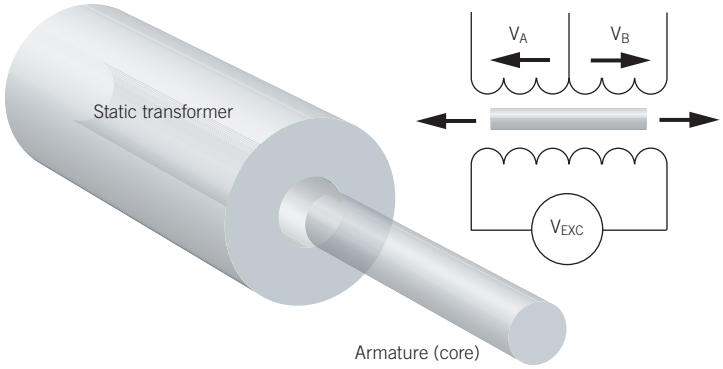
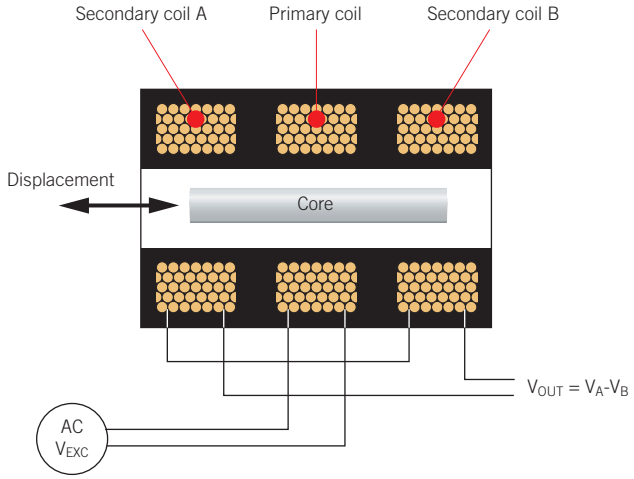
Inductive technology

6 Principle of operation

An LVDT inductive displacement transducer is constructed using a static transformer (primary winding) and two secondary windings.
The windings are formed on a hollow bobbin through which a magnetic core can travel.
The magnetic core provides a path for linking the coils via the magnetic flux.
When the primary winding is connected to an AC supply, current starts to flow in the secondary coils. A simplified electrical schematic is shown in the figure.



The secondary coils A and B are connected in series opposition so that the two voltages V_A and V_B have opposite phase and the transducer output is V_A- V_B.
If the core is in the centre position then voltages of equal magnitude but opposite phase will be induced in each secondary coil and the net output is zero.
As the core is moved in one direction, the voltage in the corresponding secondary coil increases while the other coil experiences a complementary voltage reduction. The net effect is a transducer voltage output that is proportional to displacement.
Knowledge of the magnitude and the phase of the output with respect to the excitation signal allows one to deduce the position and direction of the core motion from the null position.



The output of an LVDT is a linear function of displacement over its calibrated measurement range. Beyond this range the output becomes increasingly non-linear. Measurement range is defined as ± distance from the transducer null position.