

Calibrating analog meters with the 5080A Multi-Product Calibrator

Application Note



Calibrating portable analog meters or analog panel meters can be challenging. These types of meters have low impedance that requires a high drive capability from the calibrator. A typical electrical calibrator might trip and display an error message: “Compliance exceeded.” Similar problems can occur when calibrating digital workload with low impedance.

Calibration professionals often use a power supply and a bench digital multimeter to provide the high compliance and accuracy required for analog meter calibration. However, there are drawbacks to this solution. This application note points out those drawbacks and explains how the Fluke 5080A Multi-Product Calibrator is a better solution for calibrating analog meters.

Power supply plus DMM equals a limited calibration solution

A power supply plus a bench digital multimeter provide the high compliance and accuracy required for analog meter calibration. However, this method has several drawbacks:

- Power supplies are usually noisy and not stable enough for calibration applications. If you want more stability, you have to pay for it—a very stable power supply can easily cost more than \$10,000 (U.S. dollars).
- To calculate uncertainty, you need to combine uncertainty of the DMM and short term stability of the power supply, which is not always provided by the power supply manufacturer.
- Power supplies have limited output ranges. For example, a dc power supply with a range of 100 Volts typically does not provide enough accuracy in the low 100 millivolt range. Depending on the ranges of the meters you need to calibrate, you might need multiple power supplies to do the job.

- Similarly, power supplies usually produce ac or dc power—not both. So you’ll need at least two power supplies to calibrate ac and dc functions.
- Power supplies have a V*A limitation in that high voltage and high current cannot be supplied simultaneously. Therefore, you need two power supplies to calibrate a VA meter.
- Finally, typical power supplies cannot be automated, so you cannot realize the improved consistency, efficiency and throughput that automation provides.



Fluke 5080A Multi-Product Calibrator: the better alternative

The 5080A calibrator enables you to calibrate analog meters conveniently and reliably, without the drawbacks of a power supply and DMM.

- The 5080A calibrator is much more stable than a power supply, with 24-hour stability specified for all dc voltage ranges.
- The 5080A has six discrete dc ranges covering 0 mV through ± 1020 V, providing better accuracy than a power supply over more ranges.
- The 5080A outputs both ac and dc voltage and current, as well as resistance, dc and ac power, phase and frequency. It calibrates a broad workload that includes analog meters, digital multimeters, panel meters, watt meters, and more.

- The 5080A has the highest compliance of any calibrator in the Fluke multi-product and multi-function families, with maximum burden up to 800 milliamps for ac/dc voltage, and voltage up to 50 volts for ad/dc current.
- In addition to high voltage and current compliance, the 5080A calibrator's maximum inductive load for current output is 2.5 H, allowing calibration of high inductive analog meters.
- Unlike a power supply, the 5080A calibrator can be automated with Fluke calibration software applications including 5080/CAL, MET/CAL® Lite, or MET/CAL® Plus.

Function	Maximum burden or compliance voltage						Range
	5080A	9100	5500A	5520A	5700A	5720A	
DC V	600 mA	20 mA	10 mA	10 mA	50 mA	50 mA	0 to 33 V
AC V	800 mA	20 mA	10 mA	10 mA	50 mA	50 mA	3.3 to 33 V
DC I	50 V	4 V	4.5 V	7 V	10 V	10 V	0 to 33 mA
AC I*	44 V	4 V	3 V	5 V	7 V	7 V	3.3 to 33 mA

