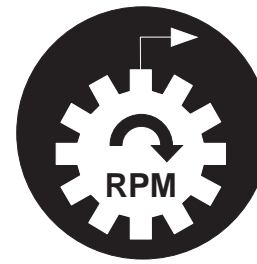
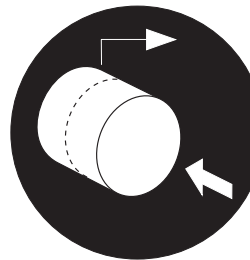
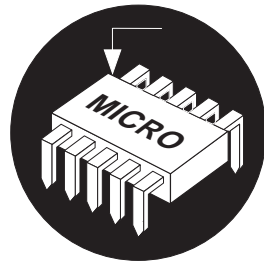
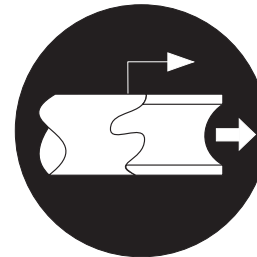
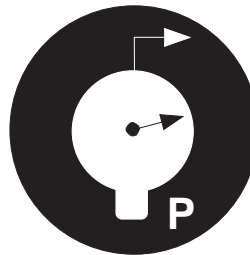
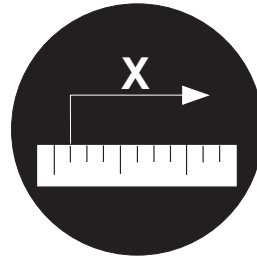


Your Guide to the Electronic Control of Fluid Power



The members of the National Fluid Power Association (NFPA) have prepared this application as an introduction to the electronic control of fluid power. The application and components described here are representative — electrohydraulics and electropneumatics can be effectively utilized in countless processes, and components are available in many different sizes and configurations.

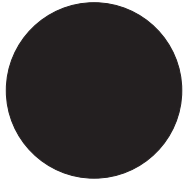
NFPA's manufacturers invite you to contact them for additional information.

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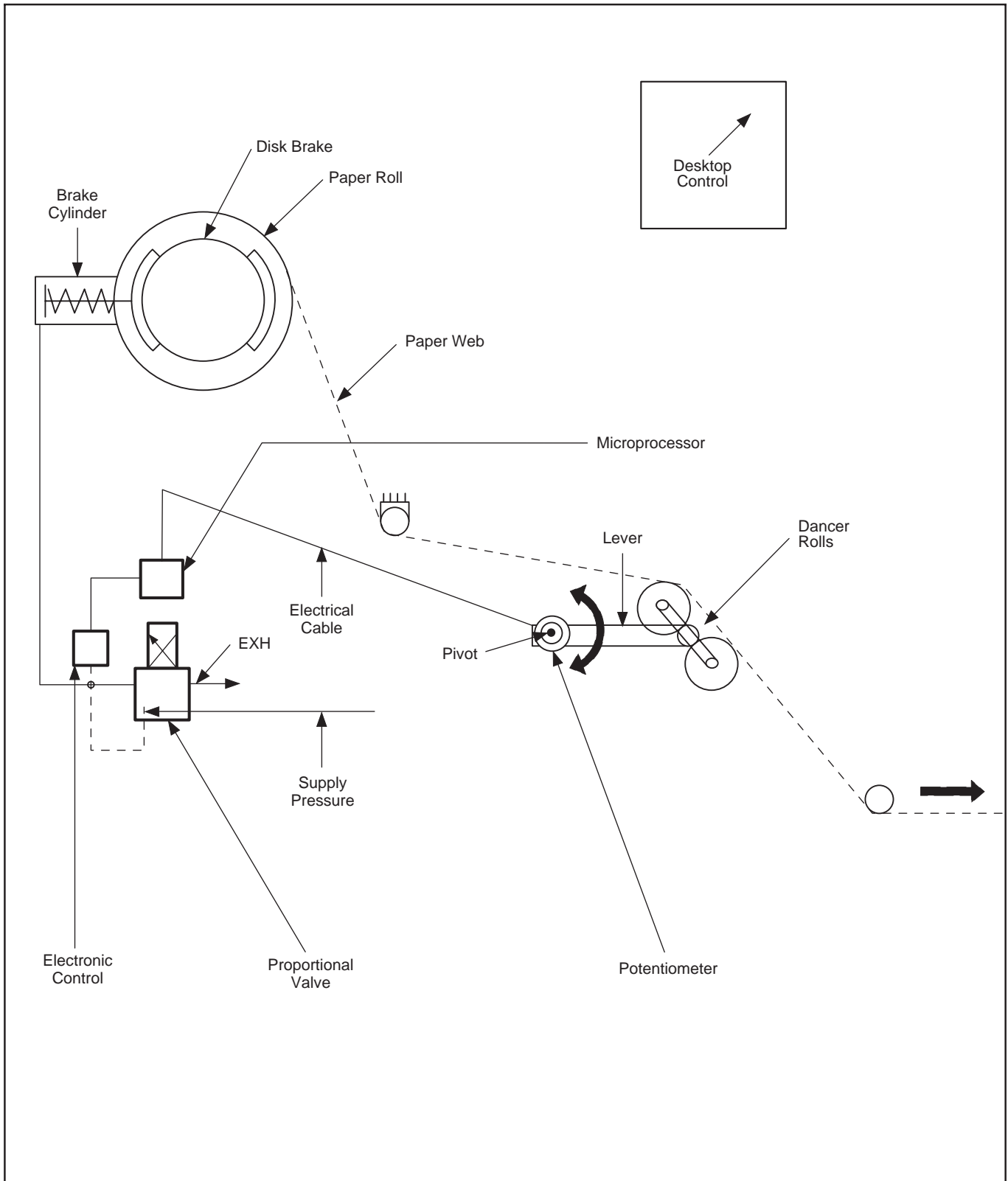
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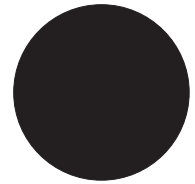
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Electropneumatics at Work

