CLAIMS

What is claimed is:

1. A method for measuring differences in voltage drop, comprising:

coupling a current measurement component having first and second terminals in series with a voltage source and a load device, the voltage source operating at a line frequency;

providing first and second voltage drop circuits each comprising a fixed value component and an adjustable value component coupled in series;

coupling the first voltage drop circuit to the first terminal of the current measurement component;

coupling the second voltage drop circuit to the second terminal of the current measurement component;

superimposing a relatively high-frequency signal onto a control input of the adjustable value components;

adjusting the values of the adjustable value components based on any difference in voltage drop values produced by the first and second voltage drop circuits due to measured variations in the voltage drops produced by the high-frequency signal; and measuring the difference in voltage drop produced by the difference in voltage drop values produced by the first and second voltage drop circuits at the line frequency.

2. A method as in claim 1, wherein the current measurement component comprises a resistor.

3. A method as in claim 1, wherein the fixed value component is a resistor.

4. A method as in claim 1, wherein the adjustable value component is an adjustable current source.

5. A method as in claim 1, wherein the adjustable value components correspond to a single adjustable value component selectively connectable to each of the fixed value components.

6. A method as in claim 1, wherein the high-frequency signal is a pseudo random signal.

7. A method as in claim 1, wherein the high-frequency signal is a square wave signal.

8. A method as in claim 1, further including using the measured voltage drop for calculating associated current flow in an associated load.

9. A method as in claim 1, further including using the measured voltage drop in multiple phases of a multi-phase electrical source to be metered, and calculating associated current flow in such corresponding multiple phases in an associated polyphase load.

10. Apparatus for measuring current flow at a first frequency through a load device, comprising:

a current measurement component having first and second terminals;

first and second voltage drop circuits coupled, respectively, to the first and second terminals of the current measurement component, each voltage drop circuit including a first fixed value component coupled in series with an adjustable value component;

a tuning circuit configured to couple a high-frequency signal to a control input of the adjustable value components, to monitor voltage drops produced by said first and second voltage drop circuits from said high-frequency signal, and to provide signals to said adjustable value components based on any differences in the voltage drops; and

a measurement device coupled to the first and second voltage drop circuits to measure voltage drop differences at said first frequency.

11. Apparatus for measuring current flow at a first frequency through a load device, comprising:

a current measurement component having first and second terminals;

first and second fixed value components connected, respectively, to said first and second terminals of the current measurement component;

an adjustable value component;

a switching device, the switching device configured to connect each fixed value device to said adjustable value component so that the first and second fixed value components are alternately coupled in series with said adjustable value component;

a tuning circuit configured to couple a high-frequency signal to a control input of the adjustable value component, to monitor voltage drops produced by said first and second fixed value components when coupled in series with said adjustable value component from said high-frequency signal, and to a provide signals to said adjustable value component based on any differences in the voltage drops;

and a measurement device coupled to the first and second fixed value components to measure voltage drop differences at said first frequency.

12. Apparatus as in claim 11, wherein said switching device comprises ganged switches.

13. A method for measuring current flow, comprising: measuring a current across a current sensing component having first and second terminals in series with a voltage source and a load device, the voltage source operating at a line frequency;

measuring a voltage difference between first and second voltage drop circuits, each voltage drop circuit comprising a fixed value component and an adjustable value component coupled in series, wherein:

the first voltage drop circuit is coupled to the first terminal of the current measurement component; and

the second voltage drop circuit is coupled to the second terminal of the current measurement component;

superimposing a signal onto a control input of the adjustable value components;

measuring variations in voltage between the first and second voltage drop circuits based on the signal; and

adjusting values of the adjustable value components based at least in part on the measured variations;

wherein the measuring of the current across the current sensing component comprises measuring a difference in voltage drop between the first and second voltage drop circuits at the line frequency.

14. A method as in claim 13, wherein the current sensing component comprises a current sensing resistor.

15. A method as in claim 13, wherein the fixed value component of each of the first and second voltage drop circuits comprises a resistor.

16. A method as in claim 13, wherein the adjustable value component comprises an adjustable current source.

17. A method as in claim 13, wherein adjusting the values of the adjustable components is performed by a tuning circuit.

18. A method as in claim 13, wherein the signal is a pseudo random signal.

19. A method as in claim 13, wherein the signal is a square wave signal.

20. A method as in claim 13, wherein the adjusting of the values of the adjustable value components compensates for differences in values of the fixed value components.

