Chapter 1: Overview

Objectives

- Learn the definition of a proportional valve.
- Recognize the different types of proportional valves.
- Learn the definition of direct acting and pilot operated.

Introduction

A proportional valve is one which can vary the output in response to the variation of electric input. The output of these valves depend on the magnetic force of the solenoid. There are three types of proportional valves, electrohydraulic proportional flow control, pressure control and directional valves.

The purpose of this manual is to explain how proportional valves work. To do this, the terminology associated with proportional valves, basic construction, operating parameters and how the valves are controlled, will be presented.
Summary of Chapters

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Types of Proportional Valves

There are three main categories of proportional valves. These include flow, pressure and directional control valves. Flow control valves control the flow into or out of a hydraulic cylinder or motor. The flow is controlled to regulate the speed of these actuators. In other words, the rate the cylinder extends and retracts or how fast the motor turns. The pressure control valves regulate the pressure applied to both of these devices. By regulating the pressure, the force the cylinder applies, or the torque of the motor is controlled. Finally, the directional control determines if the cylinder extends or retracts, or if the motor turns clockwise or counterclockwise.
Direct Acting vs. Pilot Operated

The movement of the hydraulic components (such as the spool), inside these valves can be controlled directly by the solenoid actuator. Valves which use this type of actuator are known as direct acting valves. Another method of controlling this movement is to use a small direct acting valve which controls the pressure applied to a larger spool. This is known as a pilot operated valve. In this valve, a small element pilots (controls) a large element. The diagrams below are examples of how these two functions and methods of actuation are accomplished. Both examples are pressure reducing valves. The EHPR08-33 is direct acting (controlled by the solenoid) and the TS10-36 is pilot operated (small valve controlling the larger spool). The operation of each is discussed in later chapters.