

Process Calibration Tools: Flow Applications

Application Note

Introduction

Process Calibrations Tools (PCT) is a family of Fluke tools that enable users to calibrate temperature, pressure, flow and electrical sensors, transmitters and gages in-situ and in I&C and I&E shops.

Flow

A gas flow calibration system includes components to control and measure flow (and normally to log data from one or both of these functions). Depending on the type of device being calibrated, a procedure to adjust the unit may be required also. Note, the gas flow for the calibration is normally provided with shop gas or bottled gas.

In many applications, gas flow needs to be a measure of mass flow, not volume flow. Mass flow is a measurement of the quantity of gas flowing through a system. As gas will expand and compress depending on variations in ambient pressure and temperature, its volume flow will change accordingly. For example, a gas utility would want to charge a customer based upon the quantity of gas consumed. This would be a mass measurement, not a volume measurement.

In order to calibrate gas flow equipment then, the temperature and pressure of the gas must be known, and then corrected for standard conditions. Fluke gas flow calibration equipment will handle this correction.

Applications

Flow measurement devices include rotameters, bubblemeters, mass flow meters (MFMs) and mass flow controllers (MFCs). These devices are commonly found in industries such as pharmaceutical and semiconductor manufacturing where a variety of gases need to be flowed at



very accurate low flow rates. Other industries where they are in widespread use are gas for energy (at the extraction site, in the pipeline/delivery system and at the point of consumption) and emissions (both vehicle

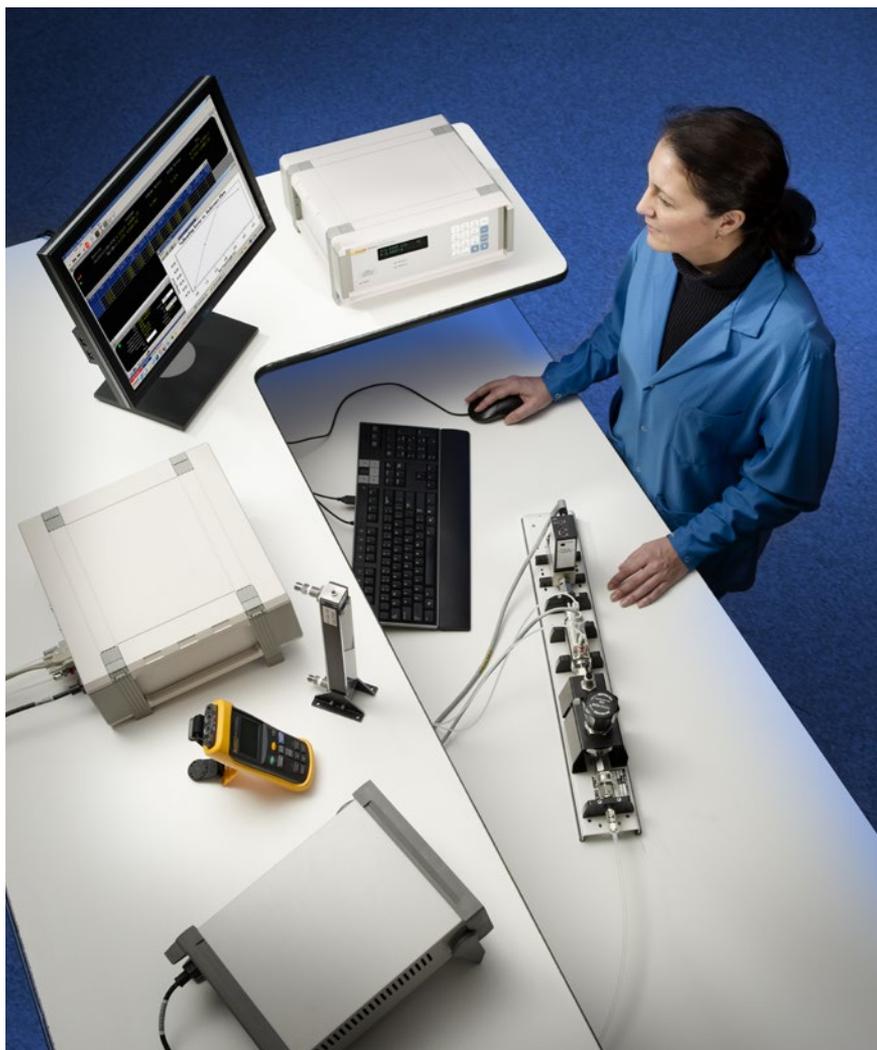
manufacturing and testing and also in-the-field air quality monitoring).

Fluke PCT features three pre-configured gas flow calibration kits that cover applications up to 50 slm.

Why Calibrate ?

The need to achieve consistent results is one of the most important reasons why we calibrate. Accuracy is an important feature of a calibrator. You may need a particular level of accuracy to comply with standards that specify a test accuracy ratio (TAR) or test uncertainty ratio (TUR). For example, many standards require a 4:1 ratio between the specified tolerance of the device under test (DUT) and the accuracy or uncertainty of the calibration equipment.

Accuracy is also important because when accurate standards are used, most of the time down time only needs to be long enough to verify that the instruments are still in tolerance. However, with inaccurate calibration standards, more borderline and out-of-tolerance indications are found. This means that a routine verification turns into an additional adjustment procedure and a final verification at each of the test points to prove the “as left” condition is in tolerance. This more than doubles the down time and the technician time involved in completing the calibration. This is because inaccurate standards tend to not be consistent with each other, causing us to make more adjustments to correct phantom errors.



Fluke Calibration. Precision, performance, confidence.™

Electrical	RF	Temperature	Pressure	Flow	Software
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Fluke Calibration
 PO Box 9090,
 Everett, WA 98206 U.S.A.

Fluke Europe B.V.
 PO Box 1186, 5602 BD
 Eindhoven, The Netherlands
 Web access: <http://www.flukecal.eu>

For more information call:
 In the U.S.A. (877) 355-3225 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.flukecal.com>

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 Printed in U.S.A. 12/2013 6001458A_EN
 Pub-ID 12141-eng

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