

1. Introduction

The IEC 61000-3 standard applies to all electrical and electronic equipment having an input current up to and including 16A per phase intended to be connected to public low voltage distribution systems. Specifically IEC 61000-3-2 specifies the limits of the harmonic components of the current injected into the public supply system that may be produced by equipment tested under specified conditions.

This guide provides a quick start-up to use the PM1000+ to measure fluctuating harmonics as defined in the IEC 61000-3-2 international standard using the PM1000+ IEC 61000-3 PC software.

This example will use the included breakout box (VPN 100-089) to allow a PM1000+, in conjunction with the PM1000+ IEC 61000-3 Pre-Compliance software, to analyze the fluctuating harmonics produced by its consumption of power.

For more information on the IEC 61000-3-2 standard, proceed to the reference section at the end of this quick start guide.

2. Hardware Set-up

2.1. General

The PM1000+ is connected to the Universal Breakout Box in a manner to allow it to measure the voltage and current used by the Unit Under Test (UUT). A connection diagram for the PM1000+ and the breakout box is shown below in figure 2.2.

For the purposes of this demonstration, the PM1000+ power cord will be plugged into the Universal Breakout Box and run an analysis of the fluctuating harmonics produced by the PM1000+ power supply. The PM1000+ will act as the UUT and the power analyzer. In general use, any suitable device can be plugged into the breakout box to be analyzed.

2.2. Equipment Required:

- PM1000+ Single Phase Power Analyzer (VPN 100-085)
- Universal Breakout Box (VPN 100-089)
- USB Interface Lead A-B 1M (VPN 77-039)
- PM1000+ Lead Set 20A (VPN 78-124)
- Provided computer

2.3. Connecting the equipment:

- Set the shunt selector switch on the Universal Breakout Box to INT - SHUNT. Figure 2.1(1).

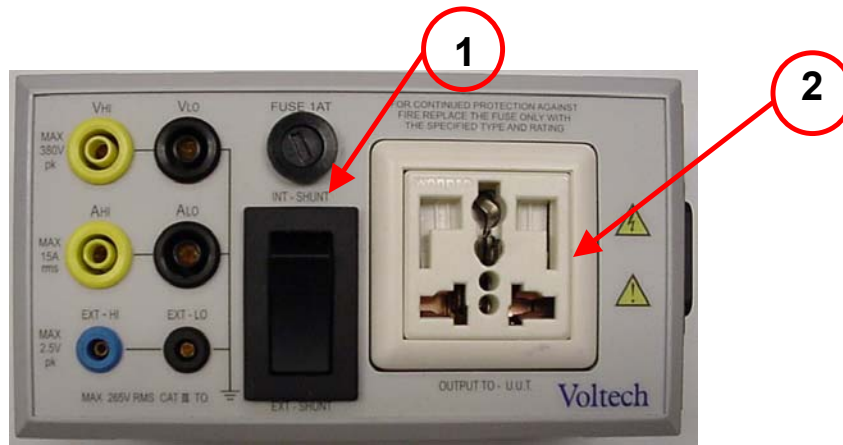


Figure 2.1 – Universal Break Out Box

- Connect the Universal Breakout Box to the PM1000+ using the PM1000+ Lead Set as shown in figure 2.2.
- Supply power to the Universal Breakout Box via the supplied mains lead.
- Connect the PM1000+ mains lead to the Universal Breakout Box power socket labeled “OUTPUT TO – U.U.T.” and shown in figure 2.1(2).
- Connect the PM1000+ to the provided computer using the USB lead.

