Ain Shams University
Faculty of Engineering

4th Year Mechatronics
2013/2014

Hydraulic and Pneumatic Control Laboratory

Familiarization of Hydraulic Kit

Name: ----------

Presented to:

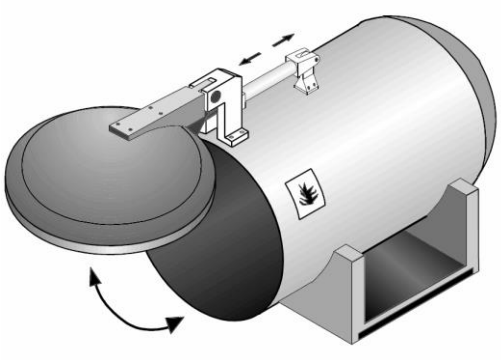
Prof. Dr/ Magdy Abdel-Hameed

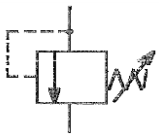
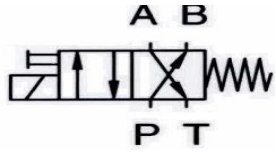
Objective:

- To familiarize the student on the components in hydraulic kit with the application of a Furnace door control using 4/2-way valve, double acting cylinder, pressure relief valve, hoses, fixed displacement pump, pressure gauge, solenoid
- To show how to determine times, pressures and forces during the advance and return strokes of a double-acting cylinder
- Drawing the hydraulic circuit diagram
- Determining the necessary components
- Practical assembly of circuit
- Measuring transfer time for the advance and return strokes
- Calculation of advance and return-stroke speeds
- Comparison of calculated and measured values

Description:

A furnace door is opened and closed by a double-acting cylinder. The cylinder is activated by a 4/2-way valve with spring return. This ensures that the door opens only as long as the valve is actuated. When the valve actuating lever is released, the door closes again.



Quantity	Item	Symbol
1	Double acting Cylinder	
1	Pressure relief valve	
1	4/2 way valve	
-	Hydraulic hoses for connections	

1. Describe the modes of operation of the circuit

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2. Design the Hydraulic circuit diagram for the circuit

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Conclusion and Results

Direction	Travel Pressure	Back pressure	Travel time
Advance Stroke	……	……	……
Return Stroke	……	……	……

Characteristic data required for calculation:

Piston area: A_{PN}	2 cm^2
Piston annular area: A_{PR}	1.2 cm^2
Stroke length (S)	200 mm
Pump output (Q)	2 l/min

Area ratio: $\alpha = A_{PN}/A_{PR}$

α =……..

Advance stroke speed: $V_{adv}=Q/A_{PN}$

V_{adv}=…….

Advance stroke time: $t_{adv}=S/V_{adv}$

t_{adv}=……

Return stroke speed: $V_{ret}=Q/A_{PR}$

V_{ret}=…….

Return stroke time: $t_{ret}=S/V_{ret}$

t_{ret}=……

Ratio of travel speeds: V_{adv}/V_{ret}=……

Ratio of travel times: t_{adv}/t_{ret}=……

3. Compare the advance- and return-stroke speeds and times with the area ratio. What is the relationship between these?

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