

Introduction:

This guide shows how to connect to and make measurements on high frequency lighting ballasts. By using the unique ballast mode of the powerful PM1000+ power analyzer, accurate measurements of Watts, Volts, Amps, Power Factor and harmonics will be made at the output of the ballast.

Conventional ballasts are very common and wide spread they cover a frequency range from 25kHz to 1MHz and are designed to drive single, twin and multiple fluorescent tubes. Testing ballasts on a production scale has also become wide spread.

Measurements of interest are

Input

Voltage, Current, Watts, Power Factor, Current Harmonics and Athd

Output

Voltage, Tube current, Tube Wattage, Vthd and Athd

Ballast INPUT Measurements

Equipment Required: -

- PM1000+.
- Universal Break-Out Box, part number 100-089

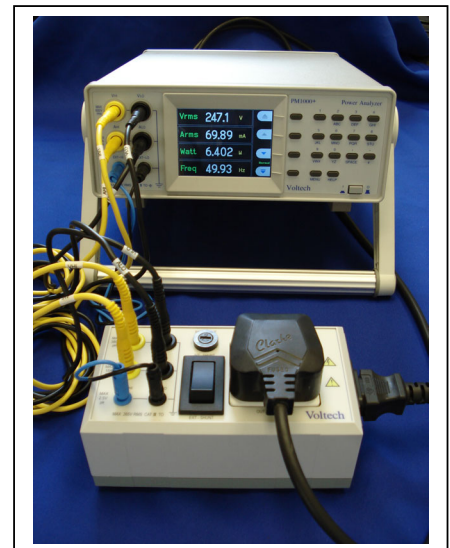
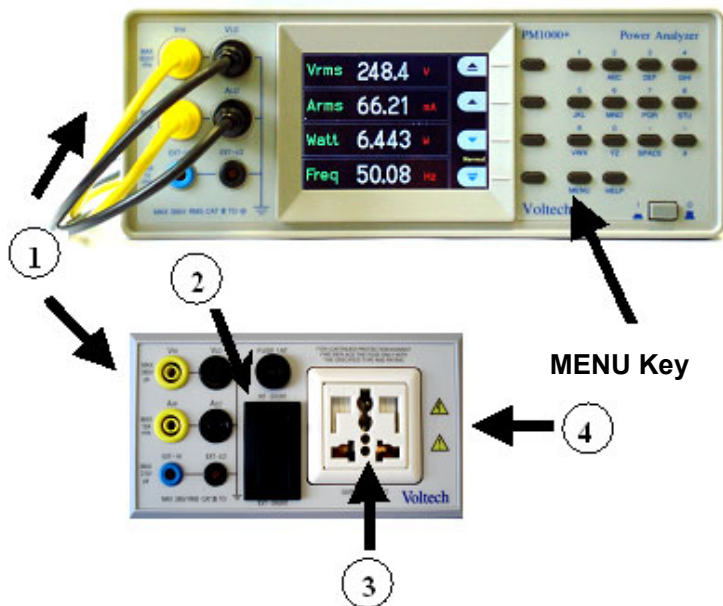


Figure 1

Hardware Connections

1. Connect the break-out box to the PM1000+ using 2 pairs of yellow and black leads. Vhi to Vhi, Vlo to Vlo, Ahi to Ahi, Alo to Alo.
2. Set the shunt selector switch (2) to "INT SHUNT".
3. Connect the input of the ballast to the universal socket on the break-out box.
4. Supply power to the break-box via the IEC Inlet and line cord (as supplied with the demonstration kit).

PM1000+ Set Up

Switch the PM1000+ on and reset it to default settings:

- Press Menu, select USER CONFIGURATION and then select Load Default.
- Press Menu to return to the measurement display.

The PM1000+ will now display the Input Watts, Vrms and Irms.

To view Athd:

- Press Menu, select MEASUREMENTS.
- Scroll down the measurement menu using the down scroll key and select Athd,
- Athd should now appear in a red bar under the PF measurement.
- Press OK.
- Press MENU to return to the measurement display.

Athd can now be viewed by selecting the scroll down key of the measurement window.

Repeat the process for any of the other measurements you wish to view.

Using the ZOOM function to view up to 14 measurements.

- Press Menu, scroll down the main menu and select VIEW, select ZOOM, select 14 results,
- Press MENU to return to the measurement display.

Ballast OUTPUT Measurements

The output voltage waveform of an electronic ballast is a carrier with a frequency of typically 25kHz to 1MHz partially modulated at the power frequency, 50, 60 or 400Hz (see Figure 2).

The PM1000+ is equipped with a special operating mode specifically for ballast or modulated ultrasonic applications, both of which have similar waveforms. This mode locks the measurement to the 50, 60 or 400Hz line frequency, whilst performing analysis at the actual carrier frequency of 25kHz to 1MHz.

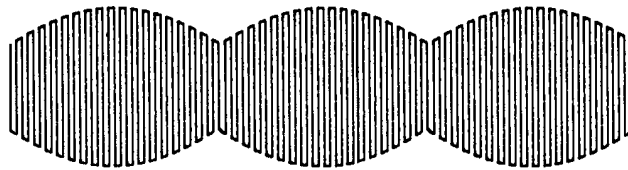


Figure 2

The Voltech Ballast CT

The Ballast CT is a precision, high-bandwidth current transformer. When used to measure the current in high-frequency lighting ballasts the Ballast CT provides:

- Isolation of the current signal from common-mode voltages, improving the overall accuracy.
- For tubes with heaters, the two inputs act to provide the difference between the two currents at the output to the power analyzer. This output is the current in the tube. In this way, the Ballast CT simplifies the connection to tubes with heaters.

