

Electric Vehicles/ Energy R&D, Testing

Impedance Measurement of Reactors While in Operation

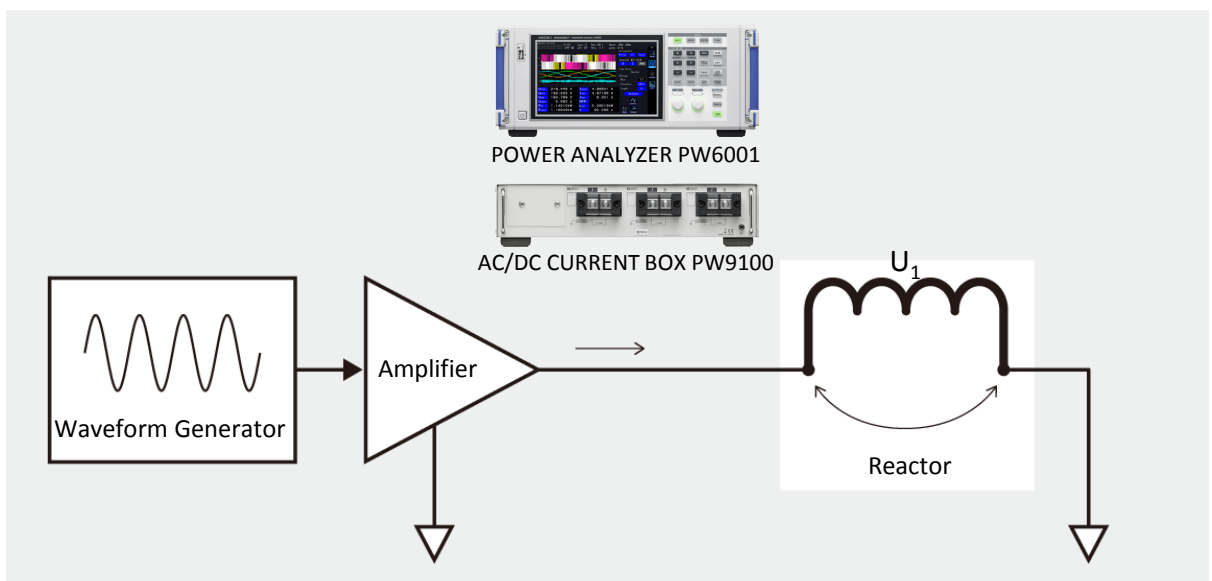
Power analyzer measures reactor impedance

Why Should A Reactor's Impedance Be Measured?

By identifying the impedance of a reactor while it is in operation, you can gain indices that aid in circuit design. Because there is a level dependency in reactor impedance, values measured by an LCR meter differ from the actual value when the reactor is in operation. By using a Power Analyzer to measure impedance while a reactor is in operation, you can capture the true impedance value.

How is Impedance Measured?

High frequency current is applied to the reactor. The Power Analyzer then measures the reactor voltage, current, and phase difference. Using the measurement results, we can then measure impedance, inductance and resistance components.



Measurable Parameters

Reactor Inductance Z and Phase Difference θ can be derived from U_1 and I_1 .

Inductance L_s and Resistance Component R_s can be derived from Inductance Z and Phase Difference θ .

Key Benefits of Power Analyzers

Thanks to the wide frequency bandwidth and phase shift correction function, the amplitude and phase of high frequency voltage and currents on reactors, capacitors, and similar devices can be accurately measured.

Based on the customer's own defined formulas, display the parameters associated with the impedance of circuit elements on the Power Analyzer in real time.

With the X-Y Plot Function, display the correlations between multiple parameters in a frequency characteristics graph or similar tool on the Power Analyzer in real time.

Formulas

$$\text{Impedance } Z [\Omega] = U_{\text{fnd1}} / I_{\text{fnd1}}$$

$$\text{Reactance } X [\Omega] = Z \times \sin(\theta_{U_1} - \theta_{I_1})$$

$$\text{Inductance } L_s [\text{H}] = X / 2\pi f$$

$$\text{Resistance Component } R_s [\Omega] = Z \times \cos(\theta_{U_1} - \theta_{I_1})$$

Products used

- POWER ANALYZER PW6001-01 x 1
- AC/DC CURRENT BOX PW9100-03 (50A, DC to 3.5MHz, 3ch) x 1
or AC/DC CURRENT SENSOR CT6904 (500A, DC to 4MHz, feed-through type)
- ※ Customers need to provide their own waveform generator and amplifier with the appropriate specifications as required.

- Information valid as of July 2018.
- Specifications are subject to change and revision without notice.