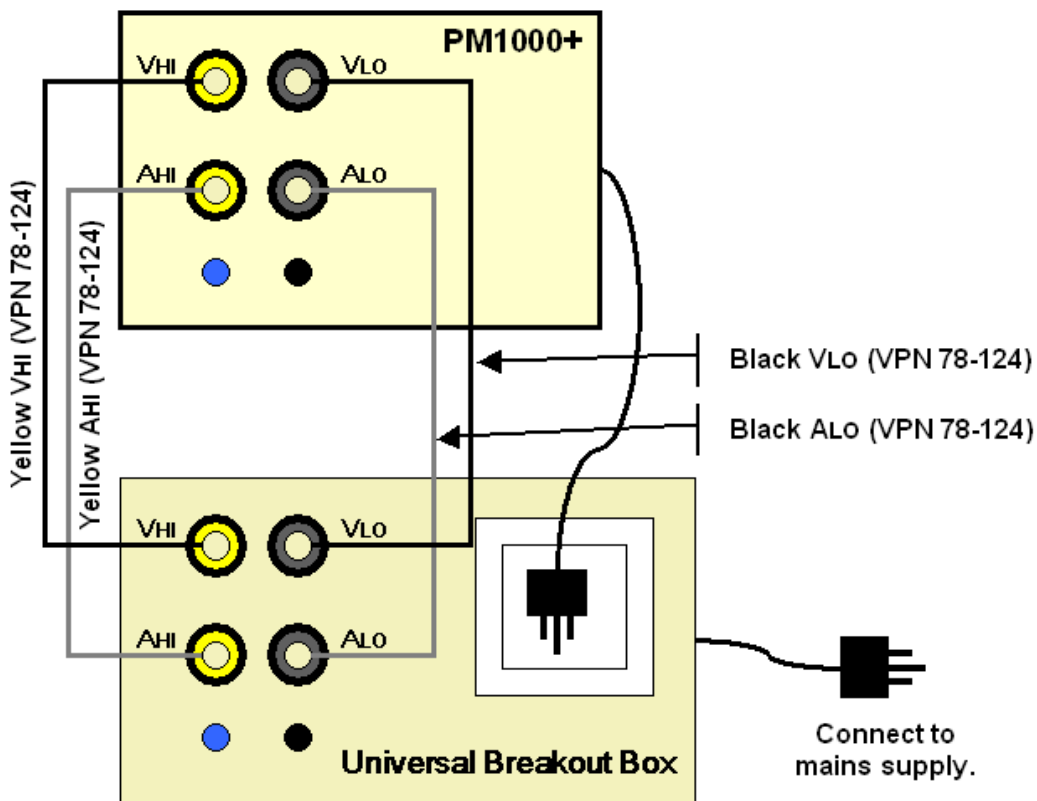


Figure 2.2 – PM1000+ to Universal Breakout Box Connection Diagram

3. Instrument Configuration

3.1. Power up the computer

Power up the provided computer by pressing the power button located on the upper right corner of the keypad.

3.2. Configure the PM1000+

Power up the PM1000+ and press the MENU key. From the Main Menu, move down and select User Configuration. Then select Load Default; this will take several seconds to load the default configuration. Next press the MENU key again to return to the measurement display.

The PM1000+ is now configured.

4. Running the Fluctuating Harmonics Test

4.1. Starting the Software

To start the PM1000+ IEC61000-3 software, click on the PM1000IEC61000 icon, on the included PC's desktop, as shown in figure 4.1 below.



Figure 4.1 - PM1000+ IEC Software Icon

4.2. Confirm Communication set-up

After the software starts up, you should see a message in the bottom left of the main window that states that a PM1000+ has been detected as shown in figure 4.2 below.

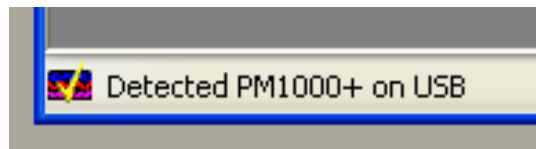


Figure 4.2 – Detected PM1000+ on USB

4.3. Configure the Fluctuating Harmonics Test

Next from the top-level menu, open Product → Configure for Harmonics. You will now see the configuration window for the Fluctuating Harmonics Test. This can be seen in figure 4.3.