For more details, see the Voltech Ballast data sheet, part number 86-023.

Equipment Required: -

- PM1000+.
- Ballast CT
- PM1000 Lead Set 78-124
- Yellow & Black Crocodile Clips
- Customer supplied leads to connect from the ballast to the tube as shown in figure 3.

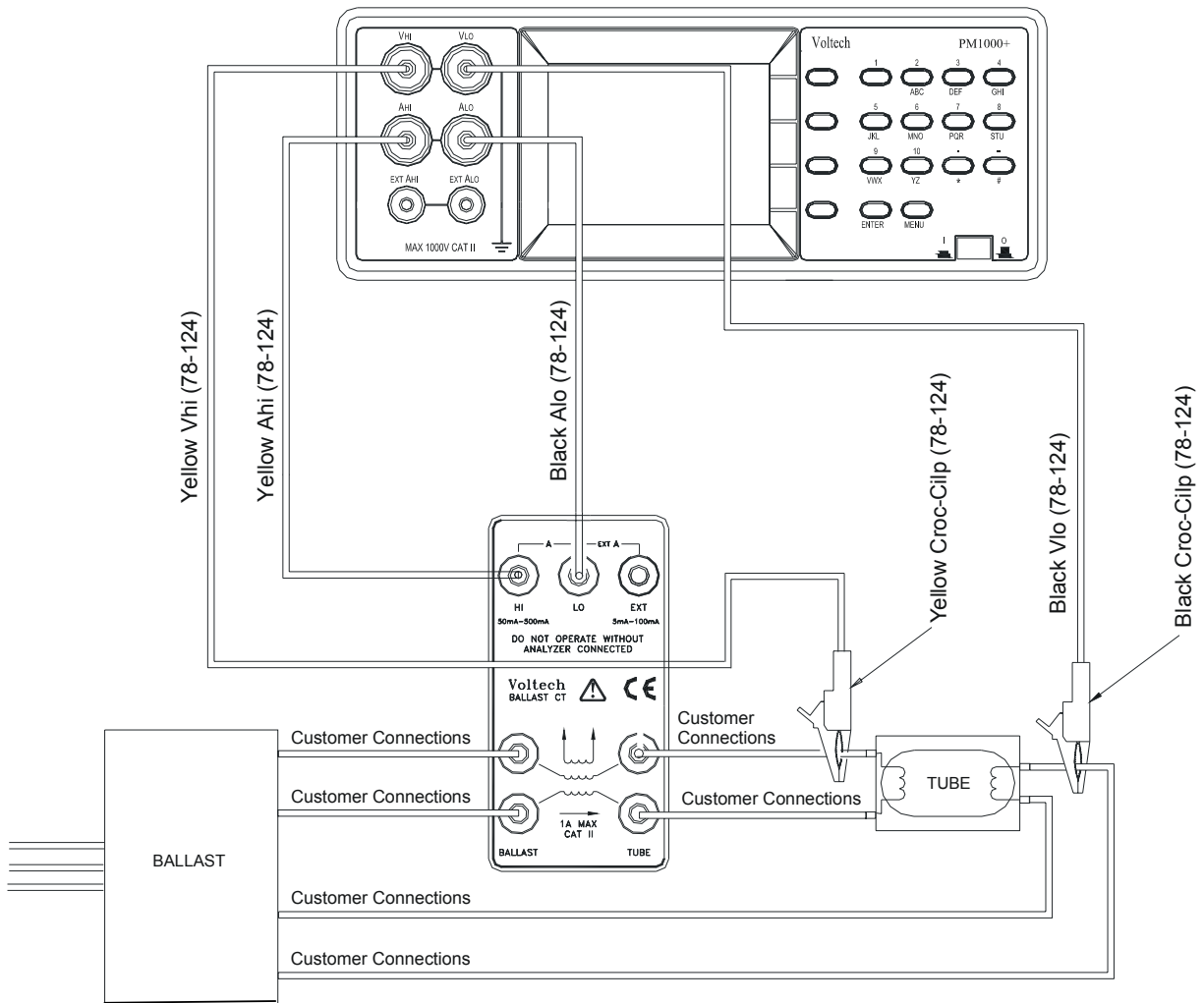


Figure 3

Hardware Connections

Connect the Lighting Ballast as shown above (figure 3).

- Connect the PM1000+ Ahi And Alo to the BALLAST CT Ahi, Alo terminals.
- Connect the PM1000+ Vhi to the BALLAST CT TUBE connection point as shown.

PM1000+ Setup.

Set the PM1000+ to factory settings:

- Press Menu, select USER CONFIGURATION and then select Load Default.
- Press Menu to return to the measurement display

Set the PM1000 into BALLAST MODE:

- Press Menu, select Modes and then select SELECT MODE.
- Select BALLAST.
- Press Menu to return to the measurement display.

The measurement window should now display “Ballast” in the bottom right hand corner of the display.

The PM1000+ is now configured to measure the Watts, Arms and Vrms output of the lighting ballast.

Apply power to the Ballast and view the measurements required.

For more detailed information on Lighting and Ballast see Voltech App-Note 101, VPN:86-628