

APPLICATION NOTE

M1001 Measurement Data Logging

October 23, 2019



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1 Introduction

This application note illustrates the use of the M1001 Power Analyzer's for logging voltage and current data logging to monitor slow moving changes in load current or power draw. To illustrate this power analyzer function, a programmable AC load is used set to operate in OCP Protection test mode. In this mode, the load current drawn from an AC source is stepped over time from zero to a user set maximum current value while the AC load monitors the AC voltage to see if the AC source's current protection circuit trips off the output.

2 AC Measurement Functions

2.1 Equipment Setup

Before any measurements can be made, it is important to set up the equipment used. For this application, we will use a standard US 120Vac, 60Hz power outlet to provide power to the EUT.

The EUT for this example is a programmable AC load, APS model 3C037-37. The benefit of using a programmable AC load is the ability to set current level, crest factor and power factor to simulate a wide range EUT types. For this application note, we are using the OCP Protection test function of the DC Load to ramp the load current from 0.1A to 6.0A.

The general equipment setup is simple and illustrated in the figure below.

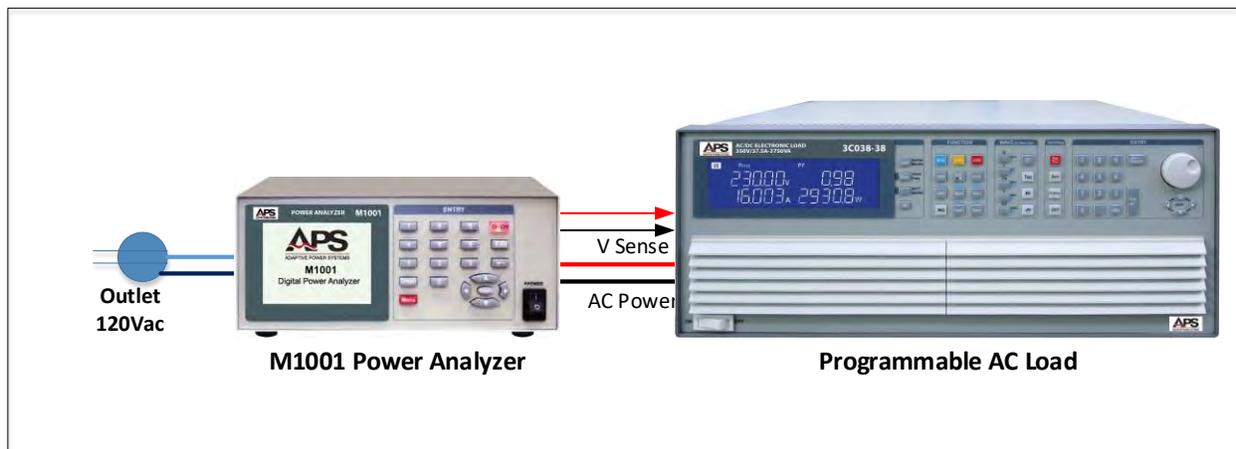


Figure 1: Equipment Setup

2.2 Measurement cable wiring

The connections between the power source (wall outlet), power analyzer and load are shown in the figure below.