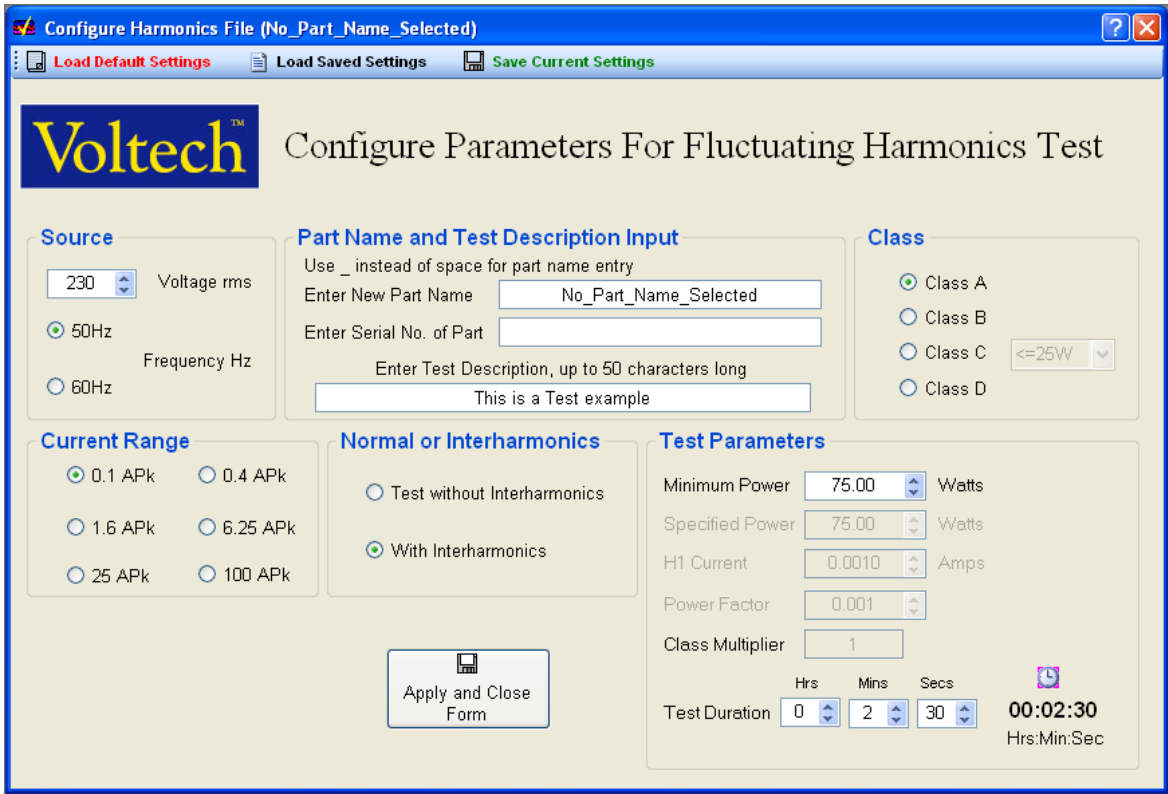


Figure 4.3 – Configure for Test

4.3.1. Source

Enter your source voltage and frequency in this box. Note that the IEC 61000-3 standard has not set limits for systems with nominal voltages less than 220 V (line-to-neutral). The software will give a warning for settings that will cause non-compliance with the IEC 61000-3-2 standard.

If you are running the test on a system with a nominal voltage less than 220 V, the software will run and give results, however it will flag the results as non-compliant.

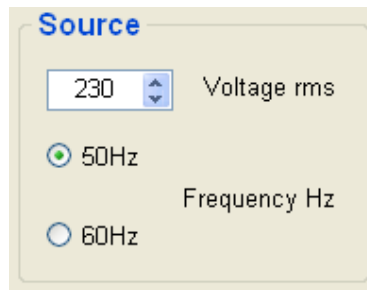


Figure 4.4 - Source

4.3.2. Current Range

Enter the current range appropriately. For this test we will select the 0.4 Apk range.

Current Range

0.1 APk 0.4 APk
 1.6 APk 6.25 APk
 25 APk 100 APk

Figure 4.5 – Current Range Selection

4.3.3. Part Name and Test Description Input

This section allows the user to enter information about the test that will be run. For the purposes of this test it can be filled out as seen in figure 4.6.

Part Name and Test Description Input

Use _ instead of space for part name entry

Enter New Part Name

Enter Serial No. of Part

Enter Test Description, up to 50 characters long

Figure 4.6 – Part Name and Test Description Input

4.3.4. Class

This section determines the class of the UUT. Please refer to Voltech Application Note 104 for information on determining the class of the UUT.

The PM1000+ will be tested as a Class D instrument. Select Class D as shown in figure 4.7.

Class

Class A
 Class B
 Class C <=25W ▾
 Class D

Figure 4.7 – Class Selection

4.3.5. Normal or Interharmonics

Select normal if you would like to test without interharmonics or select Interharmonics to test with interharmonics. We will leave interharmonics selected for this test.

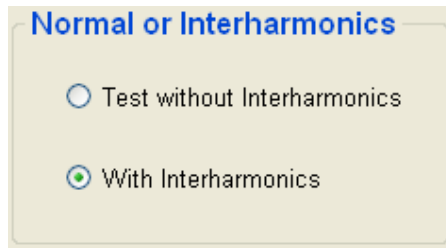


Figure 4.8 – Select Normal or Interharmonics

4.3.6. Test Parameters

Enter the minimum and the rated power of the UUT. We will enter the values as shown below in figure 4.9.

Also enter the duration of the test. We will leave the default time of 2 minutes and 30 seconds.

