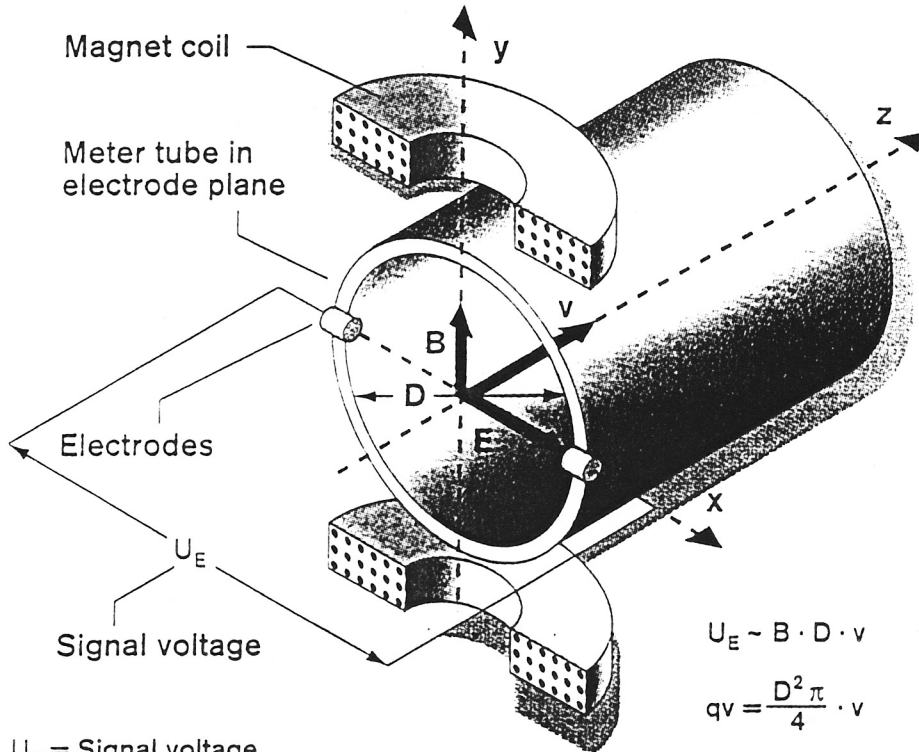


## ELECTROMAGNETIC FLOWMETER SCHEMATIC



$U_E$  = Signal voltage  
 $B$  = Magnetic flux density  
 $D$  = Electrode spacing  
 $v$  = Average flow velocity  
 $qv$  = Volume flowrate

$$U_E \sim B \cdot D \cdot v$$

$$qv = \frac{D^2 \pi}{4} \cdot v$$

$$U_E \sim qv$$

Source: Bailey-Fischer & Porter.

## How a magmeter works

Faraday's Laws of Induction say a voltage is induced in a conductor as it moves through a magnetic field. In an electronic flowmeter, a magnetic field is generated perpendicular to the fluid's flow direction. (See schematic.) Two diametrically opposed electrodes measure the voltage induced in the fluid. Signal voltage  $U_E$  is proportional to the magnetic flux density  $B$ , the electrode spacing  $D$ , and the average flow velocity  $v$ .

Because magnetic flux density and the electrode spacing are constant values, a proportionality exists between the signal voltage at the electrodes and the average flow velocity. From the volume flow rate equation, it follows that the signal voltage is also linearly proportional to the volume flow rate.

The induced flow signal is converted into scaled, analog, and digital signals in the converter.