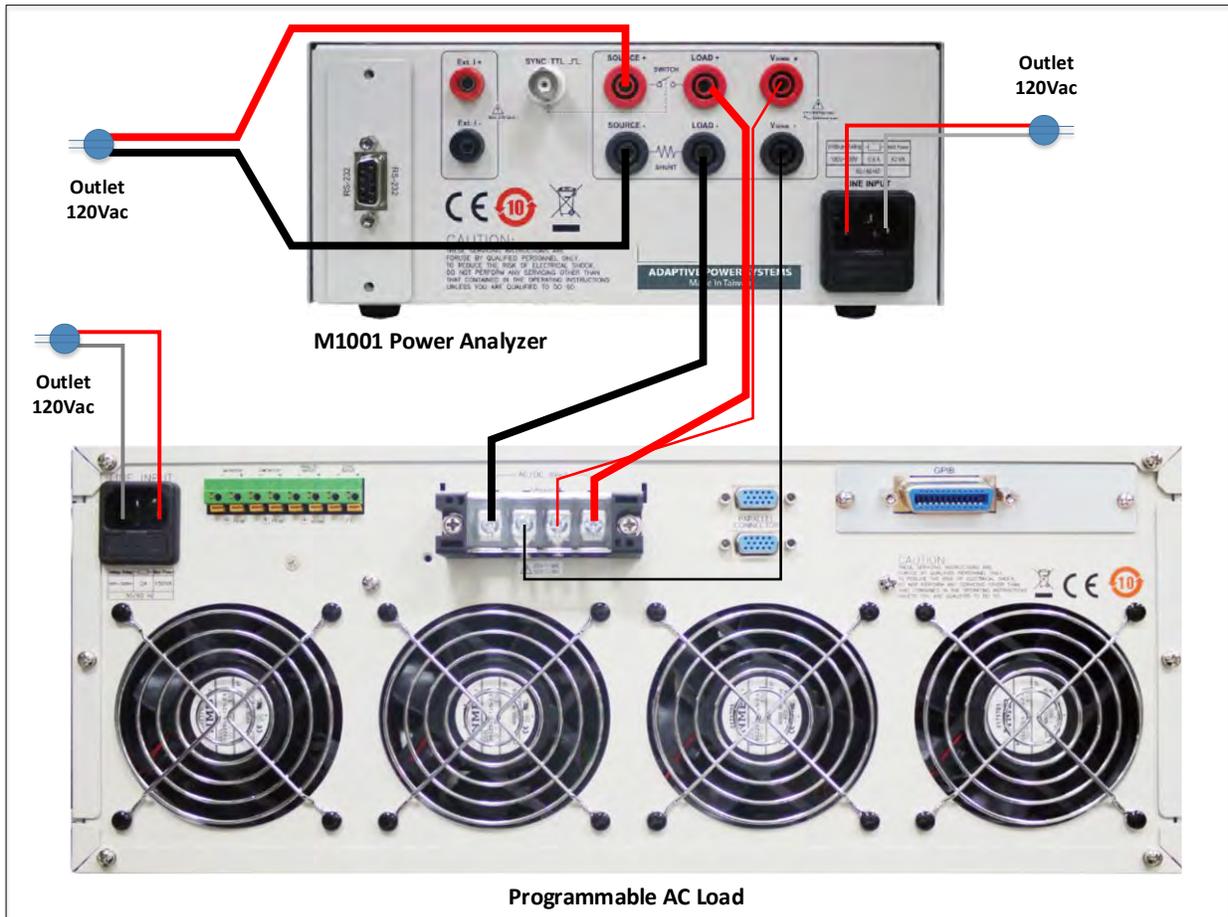


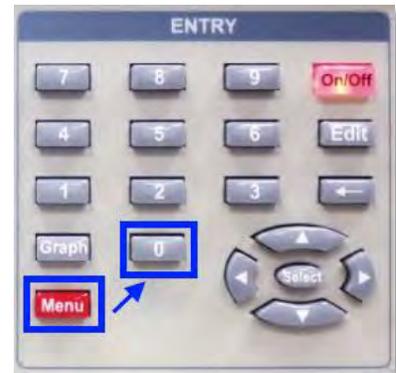
Figure 2: Equipment connections

Note the V_{SENSE} lines of the power analyzer must be connected to the load input to make sure any wire impedance voltage drops do not affect the voltage measurement results.

2.3 Initial Power Analyzer Setup

The power analyzer must be set up for the intended measurements. In this case, we are making AC measurements and will be using the internal current shunt of the M1001, as the expected current levels will be well below the 20Arms of the internal shunt.

Settings are made from the System Setting menu, available by pressing the **Menu** key followed by the number zero key **0**.



Once in the System Setting menu, press the **Edit** key and use the cursor keys to scroll through the available settings. To change a numeric setting, enter the new value and press the **Select** key inside the cursor keypad. To change alternate fields, use the left and right cursor keys to move between field settings and press **Select** when done.

Use the up down cursor keys to move to the next setting.

Since we are making AC measurements, we will make the following selections:

- Mode AC
- Average 16
- Filter 50 kHz On
- On Degree 090°
- Off Degree 000°
- Shunt Int (Internal)

System	Setting
Mode	AC,DC
Average(1~64)	16 Cycles
Filter 50kHz	On, Off
On Degree(0~359)	090°
Off Degree(0~359)	000°
Shunt	Int, Ext
Scale(1~10000)	00100.00 A/V
Display r1.00 Module r4,r3 Interface r3	

This is reflected in the System Setting screen shown here.

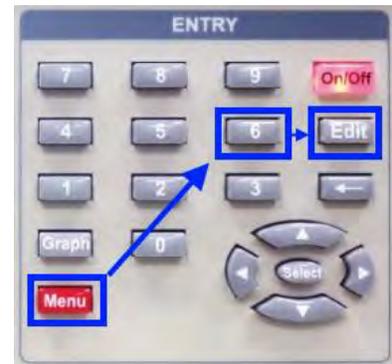
2.4 Selecting Data Logger Mode

Before we can make any measurements, we need to select the **Data Logger** mode by pressing the **Menu** key followed by the number six key **6** (Data Logger).