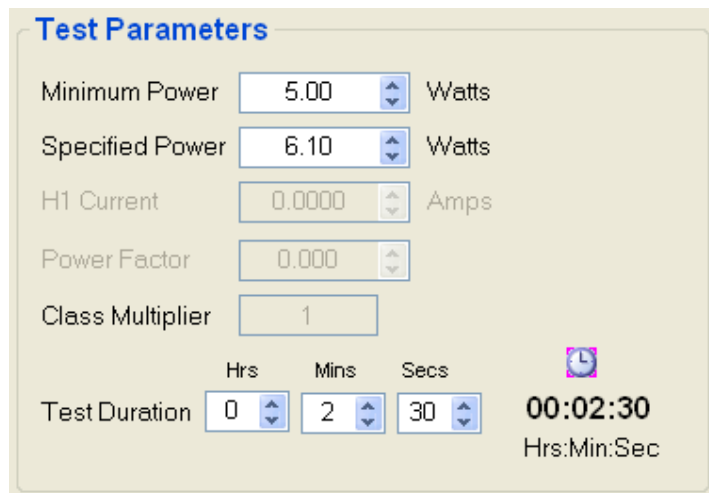


Figure 4.9 – Test Parameters

4.3.7. Finish Test Configuration

When all of the configuration values have been entered, click on the “Apply and Close Form” button to apply settings.

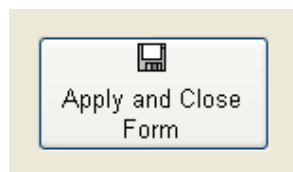


Figure 4.10 – Apply and Close Form Button

4.4. Start the Fluctuating Harmonics Test

From the top-level menu, select Run Test → Run Fluctuating Harmonic Test. You will see a window pop up with a “Start Harm/Source Test” button; click on that button.

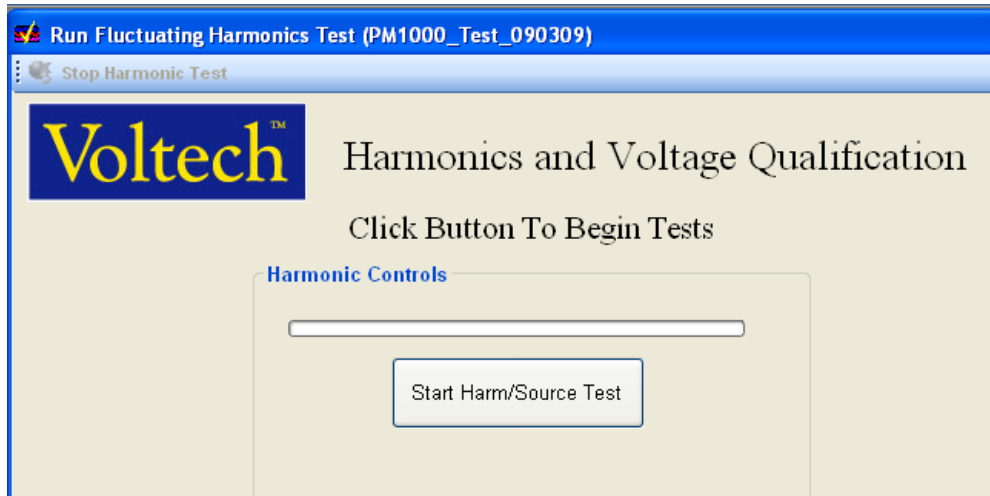


Figure 4.11 – Start Harm/Source Test Button

Next click OK to start the ten second count.

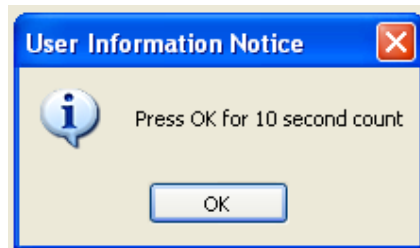


Figure 4.12 – Press OK for 10 second Count

The test should start after the ten second wait required by the standard. While the test runs you will see a display of the current harmonic levels and a countdown timer of the test duration as shown in figure 4.13.

