meatest

EN, rev. 01

Using M133C's Phantom Power Calibrate Plug-in Power Meters

application note AN107

1. What is Phantom Power?

Conventional way of power meter calibration utilizes a strong power source that runs power through meter under test and standard meter to a power load. The problem with this solution is that the power you calibrate is the power you need to supply from power grid (and use up in power load) which becomes impractical as you get into high kilowatts.

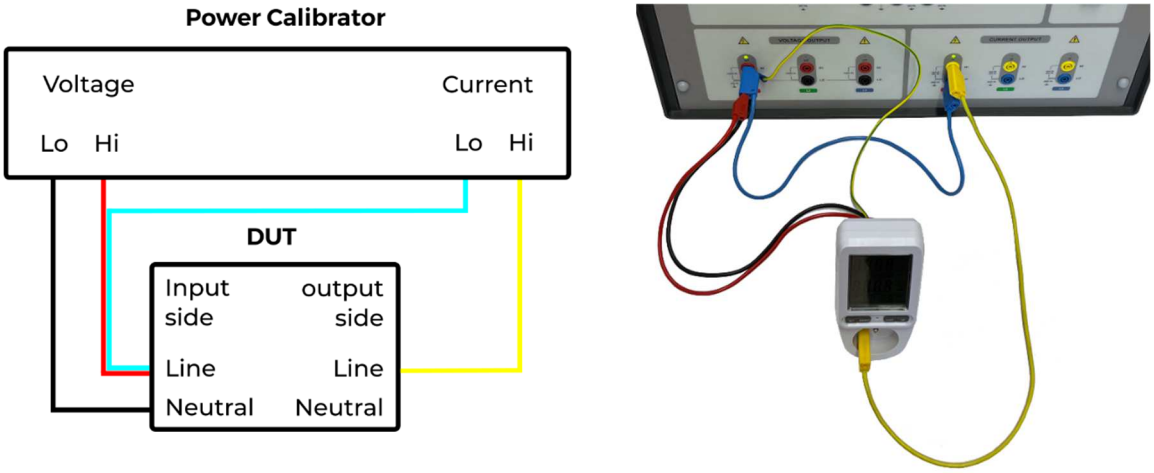
Power meters measure voltage and current independently and multiply the values to get a power readout. Typical DUT will measure voltage at between line & neutral and current flowing through shunt resistor placed between line-in and line-out or neutral-in and neutral-out. Calibrators such as Meatest M133C Power & Energy Calibrator or 9010 Multifunction Calibrator take advantage of this and provide two sets of lower power outputs – one for the voltage meter and the other for current meter.

This calibration method uses just enough power to keep the meter powered on and measuring during test but no power gets dissipated in power load so it uses a fraction of the power required by conventional source & load method. On top of that, low heat dissipation comes with better uncertainty and control of the standard value.

2. How to connect Power Meter to Phantom Power Calibrator?

First of all, make sure the current output of the calibrator can float on top of set voltage. In M133C go to MENU > Calibrator and set “Current Sources GND” to OFF. In 9010 series push SOURCE SETUP and set “Current Terminal Ground” to OFF. Floating voltage limit of both M133C and 9010 is 450 Vpk (318 Vrms in sine mode). Applying voltage to grounded current terminal will damage the calibrator.

Then connect the power calibrator to DUT as follows:



DUT ground pin can be optionally grounded through Voltage-LO terminal of the calibrator provided the voltage output is internally grounded (V-GND ON).

If the DUT shows voltage properties only but no current, try running current through Neutral instead as the shunt resistor is likely located there. To do this, switch the calibrator output off and reconnect as follows: