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APPLICATION GUIDE

PPA Series Calibration Guide

Introduction

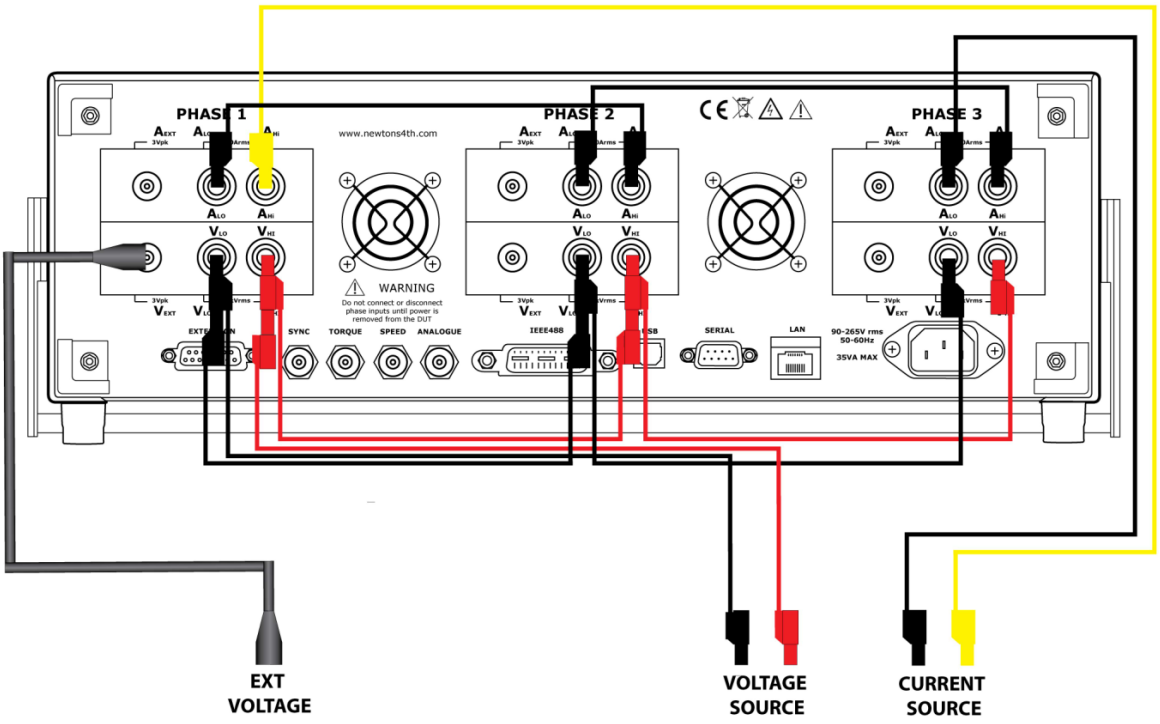
Designed for use in a wide range of power measurement applications, PPA series power analyzers offer an extensive range of configuration settings. While this flexibility enables our analyzers to provide an optimum measurement solution to many applications, it follows that incorrect configuration may compromise the accuracy of measurements.

This application guide will discuss the correct instrument configuration and additional considerations that should be understood when calibrating any PPA series power analyzer. This guide is based on the PPA45/55 Precision Power analyser, but applies to our entire range of power analyzers.

Connections

Providing up to three power measurement phases with fully isolated voltage and current channels, calibration of PPA units involves up to 6 inputs, comprising 3 voltage and 3 current cards.

While calibration engineers may instinctively consider the connection and calibration of each card separately, the fully isolated design of the PPA inputs permits simultaneous connection of all 3 voltage cards in parallel and all 3 current cards in series as shown below:



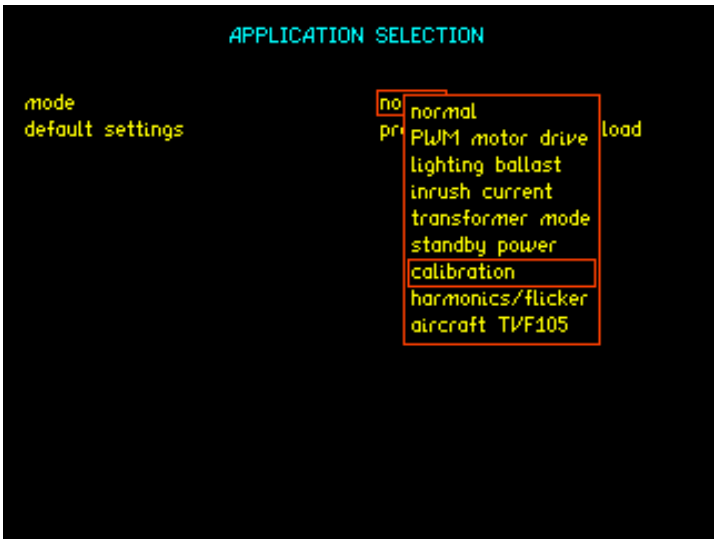
Where it is not possible to generate reference voltage and current signals at the same time, it is still recommended that voltage or current signals are applied to all 3 respective inputs.

