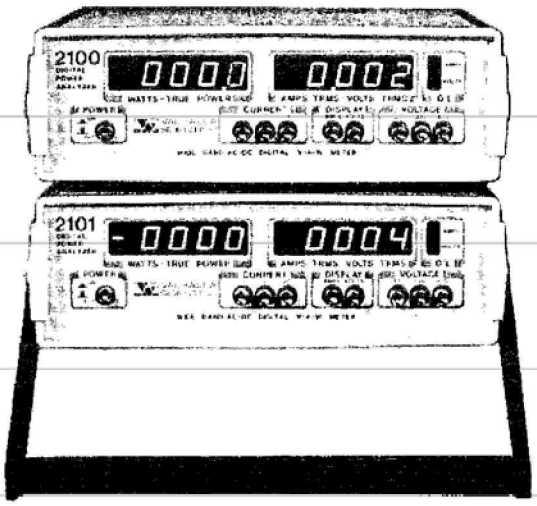
Digital Power Analyzers



The 2100 & 2101

These two benchtop single-phase Digital Power Analyzers are fully loaded with measurement features you'd expect to find on instruments costing three times the price. Both units boast twin high resolution digital displays, DC to 50KHz frequency response, true power measurement, true RMS voltage and current and built-in peak overload indicators.

True Power Measurement DC to 50KHz Response

When it comes to making tough power measurements, Valhalla's 2100 and 2101 Digital Power analyzers are as tough as they come. The wideband direct-coupled, front-end design of these models permits them to make accurate power measurements, even in the most difficult applications. Switching power supplies, SCR controlled circuits and pulsed DC devices are just a few of the applications requiring the true power measurement capability of Valhalla's 2100 series.

Analog induction-type wattmeters and low-band digital wattmeters simply lack the frequency response capability to accurately capture the true wideband power components of the watts waveform.

True RMS Voltage and Current

High accuracy, large scale integrated circuits are used to convert the True RMS value of a waveform to a proportional DC voltage. This LSI computes the instantaneous square of the input signal, averages it and takes the square root of the result to produce a proportional DC voltage. The TRMS value of current and voltage are extremely useful in computing VA for apparent power factor determinations. The TRMS converters are not involved in deriving WATTS in the power measurement mode.

Chopper Stabilized Front End

A high sensitivity, 1 microvolt, chopper stabilized amplifier features high gain, wideband performance and excellent DC stability to provide internal full scale ranges of 2mV, 20mV and 200mV for high accuracy measurements on low level signals. The result yields optimum resolution on power measurements for nine range combinations of voltage and current.

DC Wideband Response, Up to 50 KHz

Continuous instantaneous four-quadrant multiplication featuring DC coupling with excellent bandwidth allows accurate power measurements on sinusoidal or non-sinusoidal waveforms. Representative typical load waveforms are illustrated below.

SCR

FLUORESCENT LAMP

DC-HALF WAVE RECTIFIED

DC-LOW DUTY CYCLE "SQUARISH"

Current/Voltage Peak Overload Indication

These units offer both current and voltage peak crest factor caution/overload indicators. This convenient built-in feature alerts the operator to the presence of peak signal power conditions. The LED indicators illuminate for peaks of 2.5 times the full scale range (i.e. 5 amp peak on the 2 amp RMS range). Should a peak condition exist, simply uprange to gain additional peak response capability.

Single or Dual Channel BCD or Analog Output

To aid in data acquisition applications, the 2100 series DPAs are now available with optional data outputs. The "DMX" option provides raw non-isolated data to one of four available data conditioning units.

The 2190D provides isolated dual channel 0-5 VDC analog output. The 2191D offers dual channel isolated BCD capability. The dual channel 2190D and 2191D track the selected values in the dual displays of the Valhalla 2100 Series wattmeters.

Reliability Built-In From the Ground Up

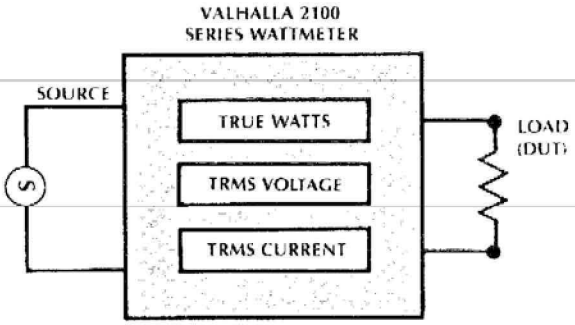
Valhalla Digital Wattmeters are tough and built to last. LSI construction minimizes parts count. The high impact injection molded case has a handy tilt bail/handle that adjusts for the perfect viewing angle and folds to protect the human engineered front panel during storage. All components are high quality "off the shelf", no private label parts to impede local service should it become necessary.

