

Hydraulic & Pneumatic Circuits





Faculty of Engineering Mechanical power Engineering Dept.

Lecture (4)

on

Components of Hydraulic Action and Control

By

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Hydraulic Actuators











Lecture (2) - Hydraulic and Pneumatic Circuits - 4th year - Mech. power Engineering Dept.

















- 1 HIGH STRENGTH CHROME PLATED 17-4 PH STAINLESS STEEL PISTON ROD
- 2 HIGH STRENGTH 17-4 PH STAINLESS STEEL TIE RODS AND TIE ROD NUTS
- 3 303/304/316 STAINLESS STEEL FLANGE, HEADS AND CYLINDER TUBE
- 5 303/304 stainless steel piston with NyLon wearband

- 6 SELF-ALIGNING ADJUSTABLE ROD END CUSHION WITH BALL CHECK FOR FAST PISTON BREAK-AWAY
- SELF-ALIGNING ADJUSTABLE CAP END CUSHION WITH INTEGRAL CHECK VALVE FOR FAST PISTON BREAK-AWAY
- (8) URETHANE SEALS FOR PETROLEUM BASED HYDRAULIC FLUIDS
 - SEAL OPTIONS ARE AVAILABLE FOR HIGH TEMPERATURE, LOW FRICTION OR NON-STANDARD FLUIDS
- (9) URETHANE AN-STYLE ROD WIPER

OPTIONAL METALLIC OR DOUBLE-ACTING ROD WIPER AVAILABLE





Seals









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Hydraulic Shock Check valve Bleed screw Piston Tube seal Check valve for Check valve for Cushion Cavity **Cushion Cavity** quick start to quick start to (extending) (retracting) retract extend Rod Bearing and Seal 345-2733(Fluid Port Fluid Port_+() **Piston Rod** Piston Ο Fluid port Q.3.75 -Cap end 2 3 1 Adjustment Cushion Cushion Spear Adjustment needle valve Spear (retracting) needle valve (extending) **Stroke Adjusters** Lock Nut Cushioning valve Cushioning bush Piston seal Guide ring Threaded Rod Stroke Adjuster





Hydraulic Cylinder Mountings







Hydraulic Cylinder Mechanical

Second-class lever



Togale













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Types of Hydraulic Cylinder Loads







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Types of Hydraulic Cylinder







Types of Hydraulic Cylinder





| | 0 | 0 | 0 | 0 | 0 |
|---|---|---|---|---|---|
| H | | | _ | | |
| | 0 | 0 | 0 | 0 | 0 |

Single Acting Spring Return Cylinder



Ram





Types of Hydraulic Cylinder



Tandem Cylinder





Duplex Cylinder



Double Acting Cylinder



Double Rod Cylinder





Limited Rotation Hydraulic Actuator









Air – oil Intensifiers

Intensifiers are boosters used to increase the fluid pressure available from the supply source.

They are also employed to reduce costs by eliminating hydraulic pumps for single intermittent low-volume applications such as bench presses and riveting machines that perform such operations as bending, broaching, cutting, crimping, and forming.









Cylinders in a Circuit













How a Check Valve Works









Check Valves in a Circuit

Suspending a Load









Pilot Operated Check Valve

What a Pilot Operated Check Valve Consists of





Pilot Operated Check Valve Symbol





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How a Pilot Operated Check Valve Works



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Pilot Operated Check Valves in a Circuit













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Fixed Orifice



Check valve

Variable Orifice



Gate valve



PINCH VALVE

PNEUMATIC

Globe valve



Hand Wheel Type

Hydraulic - "Caliper Type"

Needle valve





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Pressure Differential Affects Flow

Nonpressure Compensated Flow Control Valves









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Pressure Differential Affects Flow

Pressure Compensated Flow Control Valves











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Temperature Affects Flow

Temperature-Pressure Compensated Flow Control Valve









Flow Control Valves in a Circuit Meter-in Circuit





Meter-in circuit with bypass pressure compensated flow control valve

Meter-in circuit with restrictor pressure compensated flow control valve





Flow Control Valves in a Circuit

Meter-out Circuit



Bleed-off Circuit



Flow control can be located directly after the pump or in a line to an actuator.