We recommend this connection technique for the following reasons:

- Calibration time is reduced
- Voltage and current signal levels applied to all inputs is then known to be equal
- Default frequency synchronisation on PH1 will remain suitable for all three input calibrations
- By reducing the number of connection and source activation stages, the opportunity for errors is reduced

Note: The isolated BNC external input (EXT Voltage) can be used for frequency synchronisation or to offer low voltage ranges (from 3Vpk - 300uVpk in 9 ranges)

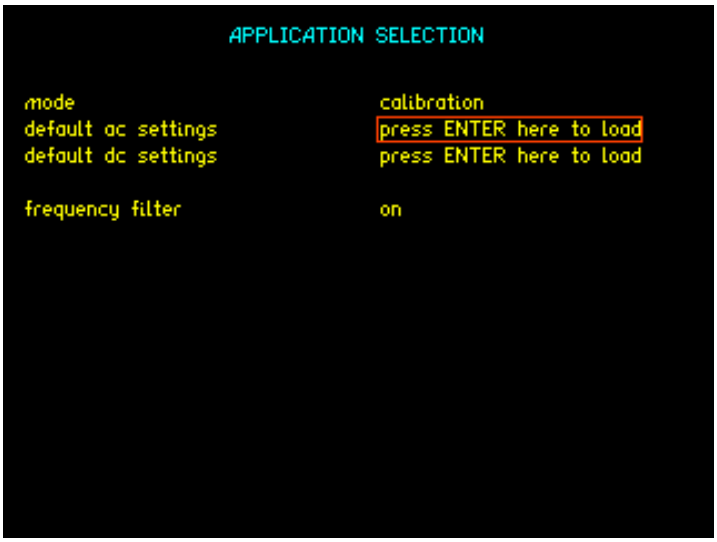
Configuring the PPA for calibration



In order to simplify instrument configuration during calibration, the application menu (APP button on the PPA front panel) includes a calibration option as shown here.

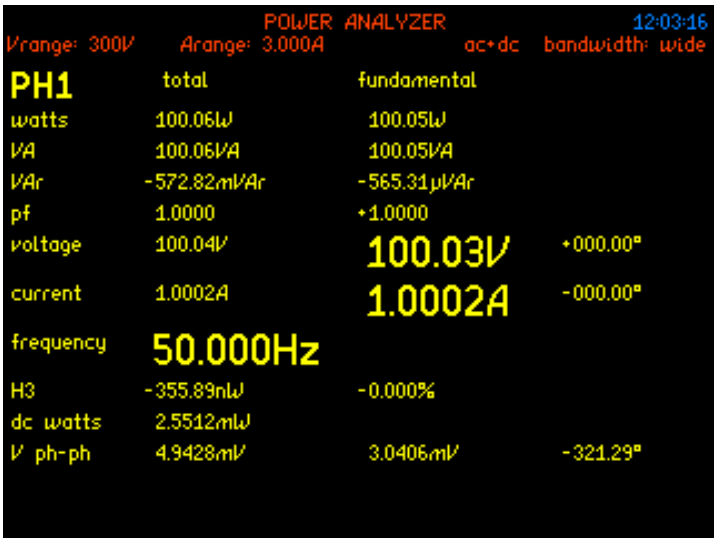
Using the ▼ navigation key, the calibration option can be selected and then entered by pressing the ENTER key.

AC Calibration



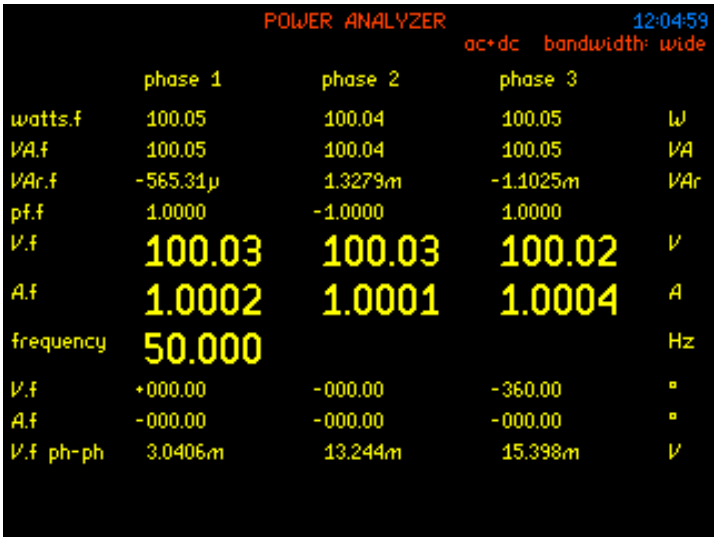
After selecting calibration mode, the screen shown here will be visible.

By selecting the 'default ac settings' option via the ▼ key followed by the ENTER key, the PPA will be configured correctly for AC calibration.



Here we have applied a nominal 100Vrms and 1Arms @ 50Hz.

Notice that the voltage and current measurements being observed are those in the fundamental column. Calibration against a sinusoidal reference signal should always be made relative to the fundamental measurement, because these values will exclude any noise or dc offset components of the applied signal. It is for this reason that we recommend use of the POWER mode display not the RMS display.