Digital Wattmeters

Improved Product Reliability With Power Analysis

Valhalla's 2100 series wattmeters are commonly used for quality assurance production testing for a wide variety of electrical products. Power efficiency is an excellent quality indicator of a products' performance, especially when compared to identical products.

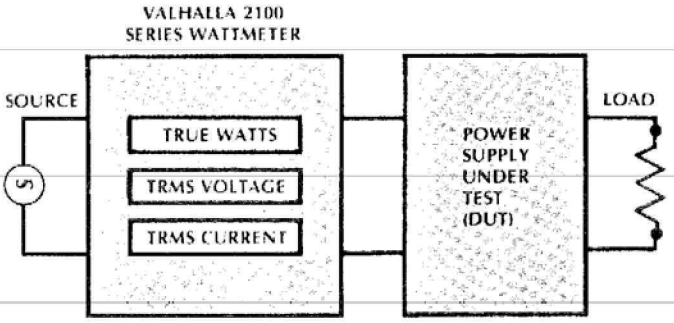
Whether the load is an electronic instrument, an electric motor, or power supply, consider the advantage of added product screening through power analysis. Faulty and defective products can be easily detected using low-line voltage testing while simultaneously examining power efficiency. A given product may be meeting it's specifications yet consuming 10% more power than normal. The explanation for increased power consumption could be a faulty or wrong value component, a faulty input transformer, or a binding gear or motor bearing which has not yet failed. Power analysis detects otherwise invisible secondary product problems so you can avoid more costly product field failures and improve your products' reliability reputation.



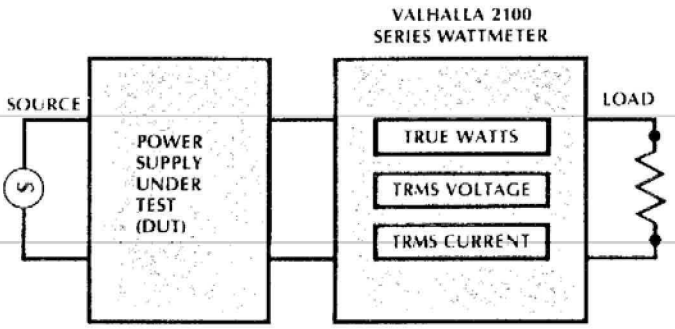
Wattmeter Wiring Diagram—Configured for Monitoring Power (V-A-W) Drawn by the Load (Device Under Test).
Figure E.

Products Typically Improved with Power Analysis

AC Power Sources
Appliances – Toasters, Mixers, T.V.'s
Compressors
Fluorescent Lamps
Gyros (Inertial Guidance Systems)
Lamp Ballasts
Lamps, Light Bulbs
Linear Mode Power Supplies
Medical Instruments
Motors
Power Tools – Drills, Saws, Lathes
Switching Mode Power Supplies
Test Instruments
Transformer Power Loss
Uninterruptible Power Supplies



Power Input Measurement of a Device Under Test (DUT)
Fig. F



Power Output Measurement of a Device Under Test (DUT)
Fig. G

The Valhalla 2100 series wattmeters do more than determine true power (EI cos Φ) drawn by a load. By taking the difference in power readings from figure F and G above, the wattmeter can determine the efficiency of the device under test. In this example the device under test can be a transformer, power supply or power source.

Following years of application-oriented improvements and special design enhancements, the new version Valhalla 2100 Series Digital Power Analyzers **now provide a 0.1% True RMS current and voltage measurement accuracy.** The improved high bandwidth shunt version allows dramatic bandwidth performance increases to 50KHz. The measurement of total harmonic currents for switching power supplies is a straight forward measurement with the Valhalla 2100. **For 60Hz power supplies, the Valhalla 2100 Series can capture up to the 83rd harmonic with 0.1% ± 6 digits accuracy.**

Digital Power Analyzers

Specifications

Model 2100 Range/Resolution Table

True RMS Voltage	True RMS Current		
	.2000A	2.000A	20.00A
150.00V	30.00W	300.0W	3000W
300.0V	60.00W	600.0W	6000W
600.0V	120.00W	1200.0W	12000W
	True WATTS		