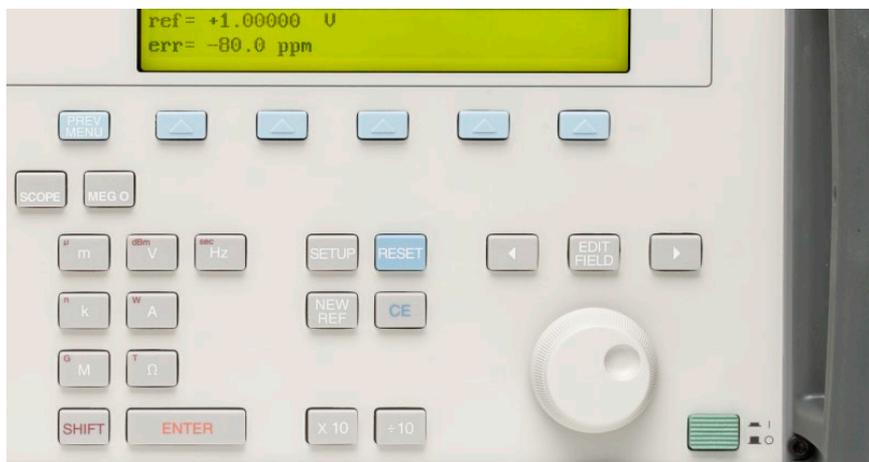
The Fluke 5080A Multi-Product Calibrator has the highest compliance of any calibrator in the Fluke multi-product and multifunction families.

Calibrate easily and efficiently

In general, you follow the same process to calibrate an analog meter with the 5080A calibrator as you would with a power supply and a DMM. However, the 5080A offers benefits that make performing the calibration easier and more efficient.

Let's look at a high-level summary of the calibration process:

1. Whether you are using a power supply and a DMM or a Fluke 5080A calibrator to calibrate an analog meter, you must verify scale linearity for the manufacturer's specified range, with test points usually at 10 %, 30 %, 50 % and 100 % of range.
2. Next, you'll check full range points for other ranges. For each test point, you will slew the source's output until the meter reads nominal value. The 5080A calibrator makes this easy, with a knob on the front panel that turns easily until the front panel displays the correct value. The knob turns with fine increments that make it easy to make small adjustments.
3. Record the analog meter's nominal reading as well as the source's output reading.
4. Calculate the error. With the 5080A calibrator, you don't have to do this calculation. The calibrator calculates the error automatically and displays it on its front panel.



The 5080A lets you easily slew the calibrator output.



Calibrate analog meters quickly with the 5080A Calibrator and the 5080/CAL software.

Add software for even more efficiency

For even more efficiency, you can use the 5080A calibrator with software for paperless data collection or automated calibration.

5080/CAL software is a standalone software application designed for calibrating analog and digital workload with the 5080A calibrator. It enables you to manage inventory, collect data and print reports, easily and economically. 5080A/CAL software allows you to easily create an analog meter calibration procedure, and remotely slew the 5080A output during runtime mode. It will record values automatically as you perform a calibration, so you don't have to use pencil and paper,

spreadsheet, or some other tool to record the data. It also calculates error automatically based on calibrator output and analog meter nominal values. You can also create customized calibration certificate templates to generate certificates for analog meters in a few clicks.

