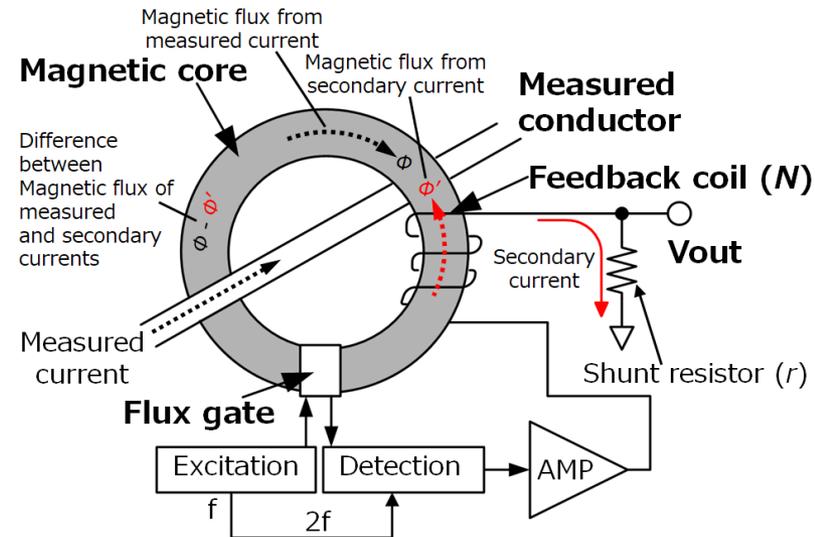


# Details of Current Sensors by Operating Principle

## ⑥ Zero Flux Method (Fluxgate Detection) (AC/DC)

### Characteristics

- Operates by canceling out the magnetic flux in the magnetic core, giving it excellent linearity unaffected by the magnetic core's  $B-H$  magnetic characteristics.
- Since the **fluxgate** exhibits an extremely small offset drift across a broad temperature range thanks to its operating principle, it can achieve exceptionally accurate and stable measurements, making this type of current sensor ideal for pairing with high accuracy power meters for uncompromising precision
- Since the frequency and harmonics of the exciting current itself become sources of noise, current sensors using a **fluxgate** exhibit slightly more noise than one using a Hall element.
- Since the probes operate using the CT of the secondary feedback winding in the high-frequency region, and utilize an amplifier for the DC and low-frequency region, a broad frequency bandwidth is supported with a high  $S/N$  ratio.



### Measurement Principle

- In the zero-flux method, in order to cancel out the magnetic flux ( $\Phi$ ) produced inside the magnetic core by the AC current flowing in the conductor being measured, a secondary current flows to the secondary side of the feedback winding inducing a secondary magnetic flux ( $\Phi'$ ).
- However, in the low-frequency regions resulting from DC currents, the magnetic flux ( $\Phi - \Phi'$ ) cannot be cancelled and thus remains in the circuit.
- The **fluxgate** detects this remaining magnetic flux ( $\Phi - \Phi'$ ). Then, a secondary feedback current is induced through an amplifier circuit so as to cancel out the magnetic flux ( $\Phi - \Phi'$ ) in the low Hz regions.
- This secondary current flows to the shunt resistor, producing a voltage across its terminals.
- The voltage is identified as proportional to the current flowing in the conductor being measured, giving us the true current level.

### Hioki Zero Flux Method Fluxgate Detection (AC/DC) Sensors

CT6841, CT6843, CT6844, CT6845, CT6846, CT6862, CT6863, CT6865, 9709, CT6904, CT6875, CT6876, CT6877