21. A method as in claim 13, wherein the measuring of the current across the current sensing component is performed for each phase of a poly-phase load.

WHAT IS CLAIMED IS:

1. A method for matching voltage drops in paired voltage drop circuits, comprising:

monitoring first and second voltage drops using circuits each comprising a fixed value component and an adjustable value component coupled in series, the fixed and adjustable valued components being configured for operation at a first frequency; and

adjusting values of the adjustable value components based on any difference in voltage drop values produced by the first and second voltage drop circuits due to measured variations in the voltage drops produced by application of a high-frequency signal higher in frequency that the first frequency.

2. A method as in claim 1, wherein the fixed value component is a resistor.

3. A method as in claim 1, wherein the adjustable value component is an adjustable current source.

4. A method as in claim 1, wherein the adjustable value components correspond to a single adjustable value component selectively connectable to each of the fixed value components.

5. A method as in claim 1, wherein the high-frequency signal is a pseudo-random signal.

6 A method as in claim 1, wherein the high-frequency signal is a square wave signal.

7. A method for measuring current flow, comprising:

coupling a current measurement component having first and second terminals in series with a voltage source and a load device, the voltage source operating at a first frequency;

providing first and second voltage drop circuits each comprising a fixed value component and an adjustable value component coupled in series;

coupling the first voltage drop circuit to the first terminal of the current measurement component;

coupling the second voltage drop circuit to the second terminal of the current measurement component;

superimposing a relatively high-frequency signal onto a control input of the adjustable value components;

adjusting the values of the adjustable value components based on any difference in voltage drop values produced by the first and second voltage drop circuits due to measured variations in the voltage drops produced by the high-frequency signal; and

measuring the difference in voltage drop produced by the difference in voltage drop values produced by the first and second voltage drop circuits at the first frequency.

8. A method as in claim 7, wherein the current sampling component comprises a resistor.

9. A method as in claim 7, wherein the fixed value component is a resistor.

10. A method as in claim 7, wherein the adjustable value component is an adjustable current source.

11. A method as in claim 7, wherein the adjustable value components correspond to a single adjustable value component selectively connectable to each of the fixed value components.

12. A method as in claim 7, wherein the high-frequency signal is a pseudo-random signal.

13. A method as in claim 7, wherein the high-frequency signal is a square wave signal.

14. A method as in claim 7, further including using the measured voltage drop for calculating associated current flow in an associated load.

15. A method as in claim 7, further including using the measured voltage drop in multiple phases of a multi-phase electrical source to be metered, and calculating associated current flow in such corresponding multiple phases in an associated polyphase load.

16. Apparatus for measuring current flow at a first frequency through a load device, comprising:

a current measurement component having first and second terminals;

first and second voltage drop circuits coupled, respectively, to the first and second terminals of the current measurement component, each voltage drop circuit including a first fixed value component coupled in series with an adjustable value component;

a tuning circuit configured to couple a high-frequency signal to a control input of the adjustable value components, to monitor voltage drops produced by said first and second voltage drop circuits from said high-frequency signal, and to provide signals to said adjustable value components based on any differences in the voltage drops; and

a measurement device coupled to the first and second voltage drop circuits to measure voltage drop differences at said first frequency.

17. Apparatus as in claim 16, wherein said fixed value component comprises a resistor.

18. Apparatus as in claim 16, wherein said adjustable value component comprises an adjustable current source.

19. Apparatus as in claim 16, wherein said high-frequency signal comprises one of a sine wave signal, a pseudo-random signal, and a square wave signal.

20. Apparatus for measuring current flow at a first frequency through a load device, comprising:

a current measurement component having first and second terminals;

first and second fixed value components connected, respectively, to said first and second terminals of the current measurement component;

an adjustable value component;

a switching device, the switching device configured to connect each fixed value device to said adjustable value component so that the first and second fixed value components are alternately coupled in series with said adjustable value component;

a tuning circuit configured to couple a high-frequency signal to a control input of the adjustable value component, to monitor voltage drops produced by said first and second fixed value components when coupled in series with said adjustable value component from said high-frequency signal, and to a provide signals to said adjustable value component based on any differences in the voltage drops; and

a measurement device coupled to the first and second fixed value components to measure voltage drop differences at said first frequency.

21. Apparatus as in claim 20, wherein said switching device comprises ganged switches.