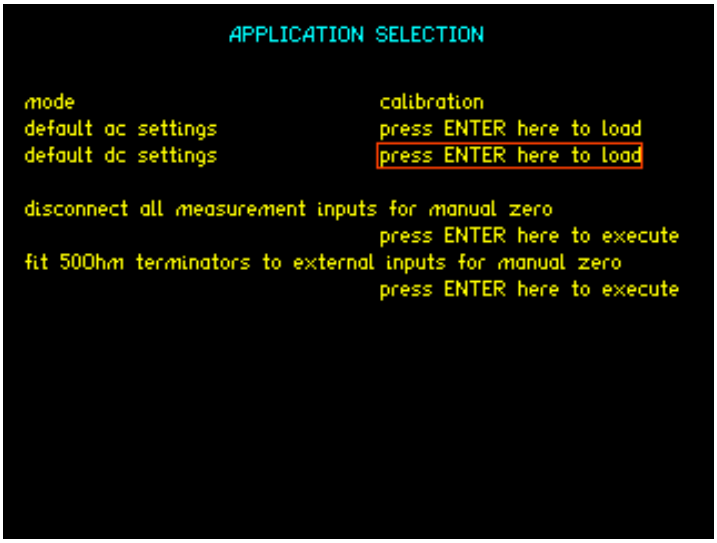


Having connected all three voltage and current inputs as shown on page 1, the NEXT key can be pressed to progress through channel display options until the three phase fundamental screen is visible as shown here.

Clearly, it is convenient to observe the same voltage and/or current on all three phases at the same time.

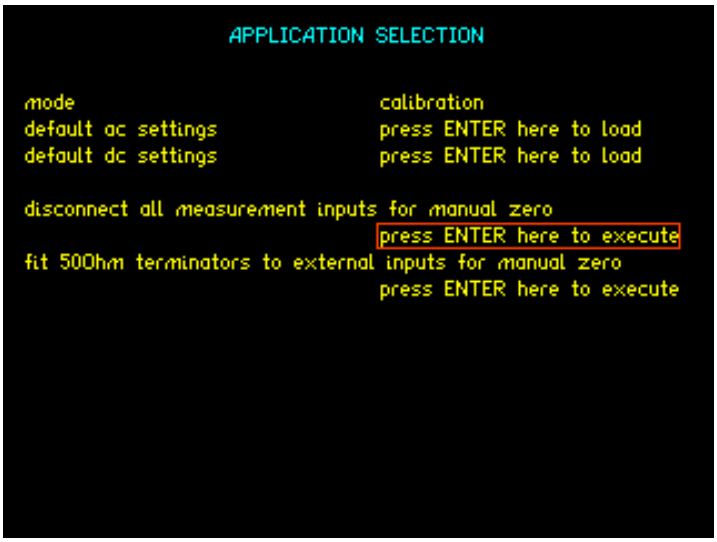
NOTE: Selection of the functions to be viewed in a larger font as shown here is via the ZOOM± buttons.
(Explained fully in the PPA quick start guide)

DC Calibration



By selecting the 'default dc settings' option via the ▼ key followed by the ENTER key, the PPA will be configured correctly for DC calibration.

Having selected default dc settings, additional options are presented that permit manual zero of either direct or external inputs.



In most cases, calibration will be associated with direct voltage or current inputs, therefore the first manual zero option shown here will be the one most commonly used.

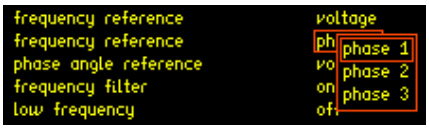
After first ensuring that there are no connections to the PPA input terminals, selecting the option shown here and pressing the ENTER key will force a DC compensation.

This compensation is automatically stored in the PPA and is reset if required by repeating the process.

Here we have applied a nominal 20mAdc to all three direct current inputs. This is 60% of range 1 on a standard PPA5530.

When calibrating with a low level voltage or current input, optimum accuracy is achieved by pressing the TRIGGER button prior to a reading.

The maximum and minimum RMS signal level associated with all ranges is defined together with the defined accuracy specification in a '**Performance Test Specification**' document available from N4L.



General Notes

Frequency detection

Unlike many conventional power analyzers or a DMM, the PPA series is designed to quantify the dc, ac and harmonic components of a total RMS signal. It is therefore **essential** that correct frequency synchronisation is achieved with an applied AC input. In normal use where voltage and current signals are measured simultaneously, a default frequency reference of phase 1 voltage is appropriate. However, where signals are applied individually to any voltage or current input, it is **essential** that the corresponding setting is selected in the acquisition (ACQU) menu, shown above. Never calibrate if the frequency is incorrect.

DC Specification

It should be remembered that the DC specification is different to the AC specification.

Range 1 maximum input

The DC or AC peak applied signal level on Range 1 of either the voltage and current inputs should not exceed 60% of the specified peak range.

Low signal levels

The external inputs (BNC) support low signal level measurement from external sensors or shunts and may also be used for external frequency synchronisation.