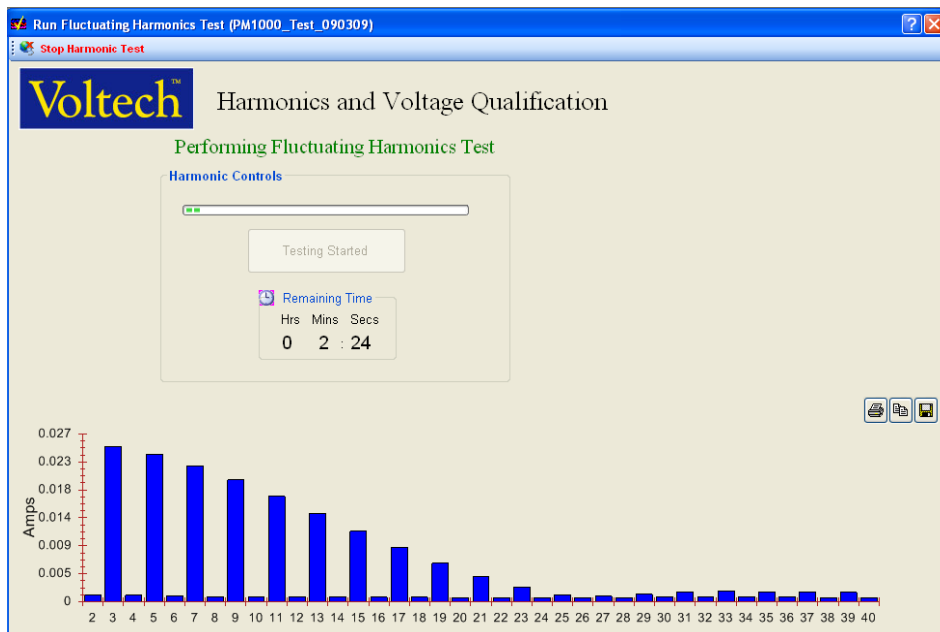


Figure 4.13 – Test Running

5. Reporting Results

By default the software will display the Main Table Report and the Test Parameters Report. To view other results, click on Results → Open Harmonic Files from the top-level menu. This will open up a window that allows you to select the results you would like to see.

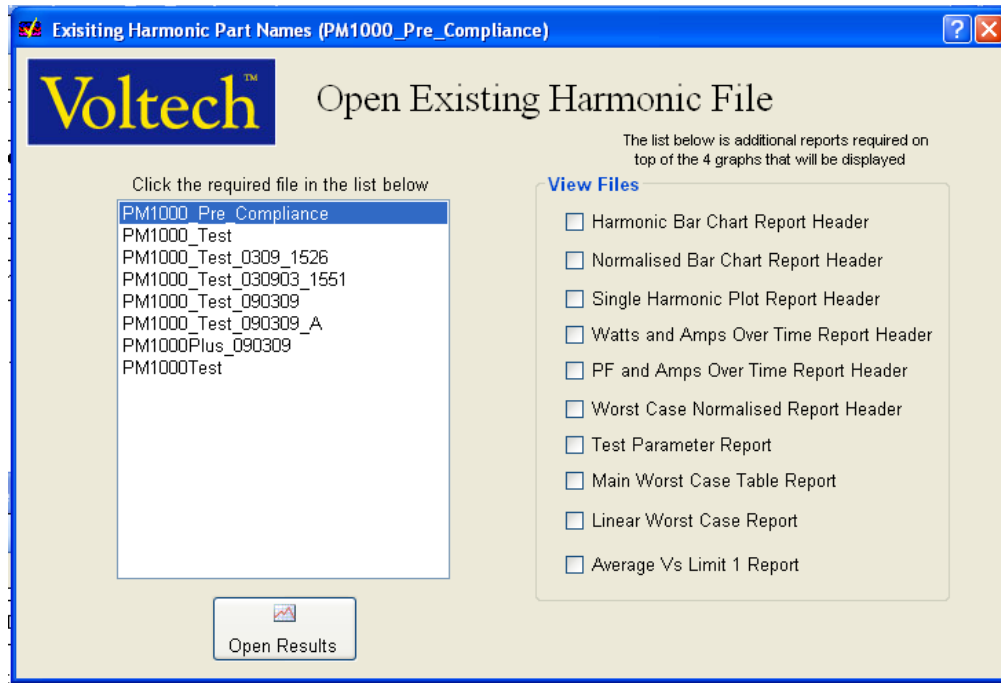


Figure 5.1 – Open Harmonic Results

On the left, select the set of results desired. Then on the right, select the reports that you desire to view.

6. References

- IEC 61000-3-2:2005 - Limits for harmonic current emissions (equipment input current $\leq 16A$ per phase)
- Voltech Instruments Application Note 104 – *The Voltech Handbook of Testing to IEC61000* available from <http://www.voltech.com/>.