Next, we need to configure the Data Logger mode for the application at hand. This is accomplished by pressing the **Edit** key and use the cursor keys to scroll through the available settings.

The Data Logger Mode allows selection of a fixed range for voltage and current. For our example, we will set up as follows:

- Use the 200V range as our power source (US grid voltage) is 120Vac rms.
- For current, we expect no more than the 6.0 A the AC OCP test function is programmed for so will use one of the 10A range.
- If the load current exceeds 10A – not expected as the programmable AC load is set to stop at 6.0 Arms – we will allow the power analyzer to switch to a higher current range.
- The update rate is set to allow fast updates of the chart at the expense of a shorter data window.



DataLog	Setting
V_Range (200V)	20V, 40V, 80V, 200V, 400V, 800V
I_Range (10A)	2mA, 4mA, 8mA, 20mA, 40mA, 80mA, 0.2A, 0.4A, 0.8A, 2A, 4A, 8A, 10A, 20A, 40A
Range_AutoUp	On, Off
Update rate	0.2sec, 0.5sec, 1sec, 2sec, 5sec, 10sec

When done, press the **Edit** key to return to the Data Logger screen. We are now ready to start the test pressing the **On/Off** key in the upper right corner of the keypad. Once pressed, this key back light will change to green (**On/Off**) and power will be applied to the AC load input.

2.5 Data Logger Result

Data logging starts and voltage and current will be shown on the vertical axis of the screen with time on the horizontal axis as shown in Figure 3. The time scale is determined by the Update rate setting, in our example 0.2 sec.

Since the load is stepping the current level, the red current line will rise over time as shown in the screen below. The current is at 4.688 A and still rising as the load is set to step for 0.1A to 6.0A. The voltage provided by the grid is at 115.79Vac. Since the power analyzer is set to upscale as needed, the vertical axis will change from 5A max to 10A max as soon. Once the graph reaches the right edge of the display screen, the chart will scroll to the left, dropping the oldest data on the left of the screen.



Figure 3: Data Logging in progress

By running the OCP Protection test on the load multiple times, we can capture repeated test cycles on the same EUT as shown in Figure 4.

Note: To stop data logging, press the **On/Off** key in the upper right corner of the keypad to disconnect the load. The data logging screen will stop showing the capture data. Pressing the **On/Off** key again will clear the screen and start a new data logging cycle.

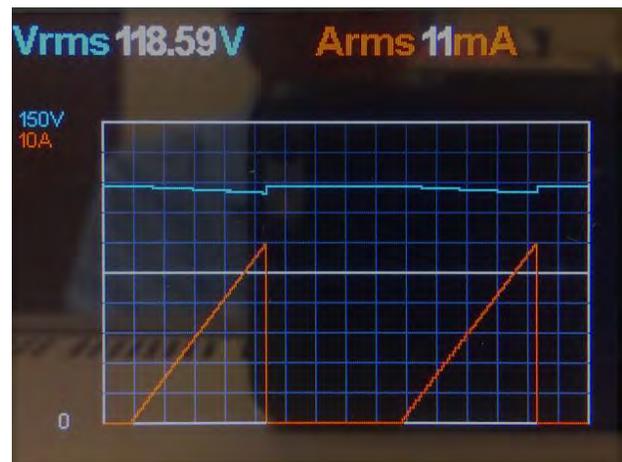


Figure 4: Data Logging stopped

3 Other M1001 Measurement Functions

Additional measurement functions of the M1001 are covered in other application notes. Contact Adaptive Power Systems or its representative for copies of other power analyzer application notes.

- Standard Meter Mode
- Standby Power Whr measurement
- Inrush Current Measurement
- ON/OFF Power Cycling

4 Summary

Gathering key measurements and harmonics content for an AC load is quick and easy when using a dedicated power analyzer.

5 Contact Information

For product information or technical support by region, contact our exclusive equipment representative shown below.

NORTH AMERICA	EUROPE	ASIA
PPST Solutions Irvine, USA Phone: +1(888) 239-1619 Fax: +1 (949) 756-0838 Email: info@ppstsolutions.com	Caltest Instruments GmbH. Kappelrodeck, Germany Phone: + 49(0)7842-99722-00 Fax: + 49(0)7842-99722-29 Email: support@adaptivepower.com	PPST Shanghai Co. Ltd. Shanghai, China Phone: +86-21-6763-9223 Fax: +86-21-5763-8240 Email: support@adaptivepower.com



M2000 Series Power Analyzers