Tension Control of Paper Web





The Problem

Tension in the web of paper is a critical measurement in high-speed, web-fed paper handling machines. It becomes even more critical if the paper is special—pre-printed in as many as four different colors on the outside surface, plus a choice of any single color on the inside. Perfect operation becomes doubly critical.

Important to tension control are the dancer rolls, which pivot on a lever arm when the tension changes. Conventionally, the lever motion operates a cam, and the cam adjusts a pressure regulator that supplies air to modulate the force on the brake cylinder, thus controlling paper tension.

Its Solution

One engineer realized that performance could be improved by eliminating the mechanical cam, and substituting an electropneumatic system based on a potentiometer at the pivot of the lever (see the illustration).

At the heart of the new tensioning system is an electronic proportional pressure control valve, adjusted automatically with a signal from the potentiometer.

As the dancer roll lever moves up (too little tension in the paper web), the air valve delivers more pressure. It delivers less pressure when the lever moves down. The resulting brake force instantly restrains the web the right amount in order to create proper tension.

In operation, potentiometer voltage is converted to current in the electronic controller. This current controls solenoid force, and solenoid force adjusts the valve opening. A pressure transducer monitors the pressure going to the brake cylinder, and the electronic controller compares it with the value needed to produce the right braking force.

A computer oversees the controls, and remotely sets the proper values for pressure and tension. The operator fine tunes the potentiometer to give the best range of voltage response to changes in lever angle.

Related Applications

Controllers for clamp force, load balancing of a group of cylinders, and pressure control of a compressor are similar examples of this type of application. But the same techniques will work in controlling any pneumatic variable—including flow and temperature—involving little more than a change in sensors.

How Electronics Improved This Application

- Speed
- Accuracy
- Automation
- Standard components

Components Used in Pneumatic Systems*

Actuators	Manifolds
After Coolers	Motors
Air Compressors	Mufflers
Air Dryers	Regulators
Air Line Lubricators	Rotary Actuators
Controls (electronic) and Software	Seals
Cylinders	Shock Absorbers
Filters	Slides
Filters/Regulators	Switches
FRLs	Tubing
Fittings	Vacuum Products
Gauges	Valves
Grippers	
Hose	

*[Click here](#) to access the **NFPA Fluid Power Product Locator**, which includes information about and links to NFPA member companies.