



## Fox Calibration Services Ensure Reliable Flow Meter Performance

Fox Thermal Instruments provides accurate, rugged, and reliable flow meters and flow and level switches to industrial OEMs and end-user customers in a wide range of industries – from biotech and food processing operations to utilities and chemical manufacturers.

Fox Thermal Instruments Calibration Lab offers these valued customers the services they need to ensure that their flow meters meet specified performance parameters and provide accurate, repeatable measurements in the field, day after day, year after year.

Fox calibrations are performed with NIST-traceable flow standards and meet MIL-STD-45662A requirements. Calibration equipment is subject to a meticulous metrology program that includes the selection, usage, calibration, control and maintenance of measurement standards.

Process parameters, fluid compositions and installation anomalies can dramatically affect the performance of flow instrumentation. The Fox Calibration Lab employs a wide range of gases, gas mixtures, temperatures, pressures and line

sizes to simulate actual fluid and process conditions. This real-world approach improves installed accuracy and minimizes measurement uncertainty.



Automated data acquisition optimizes calibration accuracy and efficiency and reduces the opportunity for human error. It also facilitates access to calibration data, parameters, flow conditions and instrument variables.

If a field technician is commissioning or servicing an installed device, or if a customer needs specific instrument information, it can be accessed quickly and easily.

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## Calibration Accuracy is Only as Good as the Reference Standard

Fox Thermal Instruments' test tunnels are calibrated at appropriate intervals, monitored for stability, and under the custody of trained laboratory personnel. Measurement assurance procedures and monitoring results are maintained in the laboratory database to ensure that all calibrations are accurate, verifiable, and traceable to NIST primary standards.

Calibration capabilities range from as low as 0.02 SCFM (.03 NM<sup>3</sup>/H) to 3000 SCFM (4800 NM<sup>3</sup>/H) and higher for line sizes larger than 6 inches (150mm). The Calibration Lab is also equipped to calibrate applications with temperature ranges from -40 to 650F (-40 to 343C) and pressure ranges from 0 to 500 psig (0 to 35 barg).

Fox Calibration Lab equipment includes:

- 2 closed loop large flow air and gas tunnels - 3" to 6" (80 to 150mm) typical
- 1 closed loop medium flow air and gas tunnel - ½" to 3" (15 to 80mm) typical
- 1 low flow bell prover air and gas tunnel - ¼" to 1½" (6 to 40mm) typical
- 1 open loop high temperature air tunnel - 1" to 4" (25 to 100mm) typical
- Custom labs are routinely assembled to meet unique customer requirements with equipment dedicated to specific applications.

## Actual Gas Calibrations Reduce Measurement Uncertainty

Fox Thermal Instruments' Calibration Lab utilizes a wide range of pure gases and specialty mixed gases to optimize measurement accuracy and fulfill customers' delivery requirements.

Whether your meter requires a straightforward air calibration or a complex mixed gas calibration, our goal is to achieve the highest accuracy and the fastest turnaround time.

On-site gas reserves, computerized mixing equipment and configurable test fixtures help

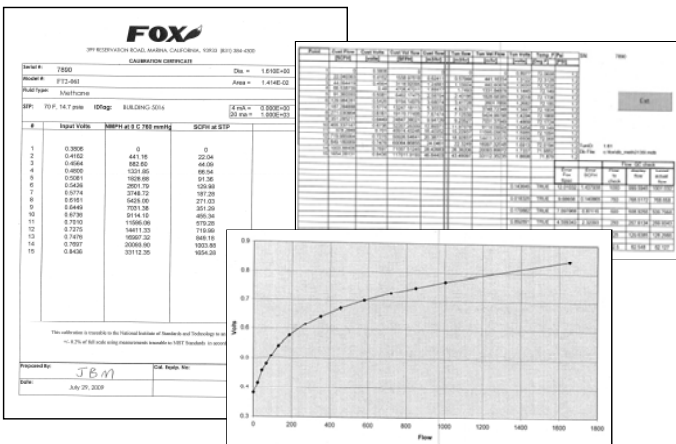
improve lab throughput and delivery time, and ensure that calibration lab accuracy is transmitted to the actual installation.



Typical calibration gases include:

- Air
- Argon
- Bio Gas
- Butane
- Carbon Dioxide
- Carbon Monoxide
- Compressed Air
- Digester Gas
- Ethane
- Flare Gas
- Gas Mixtures
- Helium
- Hydrogen
- Methane
- Natural Gas
- Nitrogen
- Propane
- Toxic and corrosive gas calibrations are performed using proprietary correlation programs

## Automated Calibration Improves Accuracy and Efficiency



Fox Thermal Instruments' automated systems maximize calibration accuracy and repeatability, as well as output and efficiency. Because procedures are executed the same way every time, results are consistent and calculating measurement uncertainty is simplified. Automated systems also enhance electronic records storage and retrieval.

The Calibration Lab maintains instrument calibration records on every flow meter, which can be accessed via software within the instrument or by querying the electronic library directly. Computer generated calibration documents describe specific instrument details that can be sorted by serial number, tag number or customer purchase order.

Calibration files include details on process conditions, calibration fluid, line size and other relevant information. All NIST-traceable equipment utilized for the calibration procedure is identified, as is the calibration history of all reference equipment.

In addition to the Calibration Certificate and a certified flow table that correlates current outputs with scaled units of flow, validation and certification documents are produced for each calibrated device.

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## Work in Progress

A typical gas calibration begins with a detailed customer application data review and sign-off by lab personnel. The following steps are then completed.

1. Select lab, lab piping and accessories to replicate actual installation.
2. Install the flowmeter (Device Under Test or DUT), pressurize and leak test the calibration system.
3. Charge calibration tunnel with calibration gas or gas mixture.
4. Perform preliminary test of calibration standard and data acquisition system.
5. Perform zero stability tests and take zero calibration point.
6. Collect approximately 12 calibration flow range data points and an over range point.
7. Download collected calibration data to DUT.
8. Perform final calibration verification over the entire flow range to ensure calibration parameters have been properly downloaded and that the DUT is performing within the published accuracy specification.
9. Download all flow meter calibration data and settings to master and back-up calibration databases.
10. Prepare calibration QC documents to record all raw data, parameters and settings and store in master and back-up calibration databases.
11. Prepare customer calibration certificate to include raw sensor voltages, flow velocities and flow rates in customer-specified units, standard asset number, reference standard data, gas/gas mixture, and calibration technician signature.

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## Why Fox Thermal Instruments?

- NIST-traceable reference standards and a meticulous metrology program prevent out-of-tolerance calibrations.
- Accurate "actual fluid" and "actual condition" calibrations optimize repeatability and long-term stability of your flow meter.
- Automated calibration procedures and electronic record keeping facilitate uncertainty analysis and improve delivery times.
- Industry-leading calibration services are based on technological innovation and a commitment to total customer satisfaction.