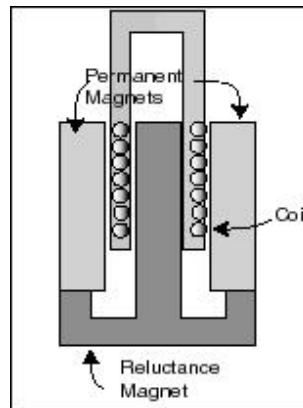


As the name suggests, the VCS10 uses voice coil technology to provide its impressive specifications. To understand this less known technology, the following brief presentation is offered.

The voice coil is a direct drive linear actuator. Stroke (length of travel) ranges from microns to several centimeters. It is ideal for applications that require positioning over a small to medium range, such as beam steering mirrors and pilot valve control.

Directly below is an image of the internal design.



As you can see the voice coil actuator is made up of essentially two components, a moving member and a fixed member. The core of the moving member is basically a group of coiled wires in a tubular form, represented by the circles. The stationary member is made up of a permanent magnet that surrounds the outer layer of the coil, and a ferromagnetic magnet of the inner structure that completes the magnetic field radiating through the coil of the moving member. Simple electromagnetics tells us that a force is exerted on a current carrying conductor when placed in a magnetic field. By applying a voltage across the leads of the coil, the magnetic field produces a force on the moving member, creating linear motion. Because the force is proportional to the current applied, good control can be achieved.

The voice coil itself is a non-commutated, two terminal limited motion device. It has linear control characteristics, zero hysteresis, zero cogging and infinite position sensitivity. It has low electrical and mechanical time constants and a high output power to weight ratio. As such, it is nearly a perfect servomechanism.

A voice coil actuator can be operated in several modes including positioning mode with the assistance of some feedback device. To complete the servo loop, a variety of different feedback devices, commonly a linear potentiometer, are used depending on the requirements of the application.

Beam steering mirrors is one example of many that are appropriate and well suited for voice coil stages. The mirrors are used in optical scanning, pointing, aiming, tracking, and stabilization applications. Inherent features of a voice coil actuator are high force-to-mass ratio, linear constants, cog-free and hysteresis-free motion are ideal for design of high performance electro-optical assemblies.

## **Applications for the VCS10 Stage**

### **Optics, Photonics and Measuring Technology**

- q Image stabilization
- q Scanning microscopy
- q Auto focus systems
- q Interferometry
- q Fiber optic alignment & switching
- q Adaptive and active optics
- q Laser tuning
- q Mirror positioning

### **Disk Drive**

- q MR head testing
- q Pole tip recession
- q Spin stands
- q Disk testing
- q Vibration cancellation

### **Microelectronics**

- q Nano-metrology
- q Wafer and mask position
- q Critical dimension measurement
- q Microlithography
- q Inspection systems
- q Vibration cancellation

### **Precision Mechanics and Mechanical Engineering**

- q Vibration cancellation
- q Structural deformation
- q Out-of-roundness grinding, drilling, tuning
- q Tool adjustment
- q Wear correction
- q Needle valve actuation
- q Micro pumps
- q Knife edge control in extrusion tools
- q Micro engraving systems

### **Life Science, Medicine, Biology**

- q Scanning microscopy
- q Patch-clamp
- q Gene technology
- q Micro manipulation
- q Cell penetration
- q Micro dispensing devices

## **VCS10 Voice Coil Stage offers these Advantages**

- q Nanometer resolution
- q Moderate force generation
- q Millisecond response
- q Low voltage
- q Low cost
- q No wear and tear