Model 2101 Range/Resolution Table

True RMS Voltage	True RMS Current		
	.2000A	2.000A	20.00A
30.00V	6.000W	60.00W	600.0W
150.00V	30.00W	300.0W	3000W
300.0V	60.00W	600.0W	6000W
	True WATTS		

Performance Specifications (Both Models)

AC/DC VOLTAGE and AC/DC CURRENT (True RMS)

Accuracy: (Voltage and Current)
DC & 40Hz to 5KHz: ±0.1% of reading ± 6 digits
5KHz to 15KHz: ±0.5% of reading ± 6 digits
15KHz to 20KHz: ±0.75% of reading ± 6 digits
useable to 50KHz with typically 1% error per 10KHz

Crest Factor Response: 50:1 for minimum RMS input, linearly decreasing to 2.5:1 for full scale RMS input.
Minimum Input: 5% of range.
Maximum Input: 600V DC or RMS AC, 1500V peak
Maximum Common Mode: 1500V peak, neutral to earth
Peak Indicator: Illuminates at 2.5 x full scale
Maximum Input: 35A peak, 20A DC or RMS; 100A DC or RMS for 16mS without damage.
Overrange: 150% of full scale for DC, up to maximum input

WATTS (True Power-EI cos Ø)

Accuracy: 25°C ± 5°C, 1 year
DC & 40Hz to 5KHz: ±0.25% of reading ± 6 digits
5KHz to 10KHz: ±0.5% of reading ± 0.5% of range
10KHz to 20KHz: ±1% of reading ± 1% of range
(2A range only)
20KHz to 50KHz: additional ± 1% per 10KHz above 20KHz
Power Factor Response: Unity to zero leading or lagging

General Specifications

Displays: Dual 4½ digit large, high intensity, 7 segment L.E.D.
Operating Temperature Range: 0°C to 50°C
Temperature Coefficient: ± .025% of range per °C from 0°C to 20°C and 30°C to 50°C
Conversion Rate: Approximately 600mS (1 per second)
Power: 115/230 VAC ± 10%, 50-60Hz, 5 Watts
Size: 23.5cm L x 21.6cm W x 6.4cm H (9.25" x 2.5" x 8.5")
Weight: 2.3kg (5 lbs) Net, 4.5kg (10 lbs) Shipping
Load Connection: 4 Terminal heavy duty binding posts

Option Specifications

Clamp-on Current Transformer **Option "I-150"**: Extends AC current Measurement capability on the 2100 and 2101 to 150 amps RMS. The 1000:1 output ratios is 2% accurate from 50Hz to 400Hz. The unit accommodates up to ½" diameter conductors.

Clamp-on Current Transformer ***Option "I-1000"****: Extends AC* current measurement capability to 1000 amps RMS. The 1000:1 ratio CT is 2% accurate from 50Hz to 400Hz.

Data Output Port **Option "DMX"**: Provides non-isolated, multiplexed data input to the 2190S/D or 2191S/D Data Conditioners. The option "DMX" is no charge when ordered in conjunction with a 2100 series DPA and a 2190/2191 Data Conditioner.

Load Power Adaptor Cord **Option "X21"**: Approximately three feet in length for each half. this convenient adaptor cord plugs directly into a standard 115V AC power outlet and mates with the 2100 or 2101 via heavy duty banana jacks. Female half provides for quick and easy load connect or disconnect capability.

For low current applications **Option "20mA"** provides a lower current range of 20mA, includes 200mA and 2.0A ranges; however, it deletes the higher 20 ampere range.

Ordering Information

Model 2100	Digital Power Analyzer .....
Model 2101	Digital Power Analyzer .....
Option "DMX"	Data Output Port.....
Option "20mA"	Low Current Version.....
Model 2190D	Dual Channel Analog Output ....
Model 2191D	Dual Channel BCD Output.....
Option "I-150"	Clamp-on 150A C.T.....
Option "I-1000"	Clamp-on 1000A C.T.....
Option "CC4"	Meter & Accessory Carrying Case..
Option "X21"	115 VAC Load Power Cord .....
Option "R4"	Rack Mount Adapter .....
Option "SP-2"	Two Year Spare Parts Kit.....
Additional	Operating/Maintenance Manual ...