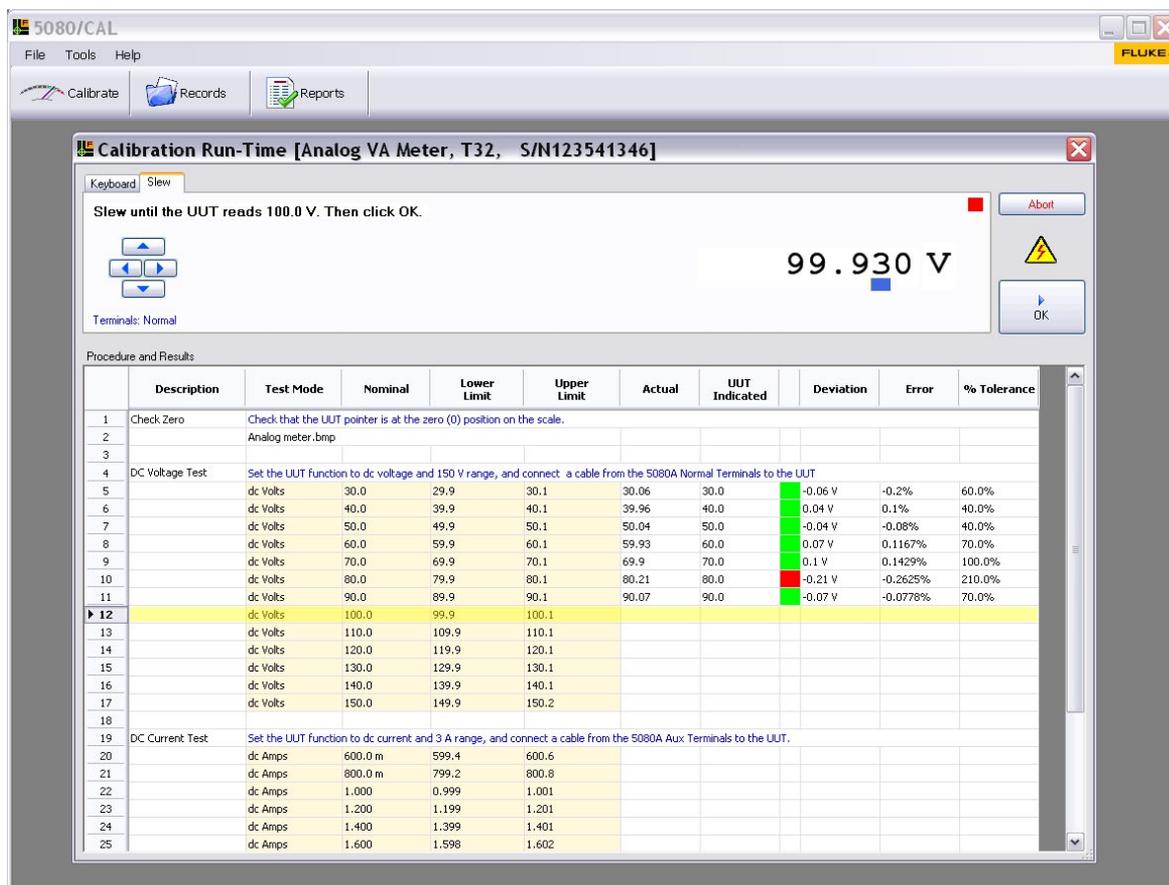
Choose 5080/CAL software if you want a very easy-to-use application for paperless data collection and management.

MET/CAL® Lite for 5080A software provides all of the automated calibration and test and measurement asset management capabilities of MET/CAL® Plus software in a lower cost version dedicated to use with the 5080A calibrator.

Choose MET/CAL Lite if you want full automation but don't need to automate additional calibrator models.

MET/CAL® Plus provides the full spectrum of calibration automation and asset management for a wide variety of calibrators, including the 5080A, and a broad range of units under test.

Choose MET/CAL Plus if you want to automate multiple calibrators, now or in the future.



5080/CAL software allows you to easily create and run an analog meter calibration procedure, and remotely slew the 5080A output during runtime mode.

Other solutions from Fluke calibration

Fluke Calibration provides the broadest range of calibrators and standards, software, service, support and training in electrical, temperature, pressure, RF and flow calibration.

Visit www.fluke.com/FlukeCal for more information about Fluke Calibration solutions.

Pressure and flow calibration



Temperature calibration

- Contact and non-contact temperature calibrators and standards
- Temperature calibration software
- Services and training



Electrical calibration

- DC/LF electrical calibrators and standards
- Power calibrators and standards
- RF calibrators
- Timer/counters and frequency standards
- Calibration software
- Services and training



Fluke Calibration. *Precision, performance, confidence.™*

Electrical	RF	Temperature	Pressure	Flow	Software
------------	----	-------------	----------	------	----------

Fluke Calibration
PO Box 9090,
Everett, WA 98206 U.S.A.

Fluke Europe B.V.
PO Box 1186, 5602 BD
Eindhoven, The Netherlands

For more information call:
In the U.S.A. (800) 443-5853 or Fax (425) 446-5116
In Europe/M-East/Africa +31 (0) 40 2675 200 or Fax +31 (0) 40 2675 222
In Canada (800)-36-FLUKE or Fax (905) 890-6866
From other countries +1 (425) 446-5500 or Fax +1 (425) 446-5116
Web access: <http://www.fluke.com>

©2010 Fluke Corporation. Specifications subject to change without notice. MET/CAL is a registered trademark of Fluke Corporation. Printed in U.S.A. 10/2010 3836489B A-EN-N
Pub-ID 11678-eng

Modification of this document is not permitted without written permission from Fluke Corporation.