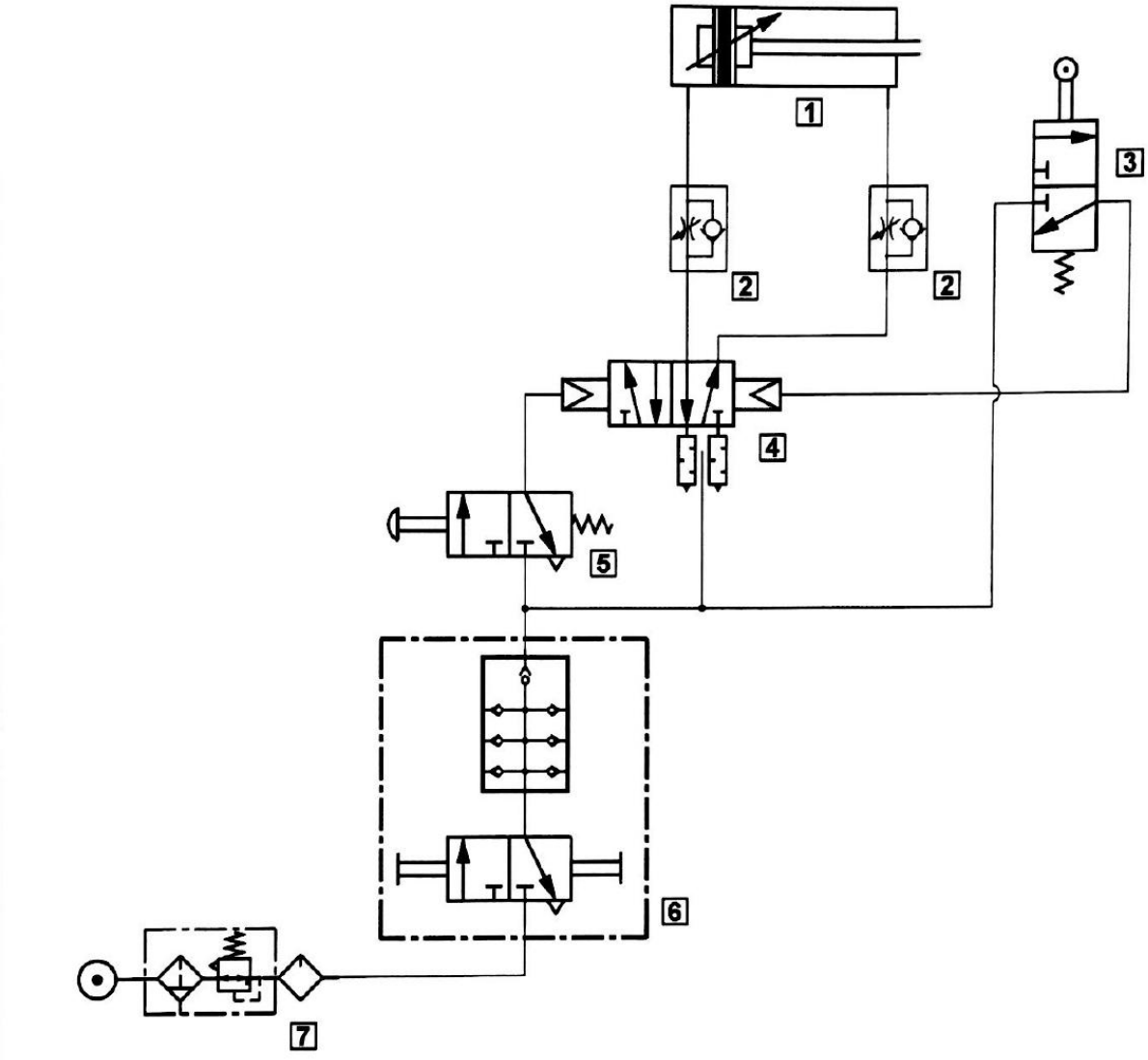
Exercise 10. Controlling the speed of a double acting cylinder using METERING OUT valve



EXPERIMENT 9

AUTOMATIC TO & FRO MOTION OF PNEUMATIC LINEAR ACTUATOR

Exercise 11. Automatic operation of a double acting cylinder in single cycle using roller lever valve and memory valve



EXPERIMENT 10

SEQUENCING CIRCUIT

Exercise 13. Single cycle automation of multiple cylinders in sequence (Sequence of motion : A+B+A-B-).